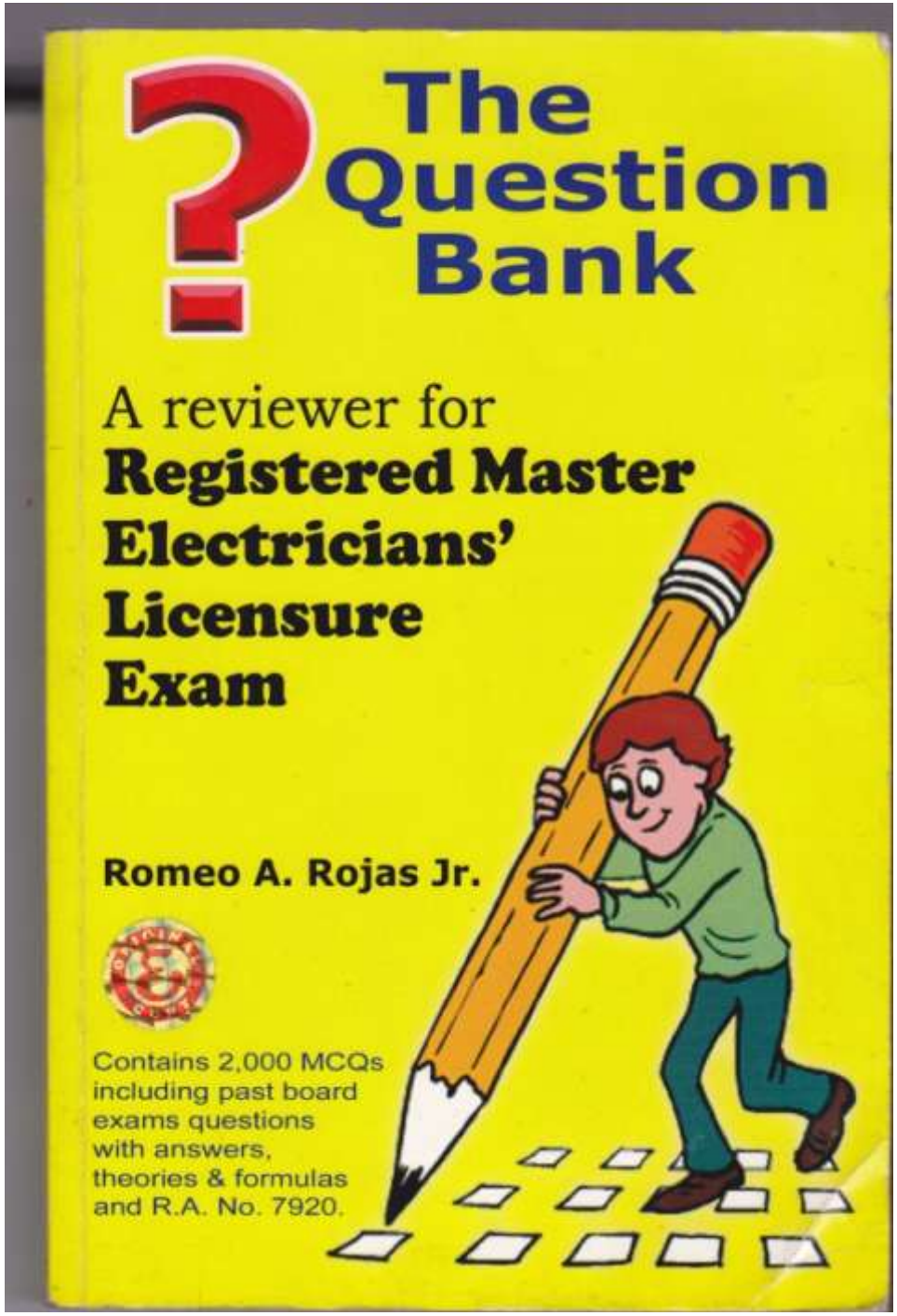
The Question Bank
A reviewer for
Registered Master Electricians' Licensure Exam
Romeo A. Rojas Jr.
Contains 2,000 MCQs including past board exams questions with answers, theories & formulas and R.A. No. 7920.

The Question Bank
A reviewer for
REGISTERED MASTER ELECTRICIANS'
Licensure Exam

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WHO CAN TAKE THE RME LICENSURE EXAM?

Article III, Section 18 of RA 7920 (New Electrical Engineering Law)

Any person applying for admission to the registered master electrician examinations, as herein provided, shall establish to the satisfaction of the Board that on or before the date of registration, he possesses the following qualifications:

(a) He is a citizen of the Philippines

(b) He is at least eighteen (18) years of age

(c) He is of good reputation with high moral values

(d) He has not been finally convicted by the court of an offense involving moral turpitude; and

(e) He has any of the following technical backgrounds;

(1) Has completed at least three (3) years of a five-year Bachelor of Science in Electrical Engineering (BSEE) program or a three year course in electrical engineering technology from an engineering school recognized by the Philippine government and in addition, has a subsequent specific record of one (1) year practice in electrical wiring and installation, operation and maintenance of utilization devices and equipment, or

(2) Has graduated from a two-year electrician's course of instruction from a vocational or trade school recognized by the Philippine government and in addition, has at least two (2) years of apprenticeship after completion of the course of instruction on electrical wiring and installation, operation and maintenance of utilization devices and equipment, or

(3) Has completed from a one-year electrician's course of instruction from a vocational or trade school recognized by the Philippine government and in addition, has at least three years of apprenticeship after completion of the course of instruction on electrical wiring and installation, operation and maintenance of utilization devices and equipment, or

(4) Has completed a four year high school education or its equivalent and in addition, has a subsequent specific record of at least five (5) years of apprenticeship in electrical wiring and installation, operation and maintenance of utilization devices and equipment.

WHAT IS THE SCOPE OF EXAMINATION FOR THE RME LICENSURE EXAM?

Article III, Section 19(c) of RA 7920 (New Electrical Engineering Law)

The applicant shall pass a written examination on the different subjects or group of subjects as follows:

(1) Technical subjects:

- Ohm' s Law: Calculations for resistance, current, voltage and power for direct current and alternating current circuits
- Electrical machines: Description and operating principles of motors, generators and transformers.
- Control equipment: Description and functions of fuses, overload relays, safety switches, circuit breakers, star-delta motor starters, transformer type motor-starters, DC motor starters.
- Electrical components: Description of resistors, capacitors, inductors and semi-conductors
- Maintenance and repair: Description of the procedures in the maintenance of electrical machinery
- Test equipment: Types and uses of measuring instruments
- Electrical engineering law provisions pertaining to registered master electricians.
- Other related subjects as maybe prescribed by the Board.

(2) Philippine Electrical Code Parts 1 and 2:

- General requirements for installation of electric wiring and equipment
- Approved wiring method
- Types of wiring materials and wiring devices
- Installation of switchboard and panelboards
- Installation in hazardous locations
- Wiring diagrams of different types of motor starters with motor protection;
- Drawing symbols and wiring plans
- Other related subjects as may be prescribed by the Board

The number of test questions shall be that the examinations can be finished in one (1) eight-hour day. The relative weight shall be fifty percent (50%) for technical subjects and fifty percent (50%) for Philippine Electrical Code. The passing general average rating shall be seventy percent (70%) with no grade below fifty percent (50%) in any subjects.

To my wife, Daday

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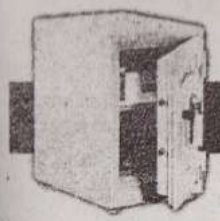


Question Bank 1

Part 1: Technical Subject

1. Which of the following is a unit of electrical pressure?

   A. Watt
   B. Ampere
   C. Ohm
   D. Volt

RME Board Exam

2. In resistance color coding, red color is assigned to what value?

   A. 3
   B. 0
   C. 2
   D. 1

3. What is another name for a secondary cell?

   A. Wet cell
   B. Storage cell
   C. Dry cell
   D. Disposable cell

RME Board Exam

4. How is a voltmeter connected in a circuit?

   A. Connect in short circuit across the load
   B. Connect in shunt across the load
   C. Connect in series across the load
   D. Connect in open circuit with the load

5. In the American Wire Gauge, as the number of gauge wire increases, the wire diameter __.

   A. increases
   B. decreases
   C. does not change
   D. does changes

RME Board Exam

6. A generator may lost residual magnetism because of _____.

   A. vibration
   B. over-excitation
   C. heating
   D. varying loads

7. A meter whose needle is initially at the center.

   A. Dynamometer
   B. Iron vane meter
   C. Galvanometer
   D. Voltmeter

8. A universal motor can be operated on which of the following supply currents?

   A. dc current only
   B. ac or dc currents
   C. 3-phase ac current only
   D. ac current only

RME Board Exam

9. A 6-volt lead-acid battery has an internal resistance of 0.01 ohm. How much current will flow if the battery has a short circuit?

   A. 60 A
   B. 600 A
   C. infinity
   D. zero

RME Board Exam

10. Automatic device that operates at preset values is known as __

A. relay
B. mercury switch
C. contactor
D. fuse

11. What is another name for full voltage starting?

A. Reduce voltage starting
B. Full load starting
C. Direct on line
D. Starting without a contactor

12. What is the resistance reading of a shorted capacitor?

A. High resistance
B. Zero resistance
C. Infinite resistance
D. 10 ohm

13. A wire has a diameter of 0.125 inch. What is its cross sectional area in circular mils?

A. 12,500
B. 22,500
C. 15,625
D. 10,800

14. In metric standard, what is the unit of conductor sizes?

A. AWG
B. Circular mils
C. mm^2
D. cm^2

RME Board Exam

15. Multimeters consist of a __.

A. voltmeter, current meter and an ohmmeter
B. voltmeter and an ammeter
C. current meter and an ohmmeter
D. voltmeter and current meter

16. What component of an atom that doesn't have any electrical charge?

A. Electron
B. Proton
C. Neutron
D. Ion

17. Excitation current is used in which of the following motors?

A. Synchronous motors
B. Wound rotor motors
C. Induction motors
D. Squirrel cage motors

18. A simple ohmmeter consists of a meter movement in series with,

A. an inductor
B. a spring
C. a capacitor
D. a battery

19. What is the former name of the American Wire Gauge?

A. NEMA
B. Westinghouse
C. Brown and Sharpe
D. IEEE

20. What resistance must be connected across a 4-ohm resistance in order to give an equivalent resistance of 3 ohms?

A. 10 ohms
B. 8 ohms
C. 12 ohms
D. 9 ohms

21. When using ohms law E divided by I would solve for ____.

A. watts
B. amperage
C. voltage
D. resistance

22. Modern contact surfaces are made from what alloys?

A. Copper
B. Silver
C. Aluminum
D. Manganin

RME Board Exam

23. On a simple ohmmeter, the zero ohm mark is ____ of the scale.

A. in the right
B. far left
C. none of these
D. far right

24. Two resistances of 8 and 10 ohms respectively are connected in parallel and take a total current of 9 A. What is the current flowing in the 8-ohm resistance?

A. 5 A
B. 4 A
C. 6 A
D. 3 A

25. How do you call a diagram showing the physical location of the components such as coils, contacts, motors and the like in their actual positions?

A. Ladder diagram
B. Schematic diagram
C. Wiring diagram
D. Power flow diagram

RME Board Exam

26. An electric iron takes 3 ½ A. If the heating element has a resistance of 40 ohms, what is its power consumption?

A. 0.45 kW
B. 0.49 kW
C. 0.35 kW
D. 0.51 kW

27. What is the purpose of constructing a lead acid cell into a multiple plate cell?

A. To increase the emf of the cell
B. To increase the capacity of the cell
C. To increase the internal resistance of the cell
D. All of these

28. The continuity of a winding coil maybe determined by measuring the resistance of the coil. If the resistance reading is infinite, the winding is ____.

A. open
B. in perfect condition
C. partially shorted
D. totally shorted

29. An instrument used to measure the state of electrical charge in a storage battery

A. Amprobe
B. Tachometer
C. Hydrometer
D. Calorie meter

30. Determine the reactance of a 50 μF capacitor at 60 Hz.

A. 18.85 ohms
B. 0.0188 ohms
C. 55.25 ohms
D. 53.05 ohms

31. In a large alternator, which of the following is normally negligible?

A. Reactance of winding
B. Resistance of winding
C. Impedance of winding
D. Current of winding

RME Board Exam

32. If the two leads of a dc series motor are reversed, which of the following events will happen?

A. It becomes a generator
B. It runs in the same direction as before
C. It will not run
D. It will run in the reverse direction

33. Find the amperage of a 5 kVA load on a 220-V, three-phase branch circuit?

A. 13 A
B. 8.66 A
C. 12.7 A
D. 22 A

RME Board Exam

34. What will happen to the resistance of a conductor when its temperature is increased?

A. It will increase
B. It remains constant
C. It varies
D. It will decrease

35. How do you call the electrons in the last orbit of an atom?

A. Bound electrons
B. Free electrons
C. Valence electrons
D. Charged electrons

RME Board Exam

36. A high resistance connected in parallel with a potential relay across a 120-V battery will

A. increase the current through the relay
B. increase the voltage across the relay
C. have no effect on the relay
D. make the relay inoperative

37. A phenomenon on a series ac circuit wherein maximum current will flow.

A. Avalanche
B. Resonance
C. Break-even
D. Breakdown

38. Which of the following connections would be most likely to injure the instruments attached?

A. An ammeter in series in the circuit
B. A voltmeter connected across the line
C. An ammeter connected across the line
D. A voltmeter in series with the line

RME Board Exam

39. The rotating part of a dc motor is known as ____

A. pole
B. stator
C. carbon brush
D. armature

40. The members of the Board shall hold office for a term of __ years from date of appointment.

A. 4
B. 3
C. 2
D. 1

41. In an automatic FORWARD-REVERSE-STOP star-delta motor controller, how many electrical timers are needed?

A. At least one
B. Only one
C. Two
D. No timer is needed

RME Board Exam

42. Two resistors of resistances 5 ohms and 7 ohms are connected in series across a 60-volt source. What is the power absorbed in the 5-ohm resistor?

A. 50 watts
B. 25 watts
C. 125 watts
D. 100 watts

43. A measuring instrument used to measure the diameter of circular wires in mils.

A. Micrometer
B. Millimeter
C. Wire gauge
D. Milliammeter

44. A secondary cell is charged with a constant current of 10 A for 10 hours. How much charge is accumulated?

A. 100 coulombs
B. 360,000 coulombs
C. 100,000 coulombs
D. 60,000 coulombs

45. At starting the motor current is high due to ____.

A. counter emf is high
B. counter emf is zero
C. supply voltage is high
D. armature circuit resistance is open

46. A cell whose emf is 1.45 V has an internal resistance of 4 ohms. What current will flow if this cell is connected across a 1-ohm resistor?

A. 0.4 A
B. 0.2 A
C. 0.5 A
D. 0.3 A

47. A voltage source of 20 V is applied across the terminals of a 2.5-ohm rheostat. Calculate the power dissipated in the rheostat?

A. 160 W
B. 100 W
C. 150 W
D. 180 W

RME Board Exam

48. What would be the advantage of 240 volts rather than 120 volts on the load with the same wattage?

A. Less power used and less voltage drop
B. Less power used
C. Greater voltage drop
D. Less voltage drop

49. What is the amperage of a 120 volt, single-phase circuit that supplies a load of 3.12 kVA?

A. 26 A
B. 30 A
C. 22 A
D. 15 A

50. During the short circuit test on transformer, which side is short circuited?

A. High side
B. Low side
C. Either sides
D. Both sides

Part 2: Philippine Electrical Code

51. Which of the following conductor sizes has the highest resistance?

A. 3.5 mm^2
B. 8.0 mm^2
C. 2.0 mm^2
D. 5.5 mm^2

52. A device or equipment which is suspended from overhead either by means of a flexible cord carrying the current, or otherwise.

A. Rosette
B. Pendant
C. Fixture
D. Air terminal

53. In the schedule of loads for motor circuits, which of the following is NOT included?

A. Type of motor
B. Manufacturer of motor
C. Motor as numbered in the power layout
D. Number of phases

RME Board Exam

54. What is the allowable ampacity of THW insulated copper conductor with an area of 8.0 mm^2 and exposed to an ambient temperature of 30 °C?

A. 45 A
B. 20 A
C. 30 A
D. 60 A

55. Which one is a standard rating of an inverse time CB?

A. 140 A
B. 130 A
C. 120 A
D. 110 A

56. The term ampere-hour is associated with which of the following?

A. Converters
B. Transformers
C. Electromagnets
D. Storage cells

RME Board Exam

57. Electrical equipment may best be mounted on a concrete wall by using one of the following. Which one is this?

A. Wooden plug
B. Expansion bolt
C. Load plug
D. Plastic plug

58. Before starting any installation work, alteration, repair or extension on any electrical system, what type of permit is needed?

A. Building permit
B. Working permit
C. Electrical permit
D. Mayor's permit

59. Above ground tanks containing liquids at atmospheric pressure are considered to be protected against lightning if the following requirements are meet. Which one?

A. The metal roof shall have a minimum thickness of 4.8 mm
B. The roof shall be welded, bolted or riveted to the shell
C. All pipes entering the tank shall be metallically connected to the tank at the point of entrance
D. All of these

60. When computing the service load, more than three fixed appliances are computed with a demand factor of ___ of the nameplate rating.

A. 80 %
B. 65 %
C. 70 %
D. 75 %

61. If the project is extensive and requires more time for checking and for computations of fees, the issuance of the electrical permit need not be issued immediately. However, the delay shall not be longer than how many working days?

A. 7
B. 6
C. 5
D. 8

62. Splices in ground conductors shall be as few as practicable and shall be attached so as to withstand a pull test of _____.

A. 900 N
B. 880 N
C. 800 N
D. 890 N

63. Locations which are hazardous because of the presence of combustible dust.

A. Class I
B. Class II
C. Class III
D. Class IV

RME Board Exam

64. If there are three wires of 150 mm^2 connected to one terminal entering a cabinet or a switchboard, the bending space at each terminal shall NOT be less than _____, provided the conductors do not enter or leave the enclosure through the wall opposite its terminals.

A. 200 mm
B. 300 mm
C. 400 mm
D. 250 mm

RME Board Exam

65. For an ambient temperature of 30 °C, a THW insulated copper conductor with a cross sectional area of 3.5 mm^2 and buried underground has the following ampacity. Which one is correct?

A. 20 A
B. 40 A
C. 15 A
D. 30 A

66. All extended parts located within _____ of the lightning protection system shall be bonded thereto.

A. 1,500 mm
B. 1,600 mm
C. 1,800 mm
D. 2,000 mm

67. Operation at substantially constant load for an indefinitely long time.

A. Continuous duty
B. Intermittent duty
C. Periodic duty
D. Short time duty

RME Board Exam

68. Transformer exceeding 112.5 kVA, shall not be located within _____ from combustible materials of the building.

A. 400 mm
B. 300 mm
C. 200 mm
D. 500 mm

69. Electrodes of iron or steel plates shall be at least __ in thickness.

A. 6.4 mm
B. 5.8 mm
C. 6.0 mm
D. 6.2 mm

70. Advisory rules in the PEC are characterized by the use of what word?

A. Will
B. Would
C. Shall
D. Should

71. The frame of the vehicle-mounted generator shall be permitted to serve as the grounding electrode for a system supplied by a generator located on the vehicle under which of the following conditions?

A. The vehicle of the generator is bonded to the vehicle frame
B. The generator supplies only equipment located on the vehicle
C. The non-current carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame
D. All of these

72. What is the minimum insulation level (in volts) for the neutral conductors of a solidly grounded system?

A. 600 V
B. 300 V
C. 500 V
D. 1,000 V

73. No boxes shall have an internal depth of less than how many millimeters?

A. 15 mm
B. 10 mm
C. 12 mm
D. 14 mm

74. Branch circuits are classified according to which of the following?

A. Voltage across it
B. Load being served
C. Power consumed
D. Setting of the overcurrent device

RME Board Exam

75. The following copper conductors have the same cross sectional area but are made up of different number of strands. Which one has the least resistance to AC current?

A. 19-strand conductor
B. Single solid conductor
C. 7-strand conductor
D. 37-strand conductor

76. An appliance, which is fastened or otherwise, secured at a specific location.

A. Permanent appliance
B. Stationary appliance
C. Portable appliance
D. Fixed appliance

77. What is the mimimum insulation resistance required for circuits rated from 201 to 400 A?

A. 25,000 ohms
B. 50, 000 ohms
C. 100,000 ohms
D. 12,500 ohms

78. A device capable to drawing lightning discharge to it in preference to vulnerable parts of the protected area.

A. Air terminal
B. Lightning trap
C. Ground mat
D. Ground terminal

RME Board Exam

79. Light fixtures suspended from the ceiling by chains should be wired so that the ___

A. chain is grounded
B. wires help support the fixture
C. wires will not touch the chains
D. wires do not support the fixture

80. Which of the following Republic Act number refers to the new Electrical Engineering Law?

A. RA 7920
B. RA 8450
C. RA 8710
D. RA 1840

81. Cable tray shall NOT be used in which of the following applications?

A. Hoistways
B. Dry locations
C. Industrial establishments
D. All of these

82. A heavy duty lamp holder shall have a rating no less than how many watts?

A. 450 W
B. 500 W
C. 600 W
D. 660 W

RME Board Exam

83. In rigid metal conduit wiring, conduits shall be supported at least every

A. 2,500 mm
B. 3,500 mm
C. 3,000 mm
D. 2,000 mm

84. Conductors used in open wiring method within ____ from the floor shall be considered exposed to physical damage.

A. 3,000 mm
B. 2,500 mm
C. 2,000 mm
D. 1,800 mm

85. Conductors normally used to carry current shall be made of ___ unless otherwise provided in the PEC.

A. aluminum
B. copper
C. steel
D. silver

86. What is the maximum electrical trade size of intermediate conduit?

A. 150 mm
B. 125 mm
C. 200 mm
D. 100 mm

87. The Philippine Electrical Code is intended for what type of applications by government bodies exercising legal jurisdiction over electrical installation?

A. Advisory
B. Mandatory
C. Optional
D. Professional

88. Individual branch circuits using type FCC (flat conductor cable) shall have ratings not exceeding how much amperes?

A. 20 A
B. 30 A
C. 15 A
D. 40 A

RME Board Exam

89. Equipment for installation in hazardous locations must be tested and approved for use according to the classification of the hazards involved. These are divided into _____ groups.

A. 4
B. 3
C. 7
D. 6

90. Aerial cable under non-metallic extensions shall have a clearance of not less than how much from steel structure members or other conductive materials?

A. 60 mm
B. 30 mm
C. 50 mm
D. 40 mm

91. For all land-based electrical installation under the scope of the Philippine Electrical Code, where should an electrical permit be filed?

A. Department of Energy
B. Office of the City Engineer
C. Office of the Mayor
D. Local Building Office

RME Board Exam

92. Compliance with the provisions of the PEC will result in ___.
I. freedom from hazard
II. good electrical service
III. an efficient system

A. I, II and III
B. I and II
C. II only
D. I only

93. In an auxiliary gutter, how much is the minimum clearance required between bare current carrying metal parts and any metal surface of the gutter?

A. 26 mm
B. 24 mm
C. 13 mm
D. 12 mm

94. Heating elements of cables shall be separated at least by how much from the edge of outlet boxes and junction boxes?

A. 200 mm
B. 100 mm
C. 150 mm
D. 300 mm

RME Board Exam

95. Auxiliary gutters shall not contain more than _____ current carrying conductors at any cross section.

A. 36
B. 32
C. 30
D. 24

96. As a rule, no overcurrent device shall be connected in series with any conductor that is _____.

A. stranded
B. current carrying
C. closed
D. intentionally grounded

97. Which of the following wires is applicable for underground service entrance conductors?

A. type THWN
B. type UF
C. type MI
D. type USE

98. For the purpose of lightning protection, a high rise building is a building with a height over how much?

A. 23 m
B. 50 m
C. 20 m
D. 15 m

99. What type of electrical conductors has a trade name, moisture resistant thermoplastic?

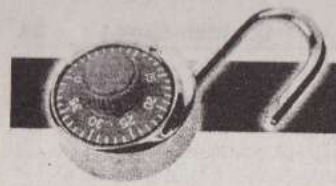
A. TW
B. THW
C. THWN
D. All of these

100. A device used for the purpose of minimizing irregularities in the flow of welding currents.

A. Rheostat box
B. Grounding transformer
C. Reactor
D. Inverter

< Exam ends here >

Proceed to the next page for the answer key and solutions!

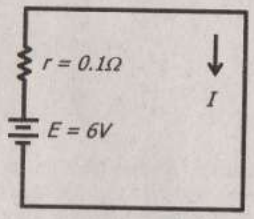


Question Bank 1

ANSWER KEY

1. D. Volt
2. C. 2
3. B. Storage cell
4. B. Connect in shunt across the load
5. B. decreases
6. C. heating
7. C. Galvanometer
8. B. ac or dc currents
9. B. 600 A

Solution:



$$I = \frac{E}{r} = \frac{6}{0.01}$$

$I = 600\ A$

10. A. relay
11. C. Direct on line
12. B. Zero resistance
13. C. 15,625

Solution:

$$d = 0.125\ \text{in} \times \frac{1000\ \text{mils}}{1\ \text{in}}$$

$d = 125$ mils

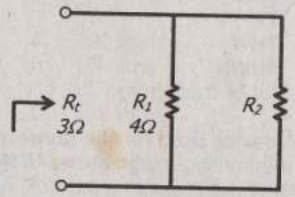
$A = d^2$

$A = (125)^2$

$A = 15,625$ circular mils

14. C. mm^2
15. A. voltmeter, current meter and an ohmmeter
16. C. Neutron
17. A. Synchronous motors
18. D. a battery
19. C. Brown and Sharpe
20. C. 12 ohms

Solution:



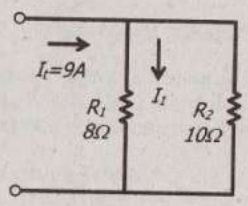
$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{3} = \frac{1}{4} + \frac{1}{R_2}$$

$R_2 = 12\ \Omega$

21. D. resistance
22. B. Silver
23. D. far right
24. A. 5 A

Solution:



Using current division theorem:

$$I_1 = \frac{I_t R_2}{R_1 + R_2} = \frac{9(10)}{8+10}$$

$I_1 = 5$ A

25. C. Wiring diagram
26. B. 0.49 kW

Solution:

$P = I^2R = (3.5)^2(40)$

$P = 490$ W or 0.49 kW

27. B. To increase the capacity of the cell
28. A. open
29. C. Hydrometer
30. D. 53.05 ohms

Solution:

$$X_C = \frac{1}{2\pi fC} = \frac{1}{2\pi(60)\left(50 \times 10^{-6}\right)}$$

$X_C = 53.05\ \Omega$

31. B. Resistance of winding
32. D. It runs in the same direction as before

Note:

To reverse the direction of a self-excited dc motor, reverse the direction of the field current or the direction of the armature current, but not both of them simultaneously.

If the supply terminals to the motor are reversed, both the armature and the field currents will reverse in direction, thus the direction of rotation of the motor will be the same.

33. A. 13 A

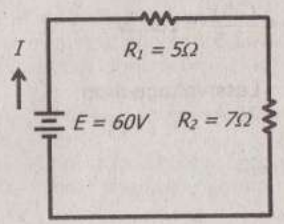
Solution:

$S = \sqrt{3}EI$

$$I = \frac{S}{\sqrt{3}E} = \frac{5,000}{\sqrt{3}(220)} = 13.12\ A$$

34. A. It will increase
35. C. Valence electrons
36. C. have no effect on the relay
37. B. Resonance
38. C. An ammeter connected across the line
39. D. armature
40. B. 3
41. B. Only one
42. C. 125 watts

Solution:



$$I = \frac{E}{R_1 + R_2} = \frac{60}{5+7} = 5\ A$$

$P_1 = I^2R_1 = (5)^2(5)$

$P_1 = 125$ W

43. A. Micrometer
44. B. 360,000 coulombs

Solution:

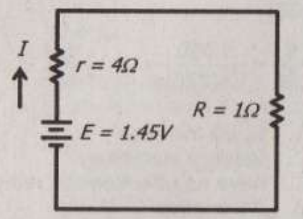
$$t = 10\ \text{hrs} \times \frac{3600\ s}{1\ \text{hr}} = 36,000\ s$$

$Q = It = (10)(36,000)$

$Q = 360,000$ C

45. B. counter emf is zero
46. D. 0.3 A

Solution:



$$I=\frac{E}{r+R}=\frac{1.45}{4+1}=0.3\ A$$

47. A. 160 W

Solution:

$$P=\frac{E^2}{R}=\frac{(20)^2}{2.5}=160\ W$$

48. D. Less voltage drop
49. A. 26 A

Solution:

$$S=EI$$

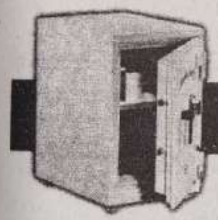
$$I=\frac{S}{E}=\frac{3125}{120}$$

$$I=26\ A$$

50. B. Low side
51. C. 2.0 mm^2
52. B. Pendant
53. B. Manufacturer of motor
54. A. 45 A
55. D. 110 A
56. D. Storage cells
57. B. Expansion bolt
58. C. Electrical permit
59. D. All of these
60. D. 75%
61. C. 5
62. D. 890 N
63. B. Class II
64. D. 250 mm
65. D. 30 A
66. C. 1800 mm
67. A. Continuous duty
68. B. 300 mm
69. A. 6.4 mm
70. D. Should
71. D. All of these
72. A. 600 V
73. C. 12 mm
74. D. Setting of the overcurrent device
75. B. Single solid conductor
76. D. Fixed appliance
77. A. 25,000 ohms
78. A. Air terminal
79. D. wires do not support the fixture
80. A. RA 7920
81. A. Hoistways
82. D. 660 W
83. C. 3,000 mm
84. C. 2,000 mm
85. B. copper
86. D. 100 mm
87. B. Mandatory
88. B. 30 A
89. B. 3
90. C. 50 mm
91. D. Local Building Office
92. A. I, II and III
93. A. 26 mm
94. A. 200 mm
95. C. 30
96. D. intentionally grounded
97. D. type USE
98. A. 23 m
99. A. TW
100. C. Reactor

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed



Question Bank 2

Part 1: Technical Subject

1. A small lamp used to indicate that a circuit is energized.

A. Pilot lamp
B. Electric sign lamp
C. Control lamp
D. Test lamp

RME Board Exam

2. A battery is charged at 15 A for 10 hours. If the charging voltage is 120 V, what is the charging cost at 1.00 peso per kW-hr?

A. 15 pesos
B. 18 pesos
C. 12 pesos
D. 20 pesos

3. What is the diameter of a copper wire having s cross sectional area of 3,969 CM?

A. 1.6 mm
B. 7.9 mils
C. 0.16 inch
D. 6.3 mm

RME Board Exam

4. An applicant for the Registered Master Electricians' Examination must at least be a graduate of _____ year electrician course of instruction and has at least ___ years of apprenticeship after completion of the course.

A. two, two
B. one, one
C. one, two
D. two, three

5. In dc circuits, the power is expressed as the product of which of the following?

A. Coulombs and amperes
B. Amperes and ohms
C. Amperes and volts
D. Coulombs and volts

RME Board Exam

6. The unit of magnetic flux in SI.

A. Tesla
B. Volt-ampere
C. Maxwell
D. Weber

7. If the series field is connected in series with the armature, and the shunt field is connected across the combination, what type of dc generator is this?

A. Shunt
B. Series
C. Long shunt compound
D. Short shunt compound

8. An instrument that measures the electrical pressure in a circuit.

A. Ammeter
B. Megger
C. Galvanometer
D. Voltmeter

RME Board Exam

9. A lubricant to make pulling of wires or cables through the conduit easier.

A. Grease
B. Resin
C. Talc
D. Iron filings

RME Board Exam

10. Give an example of an electrical conductor.

A. Brass
B. Asbestos
C. Slate
D. Latex

11. The start winding of a split-phase induction motor is switched out of the circuit by what device?

A. Magnetic contactor
B. Zero speed switch
C. Centrifugal switch
D. Proximity switch

12. When a circuit breaker is selected, which of the following is the most important factor to consider?

A. Voltage rating
B. Interrupting rating
C. Momentary rating
D. Continuous current rating

RME Board Exam

13. If 18 resistances, each of a value of 36 ohms, are connected in parallel, then the total resistance is _____.

A. 36 ohms
B. 2 ohms
C. 648 ohms
D. 54 ohms

14. A small light bulb with a resistance of 1000 ohms is connected across a 120-V line. What is the current through the bulb?

A. 1.2 A
B. 0.12 A
C. 0.012 A
D. 12 A

15. What type of energy is stored in an electrolytic cell?

A. Electrical
B. Magnetic
C. Mechanical
D. Chemical

16. A 200-V lamp has a hot resistance of 400 ohms. What is its power rating in watts?

A. 100 W
B. 200 W
C. 600 W
D. 250 W

RME Board Exam

17. A 25-W incandescent bulb rated at 120 V and operated on a 120 V line has burnt out and has to be replaced as soon as possible. There are several lamps available but not of the same rating. Which of the bulbs below should be used to approximate the power consumption of the busted bulb?

A. 20 watts, 110 volts
B. 100 watts, 240 volts
C. 50 watts, 240 volts
D. 75 watts, 220 volts

18. What is the resistance reading of a good capacitor?

A. Negligible
B. Negative
C. Infinity
D. 1 ohm

19. An inductor has a reactance of 10,000 ohms at 10 kHz. What is its reactance at 2 kHz?

A. 20,000 ohms
B. 500 ohms
C. 2,000 ohms
D. 32,000 ohms

20. All batteries have a nominal rating based on how many hours of standard rate of discharge?

A. 8
B. 24
C. 16
D. 12

21. The property that opposes any change in current.

A. Impedance
B. Resistance
C. Inductance
D. Capacitance

22. Which of the following is an integrating instrument?

A. Ammeter
B. Voltmeter
C. Wattmeter
D. Thermometer

RME Board Exam

23. Which of the following breaks down rubber insulation?

A. Water
B. Oil
C. Acid
D. None of these

24. For current to flow, a circuit must be _____.

A. isolated
B. insulated
C. complete
D. protected

25. Electrical symbol represented by a rectangle with a letter PB inside.

A. Push button
B. Pull box
C. Battery panel
D. Box panelboard

26. When the speed of the prime mover of an alternator is increased, what parameter in the alternator is affected?

A. Frequency
B. Voltage
C. Both frequency & voltage
D. Voltage & current

RME Board Exam

27. The current carrying capacity of the fuse material depends on

A. cross-sectional area
B. length
C. material
D. all of these

28. The resistance of a material is inversely proportional to its __.

A. length
B. temperature
C. cross-sectional area
D. all of these

29. A 0.4 μF capacitor has a charge of 20 μC. How much is the voltage across it?

A. 0.02 V
B. 8 V
C. 50 V
D. 0.8 V

RME Board Exam

30. A resistor of 3 ohms is connected in parallel with one of 2-ohm resistance. If the combination is connected in series with a 4-ohm resistor, what is the equivalent resistance of the whole combination of three resistors?

A. 6.4 ohms
B. 5.8 ohms
C. 4.5 ohms
D. 5.2 ohms

31. How much current is produced by a 60-V source connected across a 12-kΩ resistance?

A. 5 A
B. 7.2 A
C. 20 mA
D. 5 mA

RME Board Exam

32. In a circuit breaker, the current which exists at the instant of contact separation is known as

A. recovery current
B. surge current
C. interrupting current
D. restriking current

33. When the emfs in the two windings of the transformer are opposite in direction, the polarity of the windings is

A. additive
B. subtractive
C. either A or B
D. neither A or B

34. Which of the following is used to improve or correct s low power factor?

A. Capacitors
B. Synchronous motors
C. Synchronous condensers
D. All of these

35. Expired licenses shall be renewed only after complying the required CPE units. What does CPE stands for?

A. Credit Professional Expenses
B. Certificate of Practice and Experience
C. Course of Professional Ethics
D. Continuing Professional Education

36. An electric iron draws 15 A at 220 V. It is desired to reduced the current to 12 A by connecting a series rheostat. What is the resistance of the rheostat?

A. 3.67 ohms
B. 4.55 ohms
C. 5.12 ohms
D. 1.86 ohms

37. Commercial unit of electric energy.

A. Joule
B. Watt-hour
C. Megawatt
D. Kilowatt-hour

RME Board Exam

38. What resistance must be connected in parallel with a 1.0-ohm resistance to give an equivalent resistance of 0.2 ohm?

A. 0.75 ohm
B. 0.25 ohm
C. 1.20 ohms
D. 0.50 ohm

39. An ammeter should be connected in _____ with the load.

A. series
B. parallel
C. series-parallel
D. delta-wye

40. Three 120-ohm resistors are connected in parallel-series. What is the equivalent resistance of the combination?

A. 360 ohms
B. 80 ohms
C. 180 ohms
D. 40 ohms

41. What are the two primary parts of a three-phase induction motor?

A. Rotor and stator
B. Stator and field
C. Slip ring and brushes
D. Rotor and armature

42. The ability of a conductor to allow current flow.

A. Resistance
B. Coefficient of resistance
C. Conductance
D. Permeability

43. What is the most common usage of resistors in electronic circuits?

A. Limit current
B. Introduce a voltage drop
C. Generate heat
D. All of these

RME Board Exam

44. For a ceiling fan, which of the single-phase motor is used?

A. Split-phase type
B. Capacitor start & run type
C. Permanent capacitor type
D. Capacitor start type

45. Blue is assigned to what digit value in the resistance color code?

A. 5
B. 6
C. 7
D. 4

46. Watt-hour is equivalent to how many joules?

A. 4,186
B. 3,600
C. 44,760
D. 3,415

47. If the number of valence electrons is exactly four, how do you classify the material?

A. Conductor
B. Semi-conductor
C. Insulator
D. Superconductor

48. A half wave rectifier uses how many diodes?

A. At least two diodes
B. Only one diode
C. Only two diodes
D. One or more diodes depending on designer

49. A water heater takes 2.5 A at 230 V. What is its hot resistance?

A. 82 ohms
B. 74 ohms
C. 92 ohms
D. 70 ohms

50. SI unit of potential difference.

A. Coulomb
B. Ampere
C. Siemens
D. Volt

Part 2: Philippine Electrical Code

51. Hazardous locations where combustible dust is not normally in the air in quantities sufficient to provide explosive or ignitable mixtures, and dust accumulations are normally insufficient with the normal operation of electrical equipment.

A. Class II, Division 1
B. Class II, Division 2
C. Class III, Division 1
D. Class III, Division 2

RME Board Exam

52. In hazardous location, the use of non-metallic conduit shall be permitted provided it is buried NOT less than ___ below the earth level.

A. 400 mm
B. 600 mm
C. 1,000 mm
D. 500 mm

53. Service entrance cables shall be supported by straps or other approved methods within___ of every service head

A. 300 mm
B. 500 mm
C. 600 mm
D. 400 mm

RME Board Exam

54. Hazardous locations in which easily ignitable fibers or material producing combustible flyings are handled, manufactured or used.

A. Class III, Division 1
B. Class IIII, Division 2
C. Class I, Division 1
D. Class I, Division 2

55. Type MC cable shall be supported and secured at intervals NOT exceeding _____.

A. 2,000 mm
B. 1,800 mm
C. 1,500 mm
D. 2,500 mm

56. How much is the minimum computed load for each 2-wire laundry branch circuit?

A. 1,800 VA
B. 1,500 VA
C. 2,000 VA
D. 1,200 VA

RME Board Exam

57. There are situations where deviations from the code requirements are necessary. Before such deviations are made, there must be a written permission from one of the following entities. Which one is this?

A. Board of Electrical Eng'g
B. Code Enforcing Authority
C. IIEE Code Committee
D. Philippine Regulation Board

58. An attachment plug and receptacle shall be permitted to serve as the disconnecting means for single phase room air conditioner rated 250 V or less if the manual controls of the room air conditioner is readily accessible and located within a certain distance from the floor. What is this distance?

A. 2,000 mm
B. 1,800 mm
C. 1,900 mm
D. 1,700 mm

RME Board Exam

59. A point in a wiring system at which current is taken to be used in some equipment.

A. Grounded
B. Conductor
C. Service entrance
D. Outlet

60. Sheet steel metal boxes over 1640 cm^3 in size shall be made from steel NOT less than ___ thick uncoated.

A. 1.25 mm
B. 1.35 mm
C. 1.6 mm
D. 1.8 mm

61. Live vegetation or trees _____ used for support of overhead conductor spans.

A. shall be
B. should be
C. shall not be
D. should not be

RME Board Exam

62. Circuits with rigid non-metallic conduit approved for direct burial and placed under streets, hi-ways, roads, alleys, driveways and parking lots shall have a minimum cover distance of ___.

A. 760 mm
B. 900 mm
C. 1,000 mm
D. 600 mm

63. A conductor having no covering or electrical insulation.

A. bare conductor
B. concealed conductor
C. encased conductor
D. exposed conductor

64. Conductors used in lightning protection system maybe coursed through air without support for a distance of _____ or less.

A. 1,000 mm
B. 900 mm
C. 760 mm
D. 800 mm

65. Type FC cable shall have the temperature rating durably marked on the surface at intervals NOT exceeding _____.

A. 600 mm
B. 550 mm
C. 800 mm
D. 760 mm

66. The computed load for the branch circuit installed to supply exterior signs and outline lighting shall be computed at a minimum of how much volt-amperes?

A. 1,200
B. 1,500
C. 1,800
D. 1,000

67. The powers of the members of the Board are vested in them by who's authority?

A. President of the Philippines
B. Commissioner of PRC
C. Under RA 7920
D. National President of IIEE

68. Energized parts of generators operated at more than _____ to ground shall not be exposed to accidental contact where accessible to unqualified persons.

A. 75 V
B. 50 V
C. 100 V
D. 40 V

RME Board Exam

69. A building or other structure serve shall be supplied by only one service drop EXCEPT for

A. multiple occupancy building
B. fire pumps
C. emergency electrical system
D. all of these

70. Which of the following circuits shall NOT be grounded?

A. 2-wire dc systems
B. Vehicle mounted generators
C. Heath care facilities
D. All of these

71. The current carrying conductors in cablebus shall have insulation rating of _____or more.

A. 40 °C
B. 50 °C
C. 70 °C
D. 60 °C

72. Air terminals exceeding 600 mm in height shall be supported at a point NOT less than _____ of its height.

A. three-fourth
B. two-fifth
C. one-half
D. one-third

73. At least how many entrance(s) shall be provided to give access to the working space about electrical equipment?

A. Two
B. One
C. Three
D. Not specified in the Code

74. Non-metallic boxes shall be permitted only with _____.

A. concealed knob and tube wiring
B. non-metallic sheathed cable
C. open wiring on insulators
D. all of these

75. For straight pulls, the length of the pull box shall NOT be less than _____times the outside diameter over sheath of the largest shielded or lead covered conductor or cable entering the box.

A. 48
B. 42
C. 36
D. 38

RME Board Exam

76. This type of cable is a fabricated assembly of insulated conductors enclosed in a flexible metal sheath.

A. Ground wire
B. Integrated gas spacer cable
C. Medium voltage cable
D. Armored cable

77. So constructed or protected that exposure to a beating rain will not result in the entrance of water under specified test conditions.

A. Raindrip
B. Raintight
C. Rainproof
D. Rainsealed

78. The cross sectional area in square millimeters of a conductor shall be durably marked on the surface repeated at intervals NOT exceeding ___.

A. 600 mm
B. 900 mm
C. 1,000 mm
D. 760 mm

RME Board Exam

79. The following are common splicing rules EXCEPT one. Which one is this?

A. A splice must provide a path for the current to pass through
B. A joint must be mechanically as strong as the wire itself
C. All splices must be mechanically and electrically secured by means of a solder
D. Wires of the same size should be spliced together in line

80. Roofs with a series of parallel ridges shall have air terminals along the end ridge at intervals NOT exceeding _____.

A. 7,600 mm
B. 8,000 mm
C. 6,000 mm
D. 9,000 mm

RME Board Exam

81. Communication wires and cables shall be separated at LEAST a certain minimum distance from service drops of electric light and power conductors, which are not installed in a raceway or in cable. What is this minimum distance?

A. 150 mm
B. 175 mm
C. 300 mm
D. 200 mm

82. A _____ branch circuit shall be permitted to supply cooking appliances that are fastened in place in any occupancy.

A. 30 or 40 A
B. 20 or 30 A
C. 50 or 60 A
D. 40 or 50 A

83. Reconnection by the supplier of electrical energy in cases where service has been cut-off due to non-payment of bills shall not require a new certificate of inspection provided the period of cut-off is NOT more than _____.

A. one and one-half years
B. two years
C. half a year
D. one year

84. An overcurrent device shall be connected at the point where the conductors to be protected ___.

A. receives its supply
B. is being terminated
C. receives its load
D. none of these

85. A run of type IGS cable between pull boxes or terminations shall NOT contain more than the equivalent of _____ quarter bends.

A. one
B. two
C. three
D. four

RME Board Exam

86. Overhead conductors used in festoon lighting shall NOT be less than _____.

A. 0.75 mm^2
B. 3.5 mm^2
C. 2.0 mm^2
D. 5.5 mm^2

87. Fixed electric space heating loads shall be computed at _____ of the total computed load.

A. 80 %
B. 90 %
C. 100 %
D. 125 %

RME Board Exam

88. When circuit breakers are installed in enclosed switchboards, they are usually derated to a certain percentage. What is this percentage?

A. 60 %
B. 80 %
C. 50 %
D. 70 %

89. Open conductors shall be separated from open conductors of other circuits by NOT less than a certain distance. What is this distance?

A. 200 mm
B. 100 mm
C. 150 mm
D. 120 mm

90. Motor circuit switches shall ____ permitted to be of the knife switch type.

A. not be
B. be
C. be or not be
D. none of these

91. Branch circuits larger than ___ shall supply only non-lighting outlet loads.

A. 30 A
B. 40 A
C. 50 A
D. 60 A

92. For optional calculation in dwelling units, the first 10 kW shall be computed at 100 % while the remainder is at _____.

A. 65 %
B. 60 %
C. 50 %
D. 40 %

RME Board Exam

93. The clearance form the top of a switchboard to a ceiling which is combustible shall NOT be less than _____.

A. 1,000 mm
B. 800 mm
C. 900 mm
D. 1,250 mm

94. Which of the following statement is NOT true?

A. Electrical equipment and wiring not mentioned in the code shall require a special permission prior to installation
B. Extended use of temporary installation shall not require a new approved electrical permit
C. An application of inspection shall be filed with the government agency concerned before a preliminary and or final inspection is done
D. A copy of the electrical permit shall be posted or kept at the job site at all times, until the approval of the work have been made.

RME Board Exam

95. The rating of the overcurrent device shall not be less than the noncontinuous load plus a percentage of the continuous load.

A. 125 %
B. 80 %
C. 100 %
D. 140 %

96. Operation of equipment in excess of normal, full load rating or of a conductor in excess of rated ampacity.

A. Overload
B. Overvoltage
C. Overcurrent
D. Surge

97. For watercrafts, where should the said electrical permit be filed?

A. Local Building Office
B. Maritime Industry Authority
C. Office of the Philippine Ports Authority
D. Office of the Philippine Coast Guard

RME Board Exam

98. In concealed knob and tube wiring, the clearance to be maintained between conductors is _____.

A. 55 mm
B. 45 mm
C. 76 mm
D. 50 mm

99. Liquidtight flexible nonmetallic conduit shall NOT be used where the voltage of the contained conductors is in excess of _____.

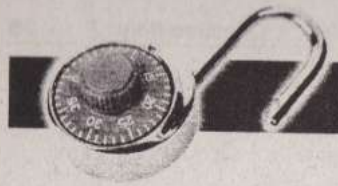
A. 600 V
B. 300 V
C. 250 V
D. 1000 V

100. Service entrance using copper conductors shall have sufficient capacity and shall NOT be smaller than _____.

A. 5.5 mm^2
B. 3.5 mm^2
C. 14.0 mm^2
D. 8.0 mm^2

< Exam ends here >

Proceed to the next page for the answer key and solutions!



Question Bank 2

ANSWER KEY

1. A. Pilot lamp
2. B. 18 pesos

Solution:

$P = EI = 120(15)$

$P = 1,800$ W or 1.8 kW

$W = Pt = 1.8(10)$

$W = 18$ kW

Cost = 18(P1)

Cost = P 18

3. A. 1.6 mm

Solution:

$A = d^2$

$d = \sqrt{A} = \sqrt{3969} = 63$ mils

$d = 63 \text{ mils} \times \frac{1 \text{ in}}{1000 \text{ mils}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{10 \text{ mm}}{1 \text{ cm}}$

$d = 1.6$ mm

4. A. two, two
5. C. Amperes and volts
6. D. Weber
7. C. Long shunt compound
8. D. Voltmeter
9. C. Talc
10. A. Brass
11. C. Centrifugal switch
12. B. Interrupting rating

13. B. 2 ohms

Solution:

For n identical resistances in parallel, the total resistance is equal to R/n.

$R_t = \frac{R}{n} = \frac{36}{18}$

$R_t = 2\ \Omega$

14. B. 0.12 A

Solution:

$I = \frac{E}{R} = \frac{120}{1000}$

$I = 0.12$ A

15. D. Chemical
16. A. 100 W

Solution:

$P = \frac{E^2}{R} = \frac{(200)^2}{400}$

$P = 100$ W

17. B. 100 watts, 240 volts

Solution:

$R = \frac{E^2}{P} \rightarrow$ formula

Choice A:

$R_1 = \frac{(110)^2}{20} = 605\ \Omega$

$P_1 = \frac{E_1^2}{R_1} = \frac{(120)^2}{605} = 23.8$ W

Choice B:

$R_1 = \frac{(240)^2}{100} = 576\ \Omega$

$P_1 = \frac{E_1^2}{R_1} = \frac{(120)^2}{576} = 25$ W

Choice C:

$R_1 = \frac{(240)^2}{50} = 1152\ \Omega$

$P_1 = \frac{E_1^2}{R_1} = \frac{(120)^2}{1152} = 12.5$ W

Choice D:

$R_1 = \frac{(220)^2}{75} = 645.33\ \Omega$

$P_1 = \frac{E_1^2}{R_1} = \frac{(120)^2}{645.33} = 22.314$ W

18. C. Infinity
19. C. 2,000 ohms

Solution:

$X_L = 2\pi fL$

$L = \frac{X_L}{2\pi f} = \frac{10,000}{2\pi(10,000)}$

$L = 0.15915$ H

$X_L = 2\pi fL$

$= 2\pi(2,000)(0.15915)$

$X_L = 2,000\ \Omega$

20. A. 8
21. C. Inductance
22. C. Wattmeter
23. C. Acid

24. C. complete
25. B. Pull box
26. C. Both frequency & voltage
27. D. all of these
28. C. cross-sectional area
29. C. 50 V

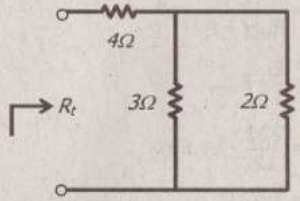
Solution:

$E = \frac{Q}{C} = \frac{20}{0.4}$

$E = 50$ V

30. D. 5.2 ohms

Solution:



$R_t = \frac{3(2)}{3+2} + 4$

$R_t = 5.2\ \Omega$

31. D. 5 mA

Solution:

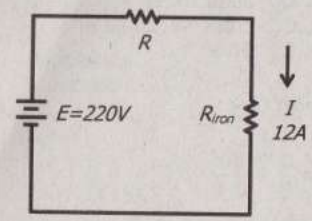
$I = \frac{E}{R} = \frac{60}{12,000}$

$I = 0.005$ A or 5 mA

32. C. interrupting current
33. A. additive
34. D. All of these
35. D. Continuing Professional Education

36. A. 3.67 ohms

Solution:



$$R_{iron} = \frac{E}{I} = \frac{220}{15}$$

$$R_{iron} = 14.667\ \Omega$$

$$I = \frac{E}{R_{iron} + R}$$

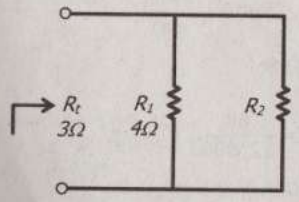
$$R = \frac{E}{I} - R_{iron}$$

$$R = \frac{220}{12} - 14.667$$

$$R = 3.67\ \Omega$$

37. D. Kilowatt-hour
38. B. 0.25 ohm

Solution:



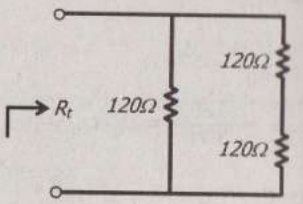
$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{0.2} = \frac{1}{1} + \frac{1}{R_2}$$

$$R_2 = 0.25\ \Omega$$

39. A. series
40. B. 80 ohms

Solution:



$$R_t = \frac{120(120+120)}{120+(120+120)}$$

$$R_t = 80\ \Omega$$

41. A. Rotor and stator
42. C. Conductance
43. D. All of these
44. B. Capacitor start & run type
45. B. 6
46. B. 3,600
47. B. Semi-conductor
48. B. Only one diode
49. C. 92 ohms

Solution:

$$R = \frac{E}{I} = \frac{230}{2.5}$$

R = 92 ohms

50. D. Volt
51. B. Class II, Division 2
52. B. 600 mm
53. A. 300 mm
54. A. Class III, Division 1
55. B. 1,800 mm
56. B. 1,500 VA
57. A. Board of Electrical Engineering
58. B. 1,800 mm
59. D. Outlet
60. B. 1.35 mm

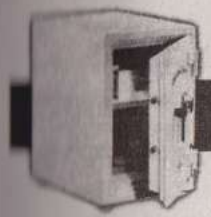
61. C. shall not be
62. D. 600 mm
63. A. bare conductor
64. B. 900 mm
65. A. 600 mm
66. A. 1,200
67. C. Under RA 7920
68. B. 50 V
69. D. all of these
70. C. Health care facilities
71. C. 70 °C
72. C. one-half
73. B. One
74. D. all of these
75. A. 48
76. D. Armored cable
77. B. Raintight
78. A. 600 mm
79. D. Wires of the same size should be spliced together in line
80. A. 7,600 mm
81. C. 300 mm
82. D. 40 or 50 A
83. D. one year
84. A. receives its supply
85. D. four
86. B. 3.5 mm^2
87. C. 100%
88. B. 80%
89. B. 100 mm
90. B. be
91. C. 50 A
92. D. 40%
93. A. 1,000 mm
94. B. Extended use of temporary installation shall not require a new approved electrical permit
95. A. 125%
96. A. Overload
97. B. Maritime Industry Authority
98. C. 76 mm
99. A. 600 V
100. D. 8.0 mm^2

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Notes

Notes



Question Bank 3

Part 1: Technical Subject

1. Which of the following steps is used for isolating a circuit breaker for maintenance purposes?

   A. Turn off the main generator
   B. Open the disconnect switches
   C. Connect the circuit breaker contacts to ground
   D. Short circuit the circuit breaker

RME Board Exam

2. How would determine, from visual observation of the armature winding, whether the generator is a lap or a wave wound.

   A. direction of the end connection
   B. connection to the commutator
   C. connection to the field winding
   D. connection to brushes

3. A resistor of 4-ohm resistance is connected in parallel with a series combination two resistors, 3-ohm and 1-ohm respectively. What is the equivalent resistance of the whole combination?

   A. 8 ohms
   B. 3 ohms
   C. 5 ohms
   D. 2 ohms

4. How many years is the term of office for any members of the BEE (Board of Electrical Eng'g)?

   A. 3 years
   B. 2 years
   C. 1 year
   D. 4 years

5. If a person is accidentally in electric shock, which of the following is the first thing to do?

   A. Call immediately the nearest doctor.
   B. Attend instantly to the victim's breathing
   C. Separate the victim immediately from the circuit
   D. Give him water at once to help him breath

RME Board Exam

6. If a three-phase, delta-wye transformer bank having a 480 V primary and a 208/120 V secondary, is considered to be 100% efficient, and to have resistive type of load, the maximum KVA of the load will be ___.

   I. equal to the kVA of the secondary of the transformer
   II. equal to the primary KVA of the transformer
   III. considerably less than the kVA of the transformer

   A. I, II and III
   B. I only
   C. I and II only
   D. II only

7. What type of lubrication is commonly used in gear motors?

   A. Water
   B. Oil
   C. Grease
   D. Talc

8. One horsepower is equivalent to how many watts?

   A. 746
   B. 764
   C. 674
   D. 500

RME Board Exam

9. Relays which verify the condition of the power system or in protection systems.

   A. Auxiliary relay
   B. Regulating relay
   C. Programming relay
   D. Monitoring relay

10. A substance that cannot be decomposed any further by any chemical reaction.

    A. Ion
    B. Element
    C. Molecule
    D. None of these

11. If the needle of the VOM will no longer align with the zero-ohm mark at the lowest range of resistance but will align on the other resistance ranges, which of the following is a probable cause?

    A. The needle is bent
    B. The supply battery is weak
    C. The meter current is abnormal
    D. The terminals were interchanged

12. The no load power input of a transformer is approximately equal to what losses in a transformer?

    A. Iron losses
    B. Copper losses
    C. Ventilation losses
    D. All of these

RME Board Exam

13. A Merz-price protection is suitable for

    A. alternators
    B. transformers
    C. transmission lines
    D. feeders

14. The admittance in AC circuit is a parameter equivalent to which of the following?

    A. Impedance
    B. Square of impedance
    C. Square root of impedance
    D. Reciprocal of impedance

15. In applying mouth to mouth rescue breathing to a person under electric shock, which of the following is the correct sequence out of the following scrambled steps?

    I. Pull his chain to keep his tongue out
    II. Clear his throat from any materials
    III. Place him on his back
    IV. Blow air through his nose or mouth
    V. Tilt his head back as far as possible

    A. I, III, II, V, IV
    B. III, V, I, IV, II
    C. III, II, V, I, IV
    D. II, V, III, IV, I

16. What is the resistance of a component having no continuity?

    A. Low resistance
    B. Zero resistance
    C. Infinite resistance
    D. All of these

17. What is the common tripping time for 60 Hz circuit breaker?

    A. 6 cycles
    B. 8 cycles
    C. 7 cycles
    D. 5 cycles

18. Motor used to start heavy loads.

    A. Synchronous motor.
    B. Series motor
    C. Wound rotor motor
    D. Compound motor

RME Board Exam

19. What should you do to prevent a shock when working on a high voltage supply?

    A. Open the filter capacitor
    B. Discharge the filter capacitor
    C. Closed the filter capacitor
    D. Charge the filter capacitor

20. Which of the following is a unit of flux?

    A. Ampere turns
    B. Gilbert
    C. Oersted
    D. Maxwell

21. An oscilloscope is usually used to measure _____.

    A. rms voltage
    B. average voltage
    C. maximum voltage
    D. all of these

RME Board Exam

22. A resistance of 4 ohms is connected in series to a parallel connection of two 8-ohm resistance. The total resistance is _____.

    A. 6 ohms
    B. 20 ohms
    C. 8 ohms
    D. 12 ohms

23. When cleaning a commutator, which of the following shall NOT be used?

    A. Clean cloth
    B. Sand paper
    C. Emery
    D. File

24. What is the equivalent capacitance of two series capacitors rated 4 and 6 μF respectively?

    A. 2.4 μF
    B. 10 μF
    C. 0.416 μF
    D. 0.1 μF

25. In the event that the prime mover fails, the alternator is prevented from motorizing by which device?

    A. Voltage regulator
    B. Inverse Time CB
    C. Reverse power relay
    D. Thermal overload relay

RME Board Exam

26. For efficient operation, induction motors are always designed with a small

    A. air gap
    B. voltage drop
    C. inductive reactance
    D. impedance

RME Board Exam

27. Which one is a semi-conductor?

A. Phosphorous
B. Arsenic
C. Gallium Arsenide
D. Diamond

28. What is the name of an ion that that acquires additional electrons?

A. Anion
B. Cathode
C. Anode
D. Cation

29. In order for a material to be called a conductor, what is the maximum number of valence electrons it can have?

A. 1
B. 2
C. 3
D. 8

RME Board Exam

30. The resistances of four rheostats are 10, 5, 7 and 3 ohms, which are connected in series to a battery, which produces a potential difference of 75 V across its terminals. Find the current in each rheostat.

A. 10 A
B. 3 A
C. 5 A
D. 7 A

RME Board Exam

31. Three resistors R_1, R_2 and R_3 are connected in series across a 100-V source. If R_2 opens, the

A. voltage across R_2 is 100 V
B. voltage across R_1 is 100 V
C. total resistance decreases
D. voltage across R_2 is zero

32. A 6-cell lead acid battery produces how much voltage across its terminals?

A. 6 V
B. 12 V
C. 9 V
D. 18 V

33. This winding is connected in series with armature winding of a dc generator to compensate the field flux distortion due to armature reaction.

A. Series field windings
B. Interpole windings
C. Compensating windings
D. Shunt field windings

RME Board Exam

34. Voltage across an electric circuit, acts as a

A. mass of electrons
B. negative ions
C. force
D. component of current

35. An ideal step-up transformer with 100 turns in the primary and 2500 turns in the secondary carries a load of 2 A in the secondary windings. What is the current in the primary side?

A. 50 A
B. 0.08 A
C. 25 A
D. 1,250 A

RME Board Exam

36. When examining a dead set, which item should be checked?

A. Open filament
B. Power supply diodes
C. Fuse
D. All of these

RME Board Exam

37. Twenty resistors each having a resistance of 1000 ohms are connected in parallel. The equivalent resistance is

A. 20,000 ohms
B. 50 ohms
C. 500 ohms
D. 5,000 ohms

38. A 220-V, 10 hp, single-phase induction motor operates at an efficiency of 86% percent at a power factor of 90%. What is the current?

A. 45.26 A
B. 37.69 A
C. 34.81 A
D. 43.81 A

39. One of the following parameters cannot be change by a transformer? Which one?

A. Impedance
B. Current
C. Voltage
D. Power

40. The counter emf of a dc motor is zero when the _____.

A. armature is not turning
B. armature just begins to turn
C. motor is at rated speed
D. motor is almost up to rated speed

41. Which of the following types of motors is most commonly used for overhead cranes?

A. dc series motor
B. split-phase motor
C. dc shunt motor
D. synchronous motor

RME Board Exam

42. A wattmeter measures

A. ac as well dc power
B. ac power only
C. dc reactive power only
D. None of these

43. In parallel operation of dc generators which of the following parameters must be the same?

A. current
B. power
C. voltage
D. all of these

RME Board Exam

44. Transforms heat energy to electric energy.

A. Transformer
B. Battery
C. Generator
D. Thermocouple

45. Which of the following is NOT normally found on alternators?

A. Slip rings
B. Commutator
C. Brushes
D. Field coils

46. Which of the following statements is NOT true?

A. A discharged lead-acid cell for a long time can easily be charged
B. Lead-acid cells can be charged and discharged at a very high rate without damaging the plates
C. A lead-acid cell has a lesser ampere hour capacity than a nickel iron cell of the same capacity
D. All of these

RME Board Exam

47. Rheostat and potentiometers are types of ___ resistors.

A. film
B. fixed
C. variable
D. wire wound

48. A step down transformer lowers

A. voltage and amperage
B. voltage and increases amperage
C. amperage and increases voltage
D. voltage and power

49. What is the feeder load of a feeder serving three squirrel cage induction motors having full load currents of 34, 27 and 12 A respectively?

A. 73 A
B. 81.50 A
C. 91.25 A
D. 58.40 A

50. Capacitor commonly used in circuits that have a combination of dc and ac voltages.

A. Ceramic capacitor
B. Plastic capacitor
C. Oil-filled capacitor
D. Electrolytic capacitor

Part 2: Philippine Electrical Code

51. For receptacle outlets, each single or each multiple receptacle on one strap shall be considered not less than _____.

A. 200 VA
B. 180 VA
C. 600 VA
D. 150 VA

52. Which of the following statements is NOT true?

A. Conductors in raceways shall be continuous between outlets
B. Metal raceways, boxes, cabinets and fittings shall be grounded
C. Metal or non-metallic raceways shall be continuous between cabinets, boxes or other enclosures.
D. Raceway shall be used as a means of support for other raceways

RME Board Exam

53. Where no standard electrical equipment of the exact size or rating is available and the next larger size is neither available the next smaller size or rating maybe used provided a special permission is obtained from one of the following. Which one is this?

A. Barrio Captain
B. Mayor
C. Electrical Inspector
D. Fire Chief

54. Which of the following statements about overcurrent devices is NOT correct?

A. It shall be located where they will not be exposed to physical damage
B. It shall be readily accessible
C. It can be located inside clothes closets
D. In a multi-family dwelling, each occupant shall have ready access to all overcurrent device protecting his occupancy

RME Board Exam

55. A box with a blank cover which is inserted in one or more runs of raceway to facilitate pulling of the conductors.

A. Coupling box
B. Junction box
C. Terminal box
D. Pull box

56. The neutral conductor from the neutral point of a generator to its connection point to the grounding impedance shall be,

A. left opened
B. grounded
C. fully insulated
D. none of these

RME Board Exam

57. What is the total number of mechanical degrees that a PVC conduit run maybe bent between pull points (pull boxes, junction boxes or utility boxes)?

A. 360 degrees
B. 180 degrees
C. 120 degrees
D. 270 degrees

58. A two wire dc system supplying premises wiring shall be grounded EXCEPT,

A. a system equipped with a ground detector and supplying only industrial equipment in limited areas
B. a system operating at 50 V or less between conductors
C. a rectifier device DC system supplied from an AC system
D. all of these

59. For ranges of 8.75 kW or more in rating, the minimum branch circuit required shall be

A. 20 A
B. 40 A
C. 30 A
D. 50 A

60. Metal raceways, enclosures, frames and other non-current carrying metal parts of electric equipment shall be kept at least a certain distance from lightning rod conductors. What is this distance?

A. 1,900 mm
B. 2,000 mm
C. 1,800 mm
D. 1,500 mm

RME Board Exam

61. Where extensive metal in or on buildings may become energized and is subject to personal contact ___ will provided additional safety.

A. bonding
B. suitable ground detectors
C. suitable arresters
D. adequate bonding and grounding

62. Instruments, pilot lights, potential transformers and other switchboard devices with potential coils shall be supplied by a circuit that is protected by a standard overcurrent device rated up to _____

A. 20 A
B. 30 A
C. 10 A
D. 15 A

63. A wire or other mechanical member having one end secured and the other end fastened to a pole maintained under tension.

A. Lug
B. Tie wire
C. Cable rack
D. Guy

64. The branch circuit rating shall NOT be less than _____ of the non-continuous load.

A. 125 %
B. 80 %
C. 100 %
D. 115 %

65. What is the maximum operating temperature of type THWN conductor?

A. 75 °C
B. 60 °C
C. 90 °C
D. 110 °C

66. A grounded metal enclosure containing a factory mounted, bare or insulated conductors, which are usually copper, or aluminum bars, rods or tubes.

A. Cable tray
B. Busway
C. Wireway
D. Cablebus

RME Board Exam

67. Below are the factors that affect the ampacity of an electrical conductor EXCEPT one. Which one is this?

A. Insulation resistance
B. Length of the conductor
C. Conductor material
D. Cross-sectional area of the conductor

68. Mineral insulated metal sheathed cable shall be permitted in any of the following installations EXCEPT one. Which one is this?

A. For control circuits
B. Where exposed to oil and gasoline
C. For feeder circuits
D. Where exposed to corrosive atmosphere

RME Board Exam

69. Where flexible tubing is used to encase the conductors, the tubing shall extend from the last insulating support to no less than _____ inside the nonmetallic boxes.

A. 8 mm
B. 10 mm
C. 5.5 mm
D. 6.4 mm

70. An insulating element, generally of elongated form with transverse holes or slots for the purpose of insulating two sections of a guy or provide insulation between structure and anchor.

A. Guy insulator
B. Pin insulator
C. Strain insulator
D. Spool insulator

71. Corner joints on a gutter shall be made tight, where the assembly is held together by rivets or bolts. The spacing shall NOT be more than _____.

A. 250 mm
B. 100 mm
C. 300 mm
D. 200 mm

72. For barber shops and beauty parlors, the general lighting load per square meter of area shall be

A. 24 watts
B. 28 watts
C. 16 watts
D. 8 watts

RME Board Exam

73. The sum of the cross sectional area of all conductors in a wireway must not exceed ___ percent of the cross-sectional area of the wireway.

A. 15
B. 20
C. 10
D. 25

74. In any watercraft, receptacle outlets operating at ___ volts or more shall have a grounding pole.

A. 100 V
B. 120 V
C. 50 V
D. 60 V

75. For 25 to 50 A circuits, the minimum insulation resistance is

A. 100,000 ohms
B. 250,000 ohms
C. 50,000 ohms
D. 25,000 ohms

76. The minimum size of wire used in electrical wiring is the former # 14 AWG. Under the metric standard in the PEC, what is the equivalent size of this wire?

A. 5.5 mm^2
B. 1.6 mm^2
C. 3.5 mm^2
D. 2.0 mm^2

77. For circuits over 600 V nominal, conductors shall NOT be bent to a radius less than _____ times the diameter for shielded or lead covered conductors.

A. 6
B. 8
C. 10
D. 12

78. What is the ampacity of a 5.5 mm^2 TW copper conductor?

A. 35 A
B. 45 A
C. 40 A
D. 30 A

RME Board Exam

79. Lighting fixtures shall be wired with a fixture flexible cord with a cross sectional area of NOT less than

A. 0.50 mm^2
B. 2.00 mm^2
C. 1.25 mm^2
D. 0.75 mm^2

80. Type MI cables shall be securely supported at intervals NOT exceeding _____.

A. 1,800 mm
B. 2,000 mm
C. 1,500 mm
D. 2,500 mm

81. If the setting of overcurrent device in a circuit ahead of equipment is 60 A, what is the minimum required grounding conductor using copper?

A. 5.5 mm^2
B. 8.0 mm^2
C. 14 mm^2
D. None of these

RME Board Exam

82. The total load on overcurrent device located in a panelboard shall NOT exceed a certain percentage of its rating. What is this percentage?

A. 100 %
B. 90 %
C. 80 %
D. 125 %

83. For show window lighting, a load of not less than __volt-amperes shall be included for each linear meter of show window.

A. 500
B. 400
C. 600
D. 300

84. Liquidtight flexible nonmetallic conduit shall be permitted to be used

A. for direct burial
B. where flexibility is required
C. in exposed or concealed locations
D. all of these

RME Board Exam

85. Flexible metal conduits must not be used in

A. wet locations
B. hoistways
C. storage battery rooms
D. all of these

86. Circuit containing electric discharge lighting transformer exclusively shall NOT be rated in excess of ___.

A. 30 A
B. 20 A
C. 15 A
D. 40 A

87. Conductors which run above the top level of a window shall be permitted to be less than 1,000 mm but in no case shall be less than

A. 300 mm
B. 600 mm
C. 500 mm
D. 800 mm

88. The conductor connecting the neutral point of the transformer or generator to the grounding impedance shall _____.

A. not be permitted to be installed in a separate raceway
B. be permitted to be installed in a separate raceway
C. not be permitted to be installed inside a raceway
D. all of these

RME Board Exam

89. The use of surface non-metal raceway is NOT permitted in all those mentioned below EXCEPT one. Which one is this?

A. Dry locations
B. Where subject to severe physical damage
C. Where the voltage is over 300 V
D. Where concealed

90. Hazardous location in which ignitable concentrations of flammable gases or vapors can exist under normal operating conditions.

A. Class II, Division 1
B. Class II, Division 2
C. Class I, Division 1
D. Class I, Division 2

91. For underground feeder and branch circuits, what type of conductors shall be used?

A. Type USE
B. Type XHHW
C. Type MI
D. Type UF

92. The maximum setting of the ground fault protection of equipment shall be ___.

A. 1,500 A
B. 1,800 A
C. 1,400 A
D. 1,200 A

93. Switches are operated vertically rather than horizontally. The upward position of the handle shall mean

A. switch-on position
B. switch-off position
C. neutral position
D. any positions

94. The grounding impedance for grounded neutral system shall be installed between the ___.

A. system neutral and the current carrying conductors
B. grounding electrode and system neutral
C. grounding electrode and metal frame of generator
D. all of these

95. For installation consisting of not more than two 2-wire branch circuits, the service disconnecting mains shall be rated NOT less than _____.

A. 20 A
B. 40 A
C. 30 A
D. 50 A

RME Board Exam

96. What is the lowest dielectric strength of transformer oil, which is acceptable to the PEC?

A. 20,000 volts
B. 22,000 volts
C. 25,000 volts
D. 17,500 volts

97. A conductor encircling a building and interconnecting all ground terminals.

A. Bonding
B. Interlink
C. Air terminal
D. Counterpoise

98. Wireways shall be supported at intervals NOT to exceed _____.

A. 1500 mm
B. 2000 mm
C. 1200 mm
D. 1800 mm

RME Board Exam

99. Flat conductor cable (FCC) system shall NOT be used in the locations enumerated below EXCEPT one. Which one is this?

A. Locations where subject to corrosive vapors
B. Damp locations
C. Residential buildings
D. Outdoors

100. A dwelling unit having a floor area not more than 50 square meters shall be permitted to have a single 20-A, 2-wire branch circuit provided the total load shall NOT exceed _____.

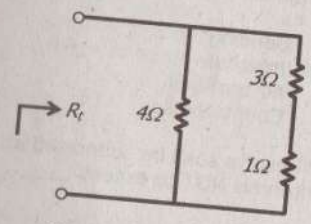
A. 3,680 volt-amperes
B. 3,860 volt-amperes
C. 3,080 volt-amperes
D. 3,068 volt-amperes

Question Bank 3

ANSWER KEY

1. B. Open the disconnect switches
2. A. direction of the end connection
3. D. 2 ohms

Solution:



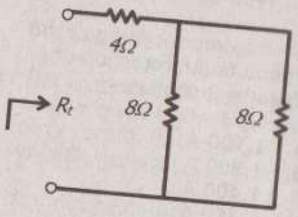
$$R_t = \frac{4(3+1)}{4+(3+1)}$$

$$R_t = 2\,\Omega$$

4. A. 3 years
5. C. Separate the victim immediately from the circuit
6. C. I and II only
7. B. Oil
8. A. 746
9. D. Monitoring relay
10. B. Element
11. B. The supply battery is weak
12. A. Iron losses
13. A. alternators
14. D. Reciprocal of impedance
15. C. c, b, e, a, d
16. C. Infinite resistance
17. B. 8 cycles
18. B. Series motor
19. B. Discharge the filter capacitor
20. D. Maxwell
21. C. maximum voltage

22. C. 8 ohms

Solution:

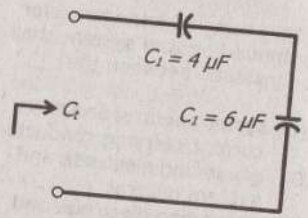


$$R_t = \frac{8(8)}{8+8} + 4$$

$$R_t = 8\,\Omega$$

23. C. Emery
24. A. 2.4 μF

Solution:



$$\frac{1}{C_t} = \frac{1}{C_1} + \frac{1}{C_2}$$

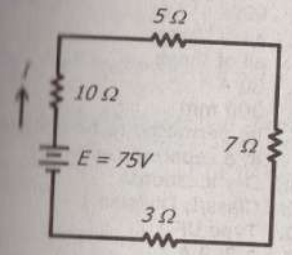
$$\frac{1}{C_t} = \frac{1}{4} + \frac{1}{6}$$

$$C_t = 2.4\,\mu F$$

25. C. Reverse power relay
26. A. air gap
27. C. Gallium Arsenide
28. A. Anion

29. C. 3
30. B. 3 A

Solution:

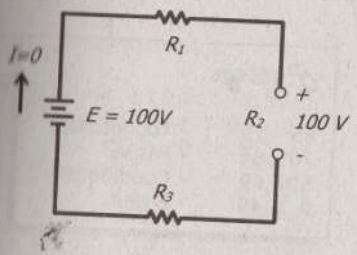


$$I = \frac{E}{R_t} = \frac{75}{10+5+7+3}$$

$$I = 3\,A$$

31. A. voltage across R_2 is 100 V

Solution:



Since open circuit, current is zero. Thus, the voltage across the open circuited R_2 is 100 V. Also since R_1 and R_3 are not open circuited, the voltage across each is 0 V.

32. B. 12 V

Solution:

E = (voltage/cell)(n)

E = (2 V)(6)

E = 12 V

33. C. Compensating windings
34. C. force
35. A. 50 A

$$\frac{I_1}{I_2} = \frac{N_2}{N_1}$$

$$I_1 = I_2\left(\frac{N_2}{N_1}\right)$$

$$I_1 = 2\left(\frac{2500}{100}\right)$$

$$I_1 = 50A$$

36. D. All of these
37. B. 50 ohms

Solution:

$$R_t = \frac{R}{n} = \frac{1000}{20}$$

$$R_t = 50 \text{ ohms}$$

38. D. 43.81 A

Solution:

$$P = EIpf$$

$$\eta = \frac{P_{out}}{P_{in}} = \frac{P_{out}}{EIpf}$$

$$I = \frac{P_{out}}{\eta Epf}$$

$$I = \frac{10\ hp \times \frac{746\ W}{hp}}{0.86(220)(0.90)}$$

$$I = 43.81\ A$$

39. D. Power
40. A. armature is not turning
41. A. dc series motor
42. A. ac as well dc power
43. C. voltage
44. D. Thermocouple

45. B. Commutator
46. D. All of these
47. C. variable
48. B. voltage and increases amperage
49. B. 81.50 A

Solution:

$$\text{Load} = \sum \text{load} + 25\% \text{ of largest load}$$

$$\text{Load} = 34+27+12+(0.25 \times 34)$$

$$\text{Load} = 81.50 \text{ A}$$

50. D. Electrolytic capacitor
51. B. 180 VA
52. D. Raceway shall be used as a means of support for other raceways
53. C. Electrical Inspector
54. C. It can be located inside clothes closets
55. D. Pull box
56. C. fully insulated
57. A. 360 degrees
58. D. all of these
59. B. 40 A
60. A. 1,900 mm
61. D adequate bonding and grounding
62. D. 15 A
63. D. Guy
64. C. 100%
65. A. 75 °C
66. B. Busway
67. A. Insulation resistance
68. D. Where exposed to corrosive atmosphere
69. D. 6.4 mm
70. A. Guy insulator
71. C. 200 mm
72. A. 24 watts
73. B. 20
74. C. 50 V
75. B. 250,000 ohms
76. D. 2.0 mm^2
77. D. 12
78. D. 30 A
79. D. 0.75 mm^2
80. A. 1,800 mm
81. A. 5.5 mm^2
82. C. 80%
83. C. 600
84. D. all of these
85. D. all of these
86. A. 30 A
87. A. 300 mm
88. B. be permitted to be installed in a separate raceway
89. A. Dry locations
90. C. Class I, Division 1
91. D. Type UF
92. D. 1,200 A
93. A. switch-on position
94. B. grounding electrode and system neutral
95. C. 30 A
96. C. 25,000 volts
97. D. Counterpoise
98. A. 1500 mm
99. B. Damp locations
100. A. 3,680 volt-amperes

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 4

Part I: Technical Subject

1. How much is the load current for a 100-W incandescent bulb connected to a 120 V power line?

A. 1.2 A
B. 0.833 A
C. 8.33 A
D. 0.12 A

RME Board Exam

2. Electromotive force is measured by a ____.

A. voltmeter
B. megger
C. clamp ammeter
D. galvanometer

3. All switches that have been turned off before doing repair work on any electrical equipment, shall be ____.

A. left as it is
B. left with its cover open
C. left with a note stating that the work is being done
D. left with its cover closed and padlocked

RME Board Exam

4. The power factor of a circuit is approximately 100 % if the circuit load consists only of

A. motors
B. incandescent lamps
C. fluorescent lamps
D. capacitors

5. The internal resistance of a milliammeter should be very low in order to have

A. a negligible effect on the circuit current
B. maximum voltage drop across the meter
C. a current which will not damage the meter
D. all of these

6. What is the approximate neutral current in a 4-wire system with phase A carrying 68 A, phase B carrying 88 A and phase C carrying 96 A?

A. 20 A
B. 30 A
C. 25 A
D. 15 A

7. What motor is best suited to drive small electric fans?

A. Universal motor
B. Shunt motor
C. Capacitor run motor
D. Resistance split-phase motor

RME Board Exam

8. One foot of a certain size of nichrome wire has a resistance of 1.63 ohms. To make a heating element for a toaster that will use 5 A at 110 V, the number of feet of wire needed is approximately

A. 17.9
B. 13.5
C. 8.2
D. 5.5

9. The proper way of measuring an unknown voltage with a multi-tester is to

A. start measuring at the lowest range of the meter
B. start measuring at the mid range of the meter
C. start measuring at the highest range
D. de-energized the circuit first

RME Board Exam

10. Temperature coefficient of a conductor is defined as the

A. increase in resistance per degree absolute
B. increase in resistance per degree centigrade
C. increase in resistance per ohm per degree absolute
D. none of these

11. What important data can be gathered by performing an open circuit test on transformers?

A. Rated power output
B. Resistance and reactance of windings
C. Core losses
D. Voltage and current ratios

12. How many kilowatts is equal to 200 joules per second?

A. 0.2
B. 200
C. 0.02
D. 2

13. A junction transistor has three terminals namely:

A. anode, cathode and triode
B. emitter, base and collector
C. base, receiver and collector
D. positive, negative and ground

RME Board Exam

14. Which of the following electric machine is equipped with slip rings?

A. dc motor or dc generator
B. Split-phase motor
C. ac generator
D. Repulsion type motor

15. The pointer or needle of an indicating instrument is usually made from

A. soft iron
B. aluminum
C. silver
D. manganin

16. A resistor when connected across a 24-V battery draws a current of 1 mA. What is the required resistance?

A. 24,000 ohms
B. 2,400 ohms
C. 24 ohms
D. 2.4 ohms

RME Board Exam

17. A device used to remove the sharp burrs or rough edges is called ____.

A. reamer
B. threader
C. hickey
D. bender

18. A dry cell has internal resistance of 0.02 ohm and a terminal voltage of 1.5 V on open circuit. What will be its terminal voltage if a 0.1-ohm resistance is connected across its terminals?

A. 1.25 V
B. 1.20 V
C. 1.42 V
D. 1.15 V

19. An instrument used to measure the speed of a motor or a generator.

A. Hydrometer
B. Thermometer
C. Tachometer
D. Oscilloscope

RME Board Exam

20. The condition of Ohm's law is that

A. the temperature should remain constant
B. the temperature should vary
C. ratio V / I should be constant
D. current should be proportional to voltage

21. A dry cell has an internal resistance of 0.02 ohm and open circuit voltage of 1.5 V. Calculate the power delivered to a resistor of 0.6-ohm resistance.

A. 3.5 watts
B. 2.4 watts
C. 2.0 watts
D. 3.8 watts

22. Each component in a motor controller must be approved for which of the following?

A. The voltage to which it will be connected.
B. The current it must carry.
C. The horsepower that it must control
D. All of these

23. A frequency of 60 Hz means that the cycle is repeated ____.

A. 60 times a minute
B. 60 times an hour
C. 60 times a second
D. none of these

RME Board Exam

24. Power factor is defined as the ratio of

A. watts to volt-amperes
B. volt-amperes to reactive
C. volt-amperes to watts
D. volts-amperes

25. What is the total kVA rating of 230 V, three-phase circuit supplied by a 20-A circuit breaker?

A. 6.42 kVA
B. 8.55 kVA
C. 7.96 kVA
D. 4.60 kVA

RME Board Exam

26. The presence of current is only made known by the effect it produces. Three important effects are:

A. heating, electric shock and generation
B. heating, magnetic and electric shock
C. generation, chemical and electric shock
D. heating, magnetic and chemical

RME Board Exam

27. A toaster takes 10 A from a 120-volt line. The power used is

A. 12 W
B. 1200 W
C. 130 W
D. none of these

28. Grease is a lubricant that is basically a combination of ____.

A. oil and soap
B. water and soap
C. oil and water
D. oil, water and soap

29. Generally all ac electric motors operate on the principle of induction or _____.

A. conduction
B. repulsion
C. capacitance
D. magnetism

30. In making a resistance test, remember that the resistance of a short circuit is

A. infinite
B. approximately zero
C. midway between high and low range
D. slightly above the midrange

31. For prevent from an electric shock, electrical ladders should have

A. plastic footings
B. rubber footings
C. wood footings
D. metal footings

32. Which of the following is the best advantage of a dc motor over an ac motor?

A. It is easier to reverse its speed.
B. It has a higher speed rating
C. It has a better speed control
D. All of these

33. Which of the following switches is the same as a three-way switch?

A. Single-pole double throw switch
B. Double-pole single throw switch
C. Single-pole single throw switch
D. Double-pole double throw switch

34. A synchronous motor when under-excited acts like _____

A. a resistor
B. an inductor
C. a capacitor
D. all of these

35. Which of the following statements describe a synchronous motor?

A. It is not self-starting
B. It requires both ac and dc supplies
C. It is used for power factor improvement
D. All of these

36. Which of the following motors produce lagging power factor?

A. Induction motor
B. Series motor
C. Compound motors
D. Synchronous motors

37. Electrical symbol represented by a circle with a plus sign inside it.

A. Push button
B. Bell
C. Riser down
D. Pull box

RME Board Exam

38. To control a lamp from five different places, an electrician would install the following:

A. three 4-way and two 2-way switches
B. two 3-way and three 4-way switches
C. four 3-way and one 4-way switches
D. three 3-way and two 4-way switches

39. A single-phase motor is taking 20 A from a 400 V supply at 0.75 lagging power factor. What is the power taken?

A. 4,000 W
B. 6,000 W
C. 8,000 W
D. 5000 W

40. Calculate the current drawn by a 100-W, 110 V incandescent lamp?

A. 0.91 A
B. 1.21 A
C. 1.10 A
D. 0.89 A

RME Board Exam

41. What is in brief, the basis of operation of a 3-phase induction motor?

A. Motor is started
B. Motor is excited
C. Magnetic field is shorted
D. Revolving magnetic field is produced when a 3-phase stator winding is fed from a 3-phase supply

RME Board Exam

42. The device used to attenuate specific signals is the

A. splitter
B. drop tap
C. line tap off
D. trap

43. A small tool with a tapered drill point used to make a pilot hole for wood screw mounting.

A. Screw driver
B. Center punch
C. Puller
D. Gimlet

RME Board Exam

44. How much is the resistance of a 600 W, 120-V toaster?

A. 0.2 ohm
B. 5 ohms
C. 20 ohms
D. 24 ohms

45. To protect battery terminals from corroding, they should be covered with _____.

A. grease
B. electrical tape
C. motor oil
D. white lead

RME Board Exam

46. The insulation resistance of the winding of an electric motor is measured by

A. ammeter
B. galvanometer
C. megohmmeter
D. voltmeter

47. A synchronous converter is used to change _____.

A. speed
B. frequency
C. ac voltage to dc voltage and vice-versa
D. mechanical energy to electrical energy

48. The direction of rotation a three phase motor can be reversed by

A. switching any two of the three leads
B. dismantling the motor and switching two leads
C. switching all three leads
D. none of these

RME Board Exam

49. The least efficient lighting source is the

A. metal halide
B. fluorescent
C. mercury
D. incandescent

50. The rating of storage battery that delivers 15 amps for 12 hours is ___.

A. 180 Ah
B. 270 Ah
C. 150 Ah
D. 360 Ah

Part 2: Philippine Electrical Code

51. A short length of a conductor used to make a connection between terminals or around a break in a circuit.

A. Jumper
B. Guy
C. Bonding wire
D. Tie wire

RME Board Exam

52. The surface nonmetallic raceway may NOT be used in the following locations EXCEPT one. Which one is this?

A. In dry locations
B. Where concealed
C. Where subject to severe physical damage
D. In hoistways

53. A fabricated assembly of insulated conductors in a flexible metallic enclosure.

A. Type MI
B. Type USE
C. Type UF
D. Type AC

54. Fixture wires shall NOT be smaller than ____ .

A. 0.5 mm^2
B. 1.25 mm^2
C. 2.0 mm^2
D. 0.75 mm^2

55. Flat cable assemblies shall NOT be installed _____.

A. in hoistways
B. in any hazardous locations
C. outdoors
D. all of these

56. For bare metal parts, busbars, etc of opposite polarity held free in air shall maintain a minimum spacing of _____ for voltages rated not over 250 V.

A. 10 mm
B. 20 mm
C. 16 mm
D. 19 mm

RME Board Exam

57. For grounding electrode to which portable or mobile equipment system neutral impedance is connected, shall be isolated from the ground by at least a certain distance from any other system or equipment grounding electrode. What is this distance?

A. 4,000 mm
B. 6,000 mm
C. 5,000 mm
D. 3,000 mm

58. Type IGS cable is using a dry kraft paper tape and an SF_6 gas. What do you mean by SF_6?

A. Sulfur fluoride
B. Sulfur hexafluoride
C. Sulfur ferrite
D. None of these

59. Cables operated at over ____ shall be shielded.

A. 2,000 V
B. 1,000 V
C. 3,000 V
D. 2,500 V

60. Space heating cables shall be secured at intervals NOT exceeding ____.

A. 300 mm
B. 200 mm
C. 400 mm
D. 500 mm

RME Board Exam

61. A run conduit between outlets, between fittings, between outlet and fitting shall not contain more than the equivalent of ____ quarter bends.

A. 2
B. 4
C. 3
D. 5

62. The average distance between down conductors in a lightning protection system shall NOT exceed

A. 30 m
B. 20 m
C. 15 m
D. 25 m

RME Board Exam

63. A storage battery supplying emergency lighting an d power shall maintain no less than 87.5 % of full voltage at total load for a period of at least

A. 1.5 hours
B. 2.5 hours
C. 2.0 hours
D. 1.0 hour

64. A general term covering an assembly or assemblies of devices for the interruption, control and metering of electric power.

A. Control system
B. Power system
C. Switchgear
D. Instrumentation

65. Thermoplastic insulated fixture wires shall be durably marked on the surface at intervals NOT exceeding

A. 900 mm
B. 500 mm
C. 1,000 mm
D. 600 mm

RME Board Exam

66. What is the temperature rating of THW insulation?

A. 60 °C
B. 85 °C
C. 75 °C
D. 90 °C

67. The minimum size of type IGS cable shall be _____.

A. 100 mm^2
B. 125 mm^2
C. 150 mm^2
D. 200 mm^2

RME Board Exam

68. This is a single conductor or multi-conductor assembly provided with or without an overall covering, primarily used for services.

A. Tray cable
B. Clad cable
C. Service entrance cable
D. Flat conductor cable

69. Ground connections shall be made at approximately every other steel column around the perimeter of the building and shall NOT be more than ____ apart.

A. 18 m
B. 20 m
C. 16 m
D. 24 m

70. Type AC cable shall NOT be permitted to be used _____.

A. in storage battery
B. on cranes or hoists
C. in motion pictures
D. all of these

RME Board Exam

71. Transformers that contain liquid that will burn shall be installed only in approved vaults and shall also comply with the following conditions EXCEPT one. Which one is this?

A. Ample ventilation shall be provided for the continuous removal of flammable gases
B. Vent openings shall lead to a safe locations outside the building
C. All vent ducts and openings shall be of sufficient areas to reliable explosion pressures within the vault
D. There shall be a robust door between the vault and any non-hazardous location

72. An appliance which can easily be moved from one place to another in normal use.

A. Fixed appliance
B. Accessible appliance
C. Stationary appliance
D. Portable appliance

73. Flat cable assemblies shall have conductors of ____ special stranded copper wires.

A. 2.0 mm^2
B. 3.5 mm^2
C. 5.5 mm^2
D. 8.0 mm^2

RME Board Exam

74. What locations do NOT allow the installation of PVC rigid conduits?

A. Hazardous locations
B. Corrosive locations
C. Wet locations
D. In concealed locations

75. Incandescent lamp fixtures shall be marked to indicate the allowable wattage of lamps. The markings shall be permanently installed in letters at least ___ high.

A. 6.0 mm
B. 6.4 mm
C. 6.3 mm
D. 6.5 mm

76. For school buildings, the general lighting load is _____ VA per square meters.

A. 24
B. 28
C. 16
D. 8

77. The feeder demand factor for three kitchen equipment other than dwelling kitchen equipment shall be _____.

A. 100 %
B. 90 %
C. 70 %
D. 80 %

78. No parts of cord connected fixtures, hanging fixtures or pendants shall be located within a zone measured _____ horizontally from a bathtub rim.

A. 900 mm
B. 1,000 mm
C. 800 mm
D. 700 mm

RME Board Exam

79. To provide for small appliance load in a dwelling unit, the feeder should be computed at

A. 2,400 watts
B. 3,000 watts
C. 1,500 watts
D. 3,600 watts

80. Which one is used on conduits and are located inside and outside of the box.

A. Couplings
B. Bushings
C. Locknuts
D. Screws

RME Board Exam

81. The circuit conductors between the service entrance equipment or isolated generating plant and the branch circuit overload device or devices.

A. overcurrent protector
B. feeder
C. motor controller
D. disconnecting switch

82. Open wiring on insulators shall be permitted only for wiring systems of _____ or less.

A. 150 V
B. 240 V
C. 300 V
D. 600 V

83. Which of the following metals is the best conductor of electricity?

A. Steel
B. Iron
C. Aluminum
D. Copper

84. The nearest ground terminal shall be NOT less than _____ from the foundation wall.

A. 760 mm
B. 800 mm
C. 550 mm
D. 600 mm

RME Board Exam

85. Conductors shall be securely attached to the buildings using fasteners. Fasteners shall be spaced NOT more than

A. 760 mm
B. 600 mm
C. 880 mm
D. 900 mm

86. The minimum diameter of air terminal used at the top of a heavy duty smoke or vent stacks shall be _____, exclusive of the corrosion protection.

A. 10 mm
B. 15 mm
C. 13 mm
D. 20 mm

87. In damp or wet locations, boxes and fittings should be properly placed or insulated to prevent

A. dust from entering the box or fitting
B. water from entering the box or fitting
C. wiring exposure
D. grounding

88. Busbars shall be made from copper having a minimum conductivity of how many percent?

A. 100 %
B. 96 %
C. 98 %
D. 97 %

89. Individual open conductors and cables other than service entrance cables shall NOT be installed within ___ of every grade level.

A. 3,100 mm
B. 2,500 mm
C. 3,700 mm
D. 3,000 mm

90. Pipelines with impedance heating shall NOT operate at greater than _____.

A. 30 V
B. 24 V
C. 50 V
D. 100 V

91. Watercraft's switchboards shall be provided with a clear working space of at least _____ at the front.

A. 1,500 mm
B. 1,200 mm
C. 1,600 mm
D. 1,000 mm

92. An insulated grounded conductor of 14 mm^2 or smaller shall be identified by a continuous ___ outer finish along its entire length.

A. green
B. black
C. green with yellow stripes
D. white or natural gray

93. Equipment having an open circuit voltage exceeding ___ shall NOT be installed in dwelling occupancies.

A. 500 V
B. 300 V
C. 250 V
D. 230 V

RME Board Exam

94. Concealed knob and tube wiring conductors shall be rigidly supported on knobs not more than a certain minimum distance apart. What is this distance?

A. 2,000 mm
B. 1,500 mm
C. 1,300 mm
D. 2,500 mm

95. The area within ___ horizontally from an aircraft power plant shall be classified hazardous under Class I, Division 2 location.

A. 1,200 mm
B. 1,500 mm
C. 1,800 mm
D. 2,000 mm

96. If the duty cycle of a motor-generator arc welder is 100 %, the supply conductors shall NOT be less than _____ of its rated primary nameplate current.

A. 115 %
B. 125 %
C. 100 %
D. 130 %

RME Board Exam

97. For a motor starter to be in sight of the controlled motor, it must NOT be more than _____ meters away.

A. 20
B. 15
C. 25
D. 10

98. Which of the following materials is used to support the conductor in the open wiring method?

A. Insulated wire stoppers
B. Insulated nails
C. Rosettes
D. Split knobs

99. Most wires used in residential house wiring are usually insulated by which of the following?

A. Asbestos
B. Cotton
C. Thermoplastic
D. Varnished cambric

100. Conductors supplying a heating unit shall be calculated at _____ percent times the heating load plus the blower motor.

A. 125
B. 100
C. 130
D. 115

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 4

ANSWER KEY

1. B. 0.833 A

Solution:

$P = EI$

$I = \frac{P}{E} = \frac{100}{120}$

$I = 0.833\ A$

2. A. voltmeter
3. D. left with its cover closed and padlocked
4. B. incandescent lamps
5. A. a negligible effect on the circuit current
6. C. 25 A

Solution:

$I_n = \sqrt{I_1^2 + I_2^2 + I_3^2 - I_1I_2 - I_2I_3 - I_1I_3}$

$I_n = \sqrt{(68)^2 + (88)^2 + (96)^2 - (68)(88) - (88)(96) - (68)(96)}$

$I_n = 24.97\ A$

7. C. Capacitor run motor
8. B. 13.5

Solution:

$R = \frac{E}{I} = \frac{110}{5}$

$R = 22\ \Omega$

$\text{Length} = 22\ \Omega \times \frac{1\ ft}{1.63\ \Omega}$

$\text{Length} = 13.5\ ft$

9. C. start measuring at the highest range
10. C. increase in resistance per ohm per degree absolute
11. C. Core losses
12. A. 0.2

Solution:

$P = 200\ J/s$ or $200\ W$

$P = 0.2\ kW$

13. B. emitter, base and collector
14. C. ac generator
15. B. aluminum
16. A. 24,000 ohms

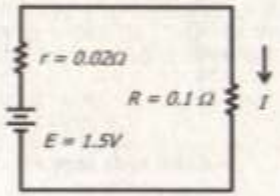
Solution:

$R = \frac{E}{I} = \frac{24}{0.001}$

$R = 24{,}000\ ohms$

17. A. reamer
18. A. 1.25 V

Solution:



$I = \frac{E}{R_t} = \frac{1.5}{0.02+0.1}$

$I = 12.5\ A$

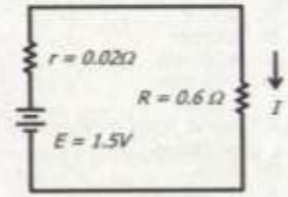
$E_R = IR$

$E_R = 12.5(0.1)$

$E_R = 1.25\ V$

19. C. Tachometer
20. A. the temperature should remain constant
21. A. 3.5 watts

Solution:



$I = \frac{E}{R_t} = \frac{1.5}{0.02+0.6}$

$I = 2.42\ A$

$P_R = I^2R = (2.42)^2(0.6)$

$P_R = 3.5\ W$

22. D. All of these
23. C. 60 times a second
24. A. watts to volt-amperes
25. C. 7.96 kVA

Solution:

$S = \sqrt{3}EI$

$S = \sqrt{3}(230)(20)$

$S = 7967.43\ VA$ or $7.96\ kVA$

26. B. heating, magnetic and electric shock

27. B. 1200 W

Solution:

$P = EI$

$P = 120(10)$

$P = 1200\ W$

28. A. oil and soap
29. B. repulsion
30. B. approximately zero
31. B. rubber footings
32. C. It has a better speed control
33. A. Single-pole double throw switch
34. B. an inductor
35. D. All of these
36. A. Induction motor
37. C. Riser down
38. B. two 3-way and three 4-way switches
39. A. 6,000 W

Solution:

$P = EIpf$

$P = 400(20)(0.75)$

$P = 6{,}000\ W$

40. A. 121 ohms

Solution:

$P = EI$

$I = \frac{P}{E} = \frac{100}{110}$

$I = 0.91\ A$

41. D. Revolving magnetic field is produced when a 3-phase stator winding is fed from a 3-phase supply
42. D. trap
43. D. Gimlet

44. D. 24 ohms

Solution:

$$P = \frac{E^2}{R}$$

$$R = \frac{E^2}{P} = \frac{120^2}{600}$$

R = 24 ohms

45. A. grease
46. C. megohmmeter
47. C. ac voltage to dc voltage and vice-versa
48. A. switching any two of the three leads
49. D. incandescent
50. A. 180 amp-hr

Solution:

Rating = I x time

Rating = (15)(12)

Rating = 180 Ah

51. A. Jumper
52. A. In dry locations
53. D. Type AC
54. D. 0.75 mm²
55. D. all of these
56. D. 19 mm
57. B. 6,000 mm
58. B. Sulfur hexafluoride
59. A. 2,000 V
60. B. 200 mm
61. B. 4
62. A. 30 m
63. A. 1.5 hours
64. C. Switchgear
65. D. 600 mm
66. C. 75 °C
67. B. 125 mm²
68. C. Service entrance cable
69. A. 18 m
70. D. all of these

71. D. There shall be a robust door between the vault and any non-hazardous location
72. D. Portable appliance
73. C. 5.5 mm²
74. A. Hazardous locations
75. B. 6.4 mm
76. A. 24
77. B. 90%
78. A. 900 mm
79. C. 1,500 watts
80. C. Locknuts
81. B. feeder
82. D. 600 V
83. D. Copper
84. D. 600 mm
85. D. 900 mm
86. B. 15 mm
87. B. water from entering the box or fitting
88. D. 97%
89. A. 3,100 mm
90. A. 30 V
91. D. 1,000 mm
92. D. white or natural gray
93. B. 300 V
94. C. 1,300 mm
95. B. 1,500 mm
96. C. 100%
97. B. 15
98. D. Split knobs
99. C. Thermoplastic
100. A. 125

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 5

Part I: Technical Subject

1. Two resistors of 5 and 10 ohms respectively are connected in parallel. If the total current to the branch is 24 A, find the current in the 5-ohm resistance?

A. 16 A
B. 15 A
C. 10 A
D. 8 A

2. Overload protective devices are rated in ____.

A. amperes
B. coulombs
C. watts
D. volts

RME Board Exam

3. A no load testis performed on a transformer for determining ___.

A. copper loss
B. magnetizing current and loss
C. efficiency of the transformer
D. shorts

4. An inverse time characteristic of a fuse means ____.

A. higher fault current, longer time needed to cut-off
B. lower fault current, shorter time needed to cut-off
C. higher fault current, shorter time needed to cut-off
D. none of these

RME Board Exam

5. If the individual resistances are 5, 10 and 15 ohms respectively. What potential must the battery supply to force a current of 0.50 A through the circuit?

A. 15 V
B. 30 V
C. 10 V
D. 60 V

6. What level of electrical license is needed as one of the requirements to be appointed as members of the Board of Electrical Engineering?

A. RME
B. REE
C. PEE
D. All of these

RME Board Exam

7. What is the function of the zero adjust control in multimeter?

A. The moving parts cab be tightened
B. It serves to conduct the current
C. With this control, the sensitivity of the instrument can be changed
D. The zero point is corrected with the help of this control

8. Which of the following devices is NOT found on a dc board?

A. Synchroscope
B. Ammeter
C. Voltmeter
D. Rheostat

RME Board Exam

9. The compressed mixture of air and petrol is burnt by means of

A. spark of spark plug
B. distributor
C. compression
D. none of these

10. A step-down transformer,

A. lowers both the voltage and current
B. lowers the voltage and increases the current
C. lowers the current and increases the voltage
D. increases both the voltage and current

RME Board Exam

11. The inducing emf within the circuit itself caused by any change of current within that circuit.

A. Mutual inductance
B. Friction
C. Self inductance
D. Losses

12. The resistance of a material is inversely proportional to its

A. length
B. diameter
C. cross-sectional area
D. volume

13. Which of the following dc generators are preferable for parallel operations due to their drooping voltage characteristics?

A. Series generators
B. Shunt generators
C. Compound generators
D. All of these

14. Flux in a magnetic circuit is comparable to what in electric circuit?

A. Voltage
B. Resistance
C. Current
D. Power

15. In a series RL circuit, the current _____ the voltage.

A. leads
B. lags
C. both A and B
D. neither A or B

RME Board Exam

16. An open resistor reads _____ ohms in an ohmmeter.

A. infinite
B. zero
C. 1 megohm
D. none of these

17. Which type of dc armature winding is used for high current applications?

A. Wye
B. Wave
C. Delta
D. Lap

18. The total opposition to current flow in ac circuits.

A. Resonance
B. Impedance
C. Admittance
D. Relactance

RME Board Exam

19. The reciprocal of impedance

A. Conductance
B. Reluctance
C. Admittance
D. Susceptance

20. Which of the following statements is TRUE?

A. The smaller the diameter of a conductor, the higher the resistance
B. The larger the diameter of a conductor, the higher the resistance
C. The smaller the diameter of a conductor, the lesser the resistance
D. The diameter of conductor does not affect the resistance

RME Board Exam

21. The power factor of an incandescent bulb is

A. 0.707 lagging
B. 0.707 leading
C. 1.0
D. zero

22. The iron losses of a dc motor occur in the ____.

A. field
B. armature
C. yoke
D. commutator

23. Commutator segments are normally made from _____.

A. iron
B. hard drawn copper
C. brass
D. aluminum

24. When 30 V is applied across two equal resistances in series, 10 mA of current flows. Find the value of each resistance.

A. 1.5 kΩ
B. 3.0 kΩ
C. 150 Ω
D. 300 Ω

RME Board Exam

25. Megger in its operation is based upon

A. electrostatic meter
B. moving coil meter
C. dynamic meter
D. moving iron meter

26. A tool used for pulling gears, bearings, and bushings on the shaft of a motor or a generator.

A. C-clamp
B. Hickey
C. Puller
D. Monkey wrench

27. A hydrometer is used to measure which of the following?

A. Specific gravity of the battery electrolyte
B. Water content of the battery
C. Internal temperature of a battery
D. Acid content of a battery

RME Board Exam

28. Applicants for registered master electricians' examination must be at least _____ years of age.

A. 18
B. 19
C. 17
D. 21

29. If the generator field is excited from a battery, the machine is classified as what type of generator?

A. Separately excited
B. Self excited
C. Synchronous
D. None of these

30. In a given circuit, when the power factor is unity, the reactive volt-ampere is _____.

A. maximum
B. zero
C. equal to real power
D. equal to apparent power

31. One advantage of the moving coil instrument is that its scale is

A. non-linear
B. linear
C. logarithmic
D. exponential

32. Which of the following is an advantage of a CB over a fuse?

A. It is more reliable
B. It is cheaper
C. It is easy to detect open, close or trip positions
D. It has a higher current rating

33. The speed of a dc motor is directly proportional to its

A. armature current
B. flux per pole
C. back emf
D. torque

RME Board Exam

34. The prefix pico means

A. 10^{-12} of a unit
B. 10^{-6} of a unit
C. 10^{-15} of a unit
D. 10^{-9} of a unit

35. Which one is the same as RMS value of an alternating wave?

A. Average value
B. Instantaneous value
C. Effective value
D. Absolute value

RME Board Exam

36. Current that continually reverses its direction.

A. Pulsating direct current
B. Alternating current
C. Direct current
D. Pulsating alternating current

37. Device used to pull wire through the conduit.

A. Straps
B. Fish tape
C. Wire tongs
D. Puller

RME Board Exam

38. It was experimentally found by James Prescott Joule that the heat produced in a current carrying conductor is proportional to

A. the square of the current
B. the current
C. square of resistance
D. none of these

39. A three-layer semi-conductor device.

A. Potentiometer
B. Diode
C. Transistor
D. Vacuum tube

RME Board Exam

40. An applicant for registered master electricians' examination must at least completed a___ year electrician course and has a specific record of _____years of apprenticeship after completion of the course.

A. two, three
B. one, one
C. two, two
D. one, two

41. Which of the following cannot be used as a medium for extinguishing the arc of a CB?

A. vacuum
B. SF_6 gas
C. water
D. open air

42. Magnetism that remains in a magnet even after the magnetizing force has been withdrawn.

A. Natural
B. Saturation
C. Ideal
D. Residual

RME Board Exam

43. Meter accuracy is determined by

A. full scale deflection
B. one fourth of full scale deflection
C. zero deflection
D. half scale deflection

44. In DC circuit, inductance and capacitance are irrelevant in circuit analysis due to

A. dc supply has no frequency
B. they do not exist in dc circuits
C. there effect is useless in dc circuits
D. all of these

45. Equalizer connections are necessary in paralleling two or more what type of generators?

A. Shunt generators
B. Series generators
C. Compound generators
D. All of these

46. In motor controls, a maintaining contact is what type of contact?

A. Normally open
B. Normally close
C. Delay-on
D. Delay-off

47. Which of the following instruments is the most sensitive?

A. Moving iron type
B. Induction type
C. Electrostatic type
D. Permanent magnet type

48. What type of relay is used for protection of motors against overload?

A. Thermal relay
B. Magnetic contactor
C. Buchholz's relay
D. Differential relay

RME Board Exam

49. An oven takes 11 A at 220 V. It is desired to reduce the current to 10 A. What resistance must be connected in series?

A. 2 ohms
B. 22 ohms
C. 20 ohms
D. 5 ohms

50. What component of a dc generator is NOT found on a separately excited ac generator?

A. Yoke
B. Field poles
C. Commutator
D. Armature

Part 2: Philippine Electrical Code

51. For single phase ac or dc motors supplied by a two wire, single phase ac or dc with one conductor grounded how many overload units shall be required?

A. One, in the grounded conductor
B. One, in the ungrounded conductor
C. Two, in both conductors
D. No overload units required

RME Board Exam

52. Stage equipment like footlights, border lights and others shall be so arranged that no branch circuit supplying such equipment will carry a load exceeding ___.

A. 20 A
B. 15 A
C. 30 A
D. 10 A

53. Metal poles ___ permitted to be used to support lighting fixture and enclosed supply conductors.

A. shall be
B. shall not be
C. both A and B
D. neither A or B

RME Board Exam

54. The branch circuit conductors that supply one or more units of data processing systems shall have an ampacity NOT less than ____ percent of the total connected load.

A. 150
B. 100
C. 125
D. 200

RME Board Exam

55. Which of the raceway methods is NOT allowed to be used in a hazardous location?

A. Rigid metal conduit
B. Liquidtight flexible metal conduit
C. Rigid non-metallic conduit
D. None of these

56. Where nails or screws are used to mount knobs, they shall be of a length sufficient to penetrate the wood to a depth equal to at least ____ the height of the knob.

A. two-third
B. three-fourth
C. one-half
D. one-third

57. How many side of any pull box shall be removable?

A. Only one side
B. Two opposite sides
C. Two adjacent sides
D. One or more sides

58. Dimmers installed in ungrounded conductors shall be protected by OCPD not exceeding ____ percent of their rating.

A. 100
B. 115
C. 125
D. 150

59. Locations which are hazardous because of the presence of easily ignitable fibers of flyings.

A. Class I
B. Class II
C. Class III
D. Class IV

RME Board Exam

60. Explosion hazards exist due to the presence of the following material EXCEPT one. Which one is this?

A. Combustible dust
B. Flammable vapors
C. Flammable liquids
D. Carbon dioxide gas

61. Smallest size of EMT (electrical metallic tubing)

A. 20 mm
B. 15 mm
C. 10 mm
D. 12 mm

62. The nominal gas pressure used in type IGS cable shall be

A. 200 kPa
B. 150 kPa
C. 138 kPa
D. 140 kPa

RME Board Exam

63. What is the temperature rating of THHN insulation?

A. 60 °C
B. 90 °C
C. 85 °C
D. 75 °C

64. All ac squirrel cage motors and synchronous motors with autotransformer starting shall have an overcurrent protective device using inverse time circuit breaker with a maximum setting of ____ of its full load current rating.

A. 250 %
B. 150 %
C. 300 %
D. 200 %

RME Board Exam

65. Some of the principal factors that affect the operating temperature of a cable are the following EXCEPT one. Which one is this?

A. Voltage
B. Ambient temperature
C. Ventilation
D. Load current

66. Self-excited generators supplying power to organs shall have a potential of NOT more than ____.

A. 15 V
B. 24 V
C. 30 V
D. 60 V

67. Mobile home service equipment shall be rated NOT less than ___.

A. 90 A
B. 60 A
C. 100 A
D. 125 A

68. Communication wires and cables shall have a voltage rating of NOT less than

A. 300 V
B. 250 V
C. 500 V
D. 600 V

69. The ampacity of the neutral conductor of a dual voltage feeder shall be ___ of the ampacity of the ungrounded conductors.

A. 100 %
B. 150 %
C. 200 %
D. 125 %

RME Board Exam

70. Metal clad cables shall be supported and secured at intervals NOT exceeding

A. 1800 mm
B. 1500 mm
C. 1600 mm
D. 2000 mm

71. The ampacities of type UF (underground feeder) cable shall be that of the ___ conductors.

A. 60 °C
B. 75 °C
C. 90 °C
D. 40 °C

72. No motor circuit in any watercraft shall have conductors less than

A. 5.5 mm^2
B. 3.5 mm^2
C. 2.0 mm^2
D. 1.25 mm^2

RME Board Exam

73. Sizes of building wires manufactured in the Philippines are standardized in square millimeters. What is the area of copper conductor, which is next larger than 8 square millimeters?

A. 12 mm^2
B. 10 mm^2
C. 14 mm^2
D. 9 mm^2

74. Each patient bed location shall be provided with a minimum of how many receptacles?

A. 4
B. 2
C. 3
D. 5

75. Flexible cords or data processing cables used to connect computer units shall be ___ as part of the system.

A. isolated
B. approved
C. both A and B
D. neither A or B

76. Branch circuits to receptacles under raised floors in computer rooms shall be wired with

A. EMT
B. IMC
C. AC cable
D. all of these

RME Board Exam

77. According to the PEC, the minimum insulation level for neutral conductors of residential installations, which have solidly grounded system, shall NOT be less than this voltage, which one is this?

A. 1,000 volts
B. 300 volts
C. 600 volts
D. 750 volts

78. The use of non-metallic raceway shall be permitted in ____

A. wet locations only
B. dry locations only
C. both A and B
D. neither A or B

79. As to the general rule, floating buildings shall be supplied by _____set of feeder conductors from their service equipment.

A. one
B. two
C. three
D. all of these

RME Board Exam

80. Which of the following electric wires has the highest ampacity?

A. 5.5 mm^2
B. 8.0 mm^2
C. 30 mm^2
D. 50 mm^2

81. Rosettes for use with conduit boxes or raceway shall have bases high enough to keep wire and terminals at least ____ from the surface wired over.

A. 12 mm
B. 10 mm
C. 13 mm
D. 15 mm

82. Indoor antennas and indoor lead-in conductors shall NOT be run nearer than ___ to conductors of other wiring systems in the premises.

A. 40 mm
B. 30 mm
C. 60 mm
D. 50 mm

83. Exit lights on watercrafts shall be provided at each point. The word "EXIT" shall be red letters not less than ___ high.

A. 50 mm
B. 60 mm
C. 64 mm
D. 40 mm

84. Receptacles located on stages in theaters shall NOT exceed ____ percent of their ratings for continuous duty loads.

A. 50
B. 60
C. 70
D. 80

85. Storage batteries used, as source of power for emergency system shall maintain a voltage applied to the load without falling below a certain percentage of normal value. What is this percentage?

A. 95.3 %
B. 87.5 %
C. 84.2 %
D. 93.7 %

86. It is known in the field as PVC.

A. Rigid metal conduit
B. Flexible non-metallic conduit
C. Rigid non-metallic conduit
D. Cable tray

87. The nominal voltage used in elevator, dumbwaiter, escalator and moving walk driving machine motors, machine brakes and motor-generator sets shall NOT exceed

A. 1,000 V
B. 500 V
C. 600 V
D. 300 V

RME Board Exam

88. A 15-A or a 20-A branch circuit shall be permitted to supply lighting units and other utilization devices. The rating of any one cord and plug connected appliance shall NOT exceed a certain percentage of the branch circuit rating. What is this percentage?

A. 80 %
B. 90 %
C. 70 %
D. 60 %

89. A cable made-up of electric conductors which provides electrical connection between an elevator or dumbwaiter car and fixed outlet in the hoistway.

A. Coaxial cable
B. Metal-clad cable
C. Flat-conductor cable
D. Traveling cable

90. Lighting fixtures exposed to cleansing water in agricultural buildings shall be __

A. drip proof
B. watertight
C. waterproof
D. any of these

RME Board Exam

91. Metal clad cables shall be permitted for installations in the following locations EXCEPT one. Which one is this?

A. Signal circuits
B. Branch circuits
C. Direct burial in the earth
D. Aerial cable

92. What is the minimum weight of a fixture that requires a support that is independent of the outlet box?

A. 20 kg
B. 25 kg
C. 23 kg
D. 24 kg

93. Open conductors on insulators shall be separated at least ____ from metal raceways, piping or other conducting materials.

A. 50 mm
B. 60 mm
C. 70 mm
D. 40 mm

94. Rigid metal conduit and intermediate metal conduit when used underground shall have a minimum burial of _____

A. 100 mm
B. 200 mm
C. 250 mm
D. 150 mm

95. Driven rods maybe used as a grounding electrodes provided the driven depth shall NOT be less than

A. 2,000 mm
B. 2,450 mm
C. 2,540 mm
D. 2,040 mm

96. One set of service entrance conductors shall be permitted to supply more than ____ sets of service equipment.

A. one
B. two
C. three
D. none of these

RME Board Exam

97. Concealed knob and tube wiring shall be supported within _____ of each side of each tap or splice.

A. 150 mm
B. 125 mm
C. 100 mm
D. 200 mm

98. An enclosed channel designed expressly for holding wires, cables or busbars with additional functions as permitted.

A. Cage
B. Cabinet
C. Junction box
D. Raceway

RME Board Exam

99. What is the insulation resistance acceptable by the Philippine Electrical Code for 600-V circuits consisting of 2.0 mm2 conductor?

A. 250,000 ohms
B. 750,000 ohms
C. 500,000 ohms
D. 1,000,000 ohms

100. A metal raceway of circular cross section with integral or associated couplings, connectors and fittings approved for the installation of electrical conductors.

A. Rigid metal conduit
B. Surface metal raceway
C. Electrical metallic tubing
D. Intermediate metal conduit

< Exam ends here >

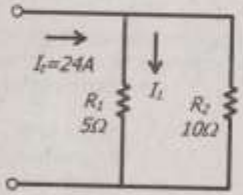
Proceed to the next page for the answer key and solutions!

Question Bank 5

ANSWER KEY

1. A. 16 A

Solution:

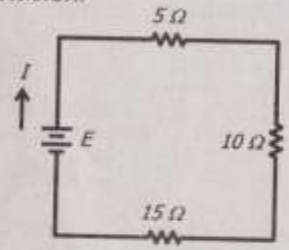


Using current division theorem:

$$I_1 = \frac{I_t R_2}{R_1 + R_2} = \frac{24(10)}{5+10} = 16\ A$$

2. A. amperes
3. B. magnetizing current and loss
4. C. higher fault current, shorter time needed to cut-off
5. A. 15 V

Solution:

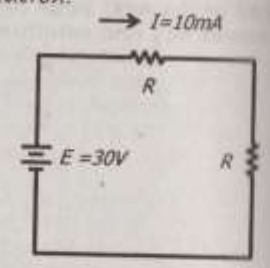


$R_t = 5+10+15 = 30\ \Omega$

$E = IR_t = 0.5(30) = 15\ V$

6. C. PEE
7. D. The zero point is corrected with the help of this control
8. A. Synchroscope
9. A. spark of spark plug
10. B. lowers the voltage and increases the current
11. C. Self inductance
12. C. cross-sectional area
13. B. Shunt generators
14. C. Current
15. B. lags
16. A. infinite
17. D. Lap
18. B. Impedance
19. C. Admittance
20. A. The smaller the diameter of a conductor, the higher the resistance
21. C. 1.0
22. C. yoke
23. B. hard drawn copper
24. A. 1.5 kΩ

Solution:



$$I = \frac{E}{R+R} = \frac{E}{2R}$$

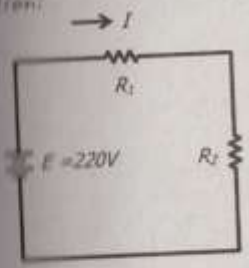
$$R = \frac{E}{2I} = \frac{30}{2(0.010)}$$

$R = 1500\ \Omega$ or $1.5\ k\Omega$

25. D. moving iron meter

26. C. Puller
27. B. Specific gravity of the battery electrolyte
28. A. 18
29. A. Separately excited
30. B. zero
31. B. linear
32. C. It is easy to detect open, close or trip positions
33. C. back emf
34. A. 10^{-12} of a unit
35. C. Effective value
36. A. Alternating current
37. B. Fish tape
38. A. the square of the current
39. C. Transistor
40. C. two, two
41. C. water
42. D. Residual
43. A. full scale deflection
44. A. dc supply has no frequency
45. C. Compound generator
46. A. Normally open
47. D. Permanent magnet type
48. A. Thermal relay
49. A. 2 ohms

Solution:



$$R_1 = \frac{E}{I} = \frac{220}{11} = 20\Omega$$

$$I_{new} = \frac{E}{R_1 + R_2}$$

$$R_2 = \frac{E}{I_{new}} - R_1 = \frac{220}{10} - 20$$

$R_2 = 2$ ohms

50. C. Commutator
51. B. One, in the ungrounded conductor
52. A. 20 A
53. A. shall be
54. C. 125
55. C. Rigid non-metallic conduit
56. C. one-half
57. D. One or more sides
58. C. 125
59. C. Class III
60. D. Carbon dioxide gas
61. B. 15 mm
62. C. 138 kPa
63. B. 90 °C
64. D. 200%
65. C. Ventilation
66. A. 15 V
67. C. 100 A
68. A. 300 V
69. A. 100%
70. A. 1800 mm
71. A. 60 °C
72. C. 2.0 mm^2
73. C. 14 mm^2
74. A. 4
75. B. approved
76. D. all of these
77. B. 300 volts
78. B. dry locations only
79. A. one
80. D. 50 mm^2
81. B. 10 mm
82. D. 50 mm
83. A. 50 mm
84. D. 80
85. B. 87.5%
86. C. Rigid non-metallic conduit
87. C. 600 V
88. A. 80%
89. D. Traveling cable
90. B. watertight
91. C. Direct burial in the earth
92. C. 23 kg
93. A. 50 mm
94. D. 150 mm
95. B. 2,450 mm
96. A. one
97. A. 150 mm

98. D. Raceway
99. C. 500,000 ohms
100. D. Intermediate metal Conduit

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 6

Part I: Technical Subject

1. The frame of a dc generator or a motor is made of what metal?

   A. Soft iron
   B. Aluminum
   C. Cast steel
   D. Hard drawn copper

RME Board Exam

2. If the maximum current on a circuit is 70 amps, the ammeter will read

   A. 60.4 A
   B. 49.49 A
   C. 69.5 A
   D. 70 A

3. What circuit element used to resonate with capacitors?

   A. Resistors
   B. Transistors
   C. Inductors
   D. Diodes

4. Which of the following is a characteristic of a wye-connected three-phase alternator?

   A. The line current is less than the phase current
   B. The line voltage is equal to the phase voltage
   C. The line voltage is greater than the phase voltage
   D. The line current is greater than the phase current

5. Which one refers to the generator's mechanical driver?

   A. Exciter
   B. Prime mover
   C. Coupler
   D. Transducer

RME Board Exam

6. In a series circuit, the current is

   A. proportional to the resistance
   B. different in different resistors
   C. constant
   D. none of these

7. Copper when exposed to ordinary atmospheres becomes oxidized turning into what color?

   A. Brown
   B. Light gray
   C. Light orange
   D. Black

RME Board Exam

8. A 200-V lamp has a hot resistance of 400 ohms. The power rating in watts of the lamp is

   A. 100 W
   B. 200 W
   C. 600 W
   D. 300 W

9. Which of the following is a unit of conductance?

   A. Gauss
   B. Mho
   C. Ohm
   D. Lumen

RME Board Exam

10. Contamination of transformer oil is because of

A. moisture
B. heating
C. decomposition of oil
D. all of these

11. Electrical symbol represented by a solid line.

A. Intercom wiring
B. Telephone wiring
C. Conduit
D. Service entrance

RME Board Exam

12. The larger the conductor, the__.

A. higher the voltage
B. higher the resistance
C. lower the resistance
D. lower the ampacity

13. Before storing a lead-acid battery for a long time, the battery should be

A. discharge and covered with canvas
B. discharge but the electrolyte is not drained
C. keep electrolyte level low
D. discharge and the electrolyte is drained

RME Board Exam

14. The armature of a generator has a resistance of 0.20 ohm. When the current through the armature is 5 A, the terminal voltage is 224 volts. What is its emf?

A. 226 V
B. 225 V
C. 230 V
D. 224 V

15. The armature core of dc machine is laminated to reduce the _____.

A. copper windings needed
B. eddy current loss
C. hysteresis loss
D. weight of the armature

RME Board Exam

16. If the number of turns in an inductor is increased, its inductance will

A. vary
B. decrease
C. increase
D. remain the same

17. What determines the voltage of a lead acid cell?

A. The type of electrodes
B. The strength of the electrolyte
C. The size of the plates
D. None of these

RME Board Exam

18. How can the polarity of a dc generator be reversed?

A. reversing the field current as well as rotation
B. increasing the field current
C. reversing the field current
D. any of these

19. One of the following is a distinguishing feature of a shunt motor. Which one?

A. It has a stable speed through a wide load range
B. It will not drop in speed if overloaded
C. It has a high starting torque
D. A load will not affect it if running at high speed

20. A 10 A electric fan with a power factor of 80% is connected to a 230 V source. How much is the power in watts?

A. 2,300 W
B. 1,760 W
C. 1,840 W
D. 1,280 W

21. A capacitor opposes any change in _____.

A. current
B. voltage
C. resistance
D. flux

22. Typical output of a lead acid cell.

A. 1.5 V
B. 2.5 V
C. 2.0 V
D. 3.0 V

RME Board Exam

23. The field winding of a shunt motor has a resistance of 110 ohms and the voltage applied is 110 V. What is the amount of power expended in the field excitation?

A. 330 W
B. 220 W
C. 440 W
D. 500 W

24. If it becomes necessary to operate a motor at a slight overload for a short period of time, you should _____.

A. install higher rating fuses
B. check bearing and motor temperatures frequently
C. jumper the terminals of the overload relay
D. call the chief engineer

RME Board Exam

25. At absolute zero temperature a semi-conductor behave as a

A. good conductor
B. variable resistor
C. good insulator
D. super conductor

26. A substance that cannot be decomposed any further by chemical action.

A. Molecule
B. Compound
C. Atom
D. Element

RME Board Exam

27. The process by which one conductor produces or induces a voltage in another conductor even though there is no mechanical coupling between the two conductors.

A. Cutting of fluxes
B. Short circuit
C. Induction
D. System

28. To dissipate internal heat in a generator, it is built with __.

A. laminated cores
B. insulation
C. special non conductors
D. none of these

RME Board Exam

29. A small swamping resistance is fit in series with the operating coil of a moving coil ammeter to compensate for the effects of

A. external magnetic fields
B. temperature variation
C. hysteresis loss
D. none of these

30. If an electronic device will hum, the most likely caused is a defective _____.

A. transistor
B. filter
C. diode
D. amplifier

31. Simplest form of a motor controller.

A. Magnetic contactor
B. Toggle switch
C. Drum switch
D. Relay

RME Board Exam

32. A megohm is connected to the ends of a motor winding what will a low ohm reading indicate?

A. Continuity
B. Loose coil
C. Open coil
D. Dirty coil

33. What is the purpose of the commutator in a dc motor?

A. To rectify the armature current
B. To magnify the armature current
C. To invert the armature current
D. To control the armature current

RME Board Exam

34. A rotary phase converter is a device having a rotary transformer and ___ panels that can operate 3 –phase loads from a single-phase source.

A. regulator
B. capacitor
C. secondary
D. primary

35. Resistance offered by the active material of a cell.

A. Bulk resistance
B. Internal resistance
C. Absolute resistance
D. Specific resistance

RME Board Exam

36. For excessive heat in the end play of a fractional horsepower motor the possible remedy is to

A. align pulleys correctly
B. add end play washers
C. replace end play bolts
D. adjust belt tension

37. Alternator synchronization means _____.

A. connecting alternators in parallel
B. connecting alternators in series
C. adjustment in field excitations
D. load sharing between alternators

38. If the heat in a motor increases, which of the following is a probable cause?

A. Repeated jogging or plugging the motor
B. Long periods of overload
C. Both A and B
D. Neither A or B

39. Which of the following dc generator has a terminal voltage that varies widely with changes in load current?

A. Shunt generator
B. Series generator
C. Cumulative compound generator
D. Flat compounded generator

40. The rating of a storage battery is expressed in

A. ampere-hours
B. watts
C. kilowatt-hours
D. volt-amperes

41. If a dc generator was rotated in the wrong direction, it would fail to build up the voltage. Why?

A. The armature field would oppose the field current
B. The circuit breaker would not energize
C. The brushes would burn out
D. The generator would motorize

RME Board Exam

42. Which of the following constitutes the major load for an automobile battery?

A. Brake light
B. Self-starter
C. Parking lights
D. Spark plug

RME Board Exam

43. If the allowable current in a copper bus bar is 1000 amperes per square inch of cross section, the width of a standard 1/4 bus bar designed to carry 1,500 A would be?

A. 4 inches
B. 6 inches
C. 8 inches
D. 2 inches

44. Ampere per volt is the same as which of the following units?

A. Joule
B. Siemen
C. Maxwell
D. Ohm

45. The power factor of an over-excited synchronous motor is

A. lagging
B. leading
C. unity
D. zero

46. When the switch of a controller opens upon voltage failure and then closes again after the voltage is restored. Which one?

A. Low voltage protection
B. Instantaneous release
C. Over-current protection
D. Low voltage release

47. In star-delta starters, at starting the motor is connected in ____ configuration.

A. wye
B. delta
C. delta-wye
D. wye-delta

48. This tool is used by lineman to remove insulation of large cables

A. Wire stripper
B. Lineman's pliers
C. Wire gauge
D. Electrician's knife

RME Board Exam

49. The thermal overload relay of motor starters protect the motor from ____

A. short circuits
B. momentary overloads
C. a sustained overload condition
D. phase-reversals

50. Most common copper busbar form for carrying heavy current.

A. Round
B. Stranded
C. Channel
D. Flat

Part 2: Philippine Electrical Code

51. Cable trays shall NOT be used in

A. hoistways
B. industrial establishments
C. dry locations
D. all of these

52. Type UF cables shall NOT be used _____.

A. as branch circuits
B. as service entrance
C. as direct burial to earth
D. all of these

RME Board Exam

53. The usual function of a disconnect switches in high voltage circuits is to

A. isolate from energized buses, equipment which are not in service
B. open or close the circuit under load
C. open the circuit in the event of an overload
D. maintain continuity of service

54. The bonding conductor used in agricultural buildings shall be copper, insulated, covered or bare, NOT smaller than _____.

A. 8.0 mm^2
B. 5.5 mm^2
C. 14.0 mm^2
D. 3.5 mm^2

RME Board Exam

55. An overheated cord often indicates

A. defective cord
B. corroded terminals
C. corroded terminals and defective cord
D. none of these

56. Individual arrester grounding conductors shall be no smaller than _____ copper.

A. 8.0 mm^2
B. 14 mm^2
C. 5.5 mm^2
D. 3.5 mm^2

57. The load for the required branch circuit installed for the supply of exterior signs or outline lighting shall be computed at a minimum of _____ volt-amperes.

A. 1,000
B. 1,200
C. 1,500
D. 1,600

58. A generic term for an artificial source of light.

A. Lumen
B. Lux
C. Candle
D. Lamp

59. The system neutral conductor shall not be connected to ground EXCEPT

A. when the generator frame is not grounded
B. through the grounding impedance
C. through a grounding transformer
D. when a ground fault is very common

60. Cable bus shall be securely supported at intervals NOT exceeding

A. 3,600 mm
B. 3,000 mm
C. 3,800 mm
D. 4,000 mm

61. Snap switches used with open wiring on insulators shall be mounted on insulating material that separates the conductors at least _____ from the surface wired over.

A. 12 mm
B. 10 mm
C. 11 mm
D. 13 mm

RME Board Exam

62. The usual nameplate data on dc motors include the following EXCEPT one. Which one is this?

A. Manufacturer's name
B. Rated frequency
C. Rated voltage
D. Rated speed

63. Metal covers for boxes shall be lined with firmly attached insulating material not less than _____ in thickness.

A. 0.80 mm
B. 0.50 mm
C. 0.75 mm
D. 0.64 mm

64. Vertical runs of wireways shall be securely supported at intervals NOT exceeding _____.

A. 4,000 mm
B. 2,400 mm
C. 3,600 mm
D. 4,500 mm

65. Conductors supplying two or more motors shall have an ampacity equal to the sum of the FLA rating of all motors plus _____ of the highest motor FLA in the group.

A. 30 %
B. 15 %
C. 20 %
D. 25 %

RME Board Exam

66. What is the purpose of using locknuts?

A. To make tighter connection
B. To make it difficult to tamper connections
C. To be able to make more connections to one stud
D. To prevent the connection from loosening under severe vibration

67. An enclosure of porcelain or other insulating material, fitting with terminals and intended for connecting the flexible cord carrying a pendant to the permanent wiring.

A. Rosette
B. Raceway
C. Cable bus
D. None of these

68. Energized parts of a generator operated at more than _____ volts to ground shall NOT be exposed to accidental contact where accessible to unqualified persons.

A. 50
B. 30
C. 48
D. 60

69. Type MI cable shall NOT be used

A. in dry, wet or continuously moist locations
B. where exposed to destructive corrosive conditions
C. for services, and feeders
D. all of these

70. Pendant conductors where not cabled and longer than a certain length shall be twisted. What length is this?

A. 1,000 mm
B. 900 mm
C. 600 mm
D. 800 mm

71. Each receptacle for dc plugging boxes shall be rated at NOT less than ____.

A. 20 A
B. 30 A
C. 15 A
D. 40 A

RME Board Exam

72. Insulated ground conductor of 14 mm^2 or smaller shall be identified by a continuous white outer finish along its entire length or another color which is

A. green
B. natural gray
C. striped green
D. striped white

73. Electrical non-metallic tubing shall NOT be used where the voltage is over

A. 500 V
B. 230 V
C. 300 V
D. 600 V

RME Board Exam

74. Which of the following statements is NOT correct?

A. Overcurrent devices shall be located where they will not be exposed to physical damage
B. Overcurrent devices shall be readily accessible
C. In a multi-family dwelling, each occupant shall have ready access to all overcurrent devices protecting his occupancy
D. Overcurrent devices may be located inside clothes closets

75. The ampacity of the phase conductors from the generator terminals to the first overcurrent device shall NOT be less than ___ percent of the nameplate current rating of the generator

A. 125
B. 110
C. 115
D. 120

76. Busways shall be marked with which of the following?

A. voltage rating
B. manufacturer's name
C. current rating
D. all of these

77. Where "U" pulls are made on the pull box, the distance between each raceway entry inside the box and the opposite wall of the box shall NOT be less than ___ times the trade diameter of the largest raceway in a row.

A. 8
B. 7
C. 6
D. 5

78. Faceplates of insulating material shall be non-combustible and not less than ___ in thickness.

A. 2.5 mm
B. 1.5 mm
C. 2.0 mm
D. 3.0 mm

79. Welding process wherein coalescence is produced by heating with an electric arc with or without the application of pressure and with or without the use of filler metal.

A. Resistance welding
B. Spot welding
C. Arc welding
D. All of these

80. Emergency lighting of ____ lux shall be provided in exit paths from all areas of attended stations.

A. 10
B. 20
C. 30
D. 15

81. Reference ambient temperature for explosion proof electrical equipment shall be ___

A. 30 °C
B. 40 °C
C. 50 °C
D. 60 °C

RME Board Exam

82. Lamp protection shall be provided by elevation of at least ___meters from the normal working surface.

A. 2
B. 1
C. 2.5
D. 3

83. Cables and cords supplied through plugging boxes shall be of

A. aluminum
B. copper
C. aluminum or copper
D. copper-clad aluminum

RME Board Exam

84. What is the maximum number of conductors permitted in a wireway at any cross-section, signal circuit or starter-control wires are not included?

A. 30 conductors
B. 50 conductors
C. 40 conductors
D. 25 conductors

85. In battery rooms with alkaline batteries, the shelves shall be lined with steel sheet NOT less than ____ thick.

A. 70 mm
B. 60 mm
C. 65 mm
D. 75 mm

86. In any watercraft, the motor circuit shall have an ampacity of NOT less than ___ of the motor's full load current rating.

A. 125 %
B. 100 %
C. 115 %
D. 130 %

RME Board Exam

87. The largest size of electrical metallic tubing is

A. 75 mm
B. 125 mm
C. 150 mm
D. 100 mm

88. The overload relay used to protect each motor-compressor set shall be selected to trip at NOT more than ____ of the motor-compressor rated load current.

A. 125 %
B. 130 %
C. 150 %
D. 140 %

RME Board Exam

89. The use of underground feeder cables may NOT be used in the following conditions EXCEPT one. Which one is this?

A. Embedded in concrete
B. Hazardous location
C. Direct burial
D. Theaters

90. Each motor shall be provided with how many disconnects?

A. Two
B. Any number
C. Only one
D. Not required by the PEC

RME Board Exam

91. Which of the following colors identifies the grounded conductor of a branch circuit?

A. Green
B. Black
C. White
D. Blue

92. Receptacles installed for the attachment of portable cords shall be rated at NOT less than ____, 250 V.

A. 20 A
B. 30 A
C. 10 A
D. 15 A

93. A conductor or group of conductors, in switchgear assemblies which serves as a common connection for two or more circuits.

A. Bus
B. Lug
C. Cut-out
D. Terminal block

94. The ampacity of capacitor circuit conductors shall NOT be less than ____ of the rated current of the capacitor.

A. 125 %
B. 115 %
C. 135 %
D. 150 %

95. An assembly of a flexible cord with an attachment plug on one end and a cord connector on the other.

A. Extension cord
B. Fixture cord
C. Appliance cord
D. None of these

96. The alternate or back-up source of power in a hospital shall have a capacity to sustain its connected loads for a minimum of ___ .

A. 1.5 hours
B. 2.0 hours
C. 1.0 hour
D. 2.5 hours

97. A disruptive discharge around or over the surface of a solid or liquid insulator.

A. Sparkover
B. Corona
C. Flashover
D. Skin effect

98. A hoisting and lowering mechanism equipped with a car or platform which moves in guides in a substantially vertical direction and which serves two or more floors of a building or structure.

A. Dumbwaiter
B. Escalator
C. Elevator
D. All of these

RME Board Exam

99. Any box not over ____ cm3 in size, intended for mounting in wood building construction shall be affixed with anchors or clamps as to provide a rigid and secure installation.

A. 1,540
B. 1,760
C. 1,800
D. 1,640

100. Motors with a marked service factor of less than 1.15 shall have an overload protection rated to ____percent of the motor's FLA.

A. 100
B. 125
C. 120
D. 115

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 6

ANSWER KEY

1. C. Cast steel
2. B. 49.49 A

Solution:

Note: The ammeter will read the effective or the rms value of the current.

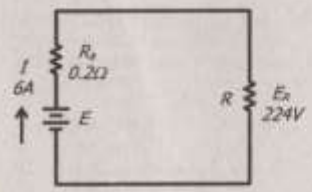
$$I_{rms} = \frac{I_{max}}{\sqrt{2}}$$

$$I_{rms} = \frac{70}{\sqrt{2}}$$

$$I_{rms} = 49.49 \text{ A}$$

3. C. Inductors
4. C. The line voltage is greater than the phase voltage
5. B. Prime mover
6. C. constant
7. D. Black
8. A. 100 W
9. B. Mho
10. D. all of these
11. C. Conduit
12. C. lower the resistance
13. D. discharge and the electrolyte is drained
14. B. 225 V

Solution:



$$E = E_R + IR_s$$

$$E = 224 + 5(0.2)$$

$$E = 225 \text{ V}$$

15. B. eddy current loss
16. C. increase
17. B. The strength of the electrolyte
18. C. reversing the field current
19. A. It has a stable speed through a wide load range
20. C. 1,840 W

Solution:

$$P = EIpf = 230(10)(0.8)$$

$$P = 1840 \text{ watts}$$

21. B. voltage
22. C. 2.0 V
23. C. 440 W

Solution:

$$P = \frac{E^2}{R} = \frac{220^2}{110}$$

$$P = 440 \text{ watts}$$

24. B. check bearing and motor temperatures frequently
25. C. good insulator
26. D. Element
27. C. Induction
28. A. laminated cores
29. A. external magnetic fields
30. B. filter
31. B. Toggle switch
32. A. Continuity
33. C. To invert the armature current
34. A. regulator

[illegible] internal resistance
[illegible] align pulleys correctly
[illegible] connecting alternators in parallel
[illegible] both A and B
[illegible] Series generator
[illegible] ampere-hours
[illegible] The armature field would oppose the field current
[illegible] Self-starter
[illegible] 6 inches

Solution:

[illegible] $\text{A} \times \frac{\text{in}^2}{1000 \text{ A}} = 1.5 \text{ in}^2$

[illegible] $\frac{A}{C} = \frac{1.5}{1/4}$

[illegible] Siemen
[illegible] leading
[illegible] Low voltage release
[illegible] eye
[illegible] Electrician's knife
[illegible] a sustained overload condition
[illegible] flat
[illegible] hoistways
[illegible] as service entrance
[illegible] isolate from energized buses, equipment which are not in service
[illegible] 8 mm^2
[illegible] corroded terminals and defective cord
[illegible] 14 mm^2
[illegible] 1,200
[illegible] Lamp
[illegible] through the grounding impedance
[illegible] 1,600 mm
[illegible] 11 mm
[illegible] Rated frequency
[illegible] 680 mm
[illegible] 4,500 mm

65. D. 25%
66. A. To make tighter connection
67. A. Rosette
68. A. 50
69. B. where exposed to destructive corrosive conditions
70. B. 900 mm
71. B. 30 A
72. B. natural gray
73. D. 600 V
74. D. Overcurrent devices may be located inside clothes closets
75. C. 115
76. D. all of these
77. C. 6
78. A. 2.5 mm
79. C. Arc welding
80. A. 10
81. C. 50 °C
82. A. 2
83. B. copper
84. A. 30 conductors
85. D. 75 mm
86. B. 100%
87. D. 100 mm
88. D. 140%
89. C. Direct burial
90. C. Only one
91. C. White
92. D. 15 A
93. A. bus
94. C. 135%
95. A. Extension cord
96. A. 1.5 hours
97. C. Flashover
98. C. Elevator
99. D. 1,640
100. D. 115

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Notes

Notes

Question Bank 7

Part I, Technical Subject

1. Why is it that slip rings are sometimes fitted on dc generators?

   A. To apply excitation to the field
   B. To supply ac from the machine
   C. To convert the internal ac to dc
   D. To supply more current

RME Board Exam

2. The temperature of the shunt field motor increased from 20°C to 80°C after 3 hours of operation. This increase in temperatures produces what effect on the behavior of the motor?

   A. It will slow down due to decrease in field current
   B. It will have no effect
   C. It will slow down the motor due to increase of field circuit resistance
   D. It will speed up the motor due to decrease in the field current

RME Board Exam

3. Electron flow produced by means of applying a pressure to a material is called ___.

   A. Electrochemistry
   B. Thermoelectricity
   C. Piezoelectricity
   D. Photo conduction

4. A coil of wire placed in the armature core used to fill up the vacant slots but which is not connected to the armature windings.

   A. Damping coil
   B. Auxiliary coil
   C. Dummy coil
   D. Compensating coil

5. Which one is the most commonly used cell?

   A. Silver-zinc
   B. Lead-acid
   C. Nickel-iron
   D. Lithium

RME Board Exam

6. Which instrument is the most sensitive?

   A. Permanent magnet moving coil
   B. Dynamometer
   C. Moving iron
   D. Hot wire

7. The shunt of an ammeter is made from

   A. copper
   B. silver
   C. manganese
   D. manganin

8. The direction of rotation of a capacitor-start induction motor can be reversed by reversing

   A. the starting winding leads
   B. the running winding leads
   C. either A or B
   D. neither A or B

9. A three-phase load is balanced if all three phases have the same

A. impedance
B. power factor
C. both B and C
D. resistance

10. PVC is a widely used insulation or jacketing on communication wires control cable, bell wire, building wire, appliance cord, etc. What do you mean by PVC?

A. Propylene chloride
B. Polyethylene chloride
C. Polyester chloride
D. Polyvinyl chloride

RME Board Exam

11. An electrical timer switch for lighting is normally connected in ___ with the lighting circuit being controlled.

A. tandem
B. sequence
C. series
D. parallel

12. When using Ohm's law IR would solve for _____.

A. amperage
B. resistance
C. electrical power
D. voltage

13. Alternator voltage can be increased by _____.

A. decreasing the prime mover speed
B. increasing the field circuit rheostat
C. increasing the prime mover speed
D. increasing the armature resistance

14. Unit of electrical current flo

A. Ampere
B. Coulomb
C. Weber
D. Volt

RME Board Exam

15. International ohm is defined terms of resistance of

A. a cube of carbon
B. a column of mercury
C. a cube of copper
D. a unit length of metal

16. At what percentage speed rated will a centrifugal switch opens in a split-phase motor when started?

A. 75%
B. 50%
C. 100%
D. 60%

17. The ratio of KW to KVA is

A. plant factor
B. utilization factor
C. factor of safety
D. power factor

18. Counter emf is measured in

A. amps
B. volts
C. ohms
D. ampere-turns

RME Board Exam

19. A fluorescent lamp unit connected to a 110-V ac line takes 1.20 A and requires 110 power. What is its power factor

A. 0.9
B. 0.833
C. 0.866
D. 0.8

20. An electric heater uses 20 kW-hr in 8 hours. If the voltage across the heater is 240 volts. What is the heater resistance?

A. 25 Ω
B. 83 Ω
C. 23 Ω
D. 12 Ω

21. A rheostat is used to regulate the current in a circuit by

A. varying the voltage of the circuit
B. varying the power factor of the circuit
C. varying the resistance of the circuit
D. all of these

RME Board Exam

22. Ohm's law is applicable to

A. electric arcs
B. gas discharge lamps
C. rectifying devices
D. none of these

23. Capacitors are used to ___.

A. filter ac currents and pass dc currents
B. filter ac and dc currents
C. filter dc currents and pass ac currents
D. pass dc and ac currents

24. In a series circuit, the total resistance is _____.

A. the sum of the reciprocals of all resistances
B. the average of all resistances
C. the sum of all resistances
D. smaller than the smallest resistance

25. The hot resistance of a 230-V incandescent lamp is 300 ohms. What current is required to operate the lamp?

A. 0.85 A
B. 0.77 A
C. 1.30 A
D. 0.74 A

RME Board Exam

26. What voltage would be required to produce a flow of 10 A through a resistance of 12 ohms?

A. 125 V
B. 122 V
C. 121 V
D. 120 V

27. The advantage of a wye-connected system is that _____.

A. the line currents and phase currents are equal
B. it is easy to troubleshoot due to it's a simple arrangement
C. two voltages can be used
D. none of these

RME Board Exam

28. An ac circuit has a resistance of 4 ohms and a reactance of 3 ohms. What is the impedance?

A. 7 ohms
B. 5 ohms
C. 12 ohms
D. 8 ohms

29. In a shunt-wound generator the rheostat is connected

A. in parallel with the field
B. across the line
C. in series with the field
D. none of these

RME Board Exam

30. How many coils are there in a megger?

A. Two
B. Four
C. One
D. Three

31. Washing machines usually uses what type of motor?

A. Hysteresis motor
B. Compound motor
C. Shaded-pole motor
D. Resistance split-phase motor

RME Board Exam

32. The number of cycles of an ac voltage is known as

A. frequency
B. wave form
C. phase angle
D. half mode

33. One joule of electrical energy is equivalent to _____.

A. one watt-second
B. one watt-minute
C. one kilowatt-hour
D. one watt per second

34. Type of overload that contains a solder pot.

A. Bimetallic
B. Metallic
C. Melting alloy
D. Magnetic

35. A synchronous motor is excited with

A. an ac current
B. a dc current
C. a combination of ac and dc currents
D. any current

36. A cell supplies a load current of 0.5 A for a period of 20 hours until its terminal voltage falls to an unacceptable level. How long it could be expected to supply a current of 100 mA?

A. 50 hours
B. 100 hours
C. 60 hours
D. 70 hours

37. The physical of a resistor that determines its ability to dissipate heat is rated in

A. amperes
B. ohms
C. volts
D. watts

RME Board Exam

38. A 3-ohm resistor and a 6-ohm resistor are connected in series across a dc supply. If the voltage drop across the 3-ohm resistor is 4 V, what is the voltage of the supply?

A. 6 volts
B. 8 volts
C. 18 volts
D. 12 volts

39. Solutions that are used in batteries are called _____

A. pastes
B. catalyst
C. compounds
D. electrolytes

RME Board Exam

40. Lubrication is never used on

A. a commutator
B. a knife switch
C. a cutting die when threading
D. wire being pulled into a conduit

RME Board Exam

41. In a dc generator, the purpose of the commutator is to _____.

A. rectify armature current
B. convert magnetic lines of force to flux
C. keep a constant voltage
D. keep a constant amperage

42. If an atom has less than 4 valence electrons, the material is

A. an insulator
B. a semi-conductor
C. a super conductor
D. a conductor

43. Resistors are commonly made from _____.

A. mica
B. porcelain
C. ceramic
D. all of these

RME Board Exam

44. A battery is a group of cells connected in

A. parallel
B. series-parallel
C. series
D. all of these

45. Another name for capacitance to ground

A. Dielectric capacitance
B. Image capacitance
C. Skin capacitance
D. Stray capacitance

46. What is the internal resistance of an ideal current source?

A. Low
B. Negative
C. High
D. Zero

47. Which of the following is a requirement to induce a voltage and current in a wire?

A. A magnetic field
B. A conductor in a closed circuit
C. Motion between A and B
D. All of these

RME Board Exam

48. Resistance commonly used in power circuits.

A. Carbon composition
B. Wire wound resistors
C. Deposited film resistors
D. Etched circuit resistors

49. When selecting the size of wire to be used in a circuit, the most important tem to consider is the

A. resistance of the circuit
B. amperage of the circuit
C. voltage of the circuit
D. amount of wire to be used

50. How can a short circuit be detected?

A. By using an ohmmeter
B. By using a megger
C. By using an oscilloscope
D. By using an ammeter

Part 2: Philippine Electrical Code

51. Sheet metal troughs with hinged or removable covers for housing and protecting electric wires and cables and which conductors are laid in place after this object has been installed as a complete system.

A. Wireways
B. Busways
C. Cable trays
D. Non-metallic extensions

52. The minimum size of branch circuit capacity to supply laundry receptacle outlets shall be ___.

A. 20 A
B. 15 A
C. 25 A
D. 30 A

53. The grounding electrode conductor shall be _____.

A. copper
B. copper-clad-aluminum
C. aluminum
D. all of these

RME Board Exam

54. Conductors in open wiring on insulators shall be rigidly supported within ___ from a tap or splice.

A. 200 mm
B. 100 mm
C. 250 mm
D. 150 mm

55. Main and equipment bonding jumper shall be made from ___.

A. copper
B. aluminum
C. both A and B
D. neither A or B

56. Which of the following statements is NOT one of the primary objective of the Philippine Electrical Code?

A. To establish electrical work standards
B. To establish basic material qualities
C. To ensure safety in using electricity
D. None of these

RME Board Exam

57. Connection between [illegible] or inductive metal object [illegible] element of a lightning [illegible] system to accomplish [illegible] continuity.

A. Connectors
B. Interlink
C. Counterpoise
D. Bonding

58. The minimum insulation [illegible] neutral conductors of [illegible] grounded system shall be [illegible]

A. 500 V
B. 300 V
C. 600 V
D. 750 V

RME Board Exam

59. Flexible cords used in [illegible] where there is a lot of [illegible] or fibers shall comply [illegible] following EXCEPT one. [illegible] one is this?

A. It shall be approved [illegible] in locations which are [illegible] filled
B. It shall contain in addition [illegible] the conductors, a grounding conductor
C. It shall be of type [illegible] for extra hard usage
D. It shall be provided [illegible] suitable seal to prevent [illegible] entrance of dust

60. For class II lightning [illegible] the minimum diameter of [illegible] copper air terminal shall be [illegible]

A. 15.9 mm
B. 12.7 mm
C. 10.5 mm
D. 9.5 mm

RME Board Exam

[illegible] of PEC 1 requires [illegible] spaces for equipment [illegible] 600 V nominal or less [illegible] This is required for [illegible] parts on the other side, like [illegible] brick or tile walls and [illegible] be considered as grounded. [illegible] this minimum distance [illegible] condition 2?

[illegible] mm
[illegible] mm
[illegible] mm
[illegible] mm

[illegible] of unidirectional polarity.

[illegible] effect
[illegible]
[illegible]
[illegible]

[illegible] gutter shall be [illegible] throughout it entire [illegible] at intervals _____

[illegible] mm
[illegible] mm
[illegible] mm
[illegible] mm

RME Board Exam

[illegible] installing cables or [illegible] type wiring method [illegible] to the framing members [illegible] as joists, rafters or studs, [illegible] cable or raceway shall be [illegible] and supported so that [illegible] nearest outside surface of [illegible] cable or raceway is NOT less [illegible] a certain distance from the [illegible] edge of the framing [illegible]. What is this distance?

[illegible] mm
[illegible] mm
[illegible] mm
[illegible] mm

65. Mats of insulating rubber or other suitable floor insulation shall be provided for the operator where the voltage to ground exceeds _____

A. 150 V
B. 100 V
C. 250 V
D. 120 V

66. A point at which the load of a given area is assumed to be concentrated.

A. Switchboard
B. Outlet
C. Panelboard
D. Load center

67. How many 20 A branch circuit shall be provided for all receptacle outlets for the small appliance load?

A. One or more
B. At least two
C. Only one
D. None of these

68. For a one family dwelling unit having an initial load of 10 kVA or more, the minimum service entrance capacity shall be ___

A. 100 A
B. 90 A
C. 60 A
D. 30 A

69. The workspace about electrical equipment shall be adequate to permit at least ___ degree opening of doors or hinged panels.

A. 90
B. 45
C. 60
D. 75

RME Board Exam

70. The multiplying factor for determining the size of branch circuit protection for non-time delay fuse is

A. 300 %
B. 175 %
C. 250 %
D. 150 %

71. Portable appliances equipped with proper cord and plug caps and NOT more than ____ maybe installed without an electrical permit.

A. 1,200 VA
B. 1,500 VA
C. 1,000 VA
D. 1,800 VA

RME Board Exam

72. Each transformer up to 600 V nominal shall be protected by an individual overcurrent device on the primary side at not more than a certain percentage of the rated primary current of the transformer. What is this maximum percentage?

A. 110 %
B. 125 %
C. 100 %
D. 140 %

73. Tools and portable handlamps likely to be used in wet and conductive locations shall not be required to be grounded where supplied through an isolating transformer with an ungrounded secondary of not more than ___.

A. 100 V
B. 150 V
C. 50 V
D. 60 V

RME Board Exam

74. What is the maximum [illegible] rating allowed by the [illegible] protect a single phase [illegible] that draws 20 A at full [illegible] against short circuit but [illegible] same time will not fail [illegible]

A. 30 A
B. 60 A
C. 50 A
D. 20 A

75. The Code has been [illegible] and adopted by the [illegible] What does the acronym [illegible] stands for?

A. Philippine Regulation Commission
B. Professional Regulation Commission
C. Philippine Regulation Commission
D. Professional Regulation Commission

76. Which of the following [illegible] standard content of an [illegible] plan?

A. Location plan
B. Legend and general [illegible]
C. Schedule of maximum [illegible]
D. Specifications

RME Board Exam

77. Conductors supplying [illegible] more motor-compressors [illegible] without additional loads [illegible] have an ampacity not less [illegible] the sum of the rated load [illegible] ___ percent of the highest [illegible] motor-compressor rating [illegible] group.

A. 30
B. 25
C. 20
D. 15

[illegible] of the following [illegible] is NOT applicable on [illegible] locations?

[illegible] Type THHN
[illegible] Type THW
[illegible] Type RHW
[illegible] Type THWN

[illegible] 1.25 mm² fixture wire has [illegible] ampacity of ____.

[illegible] 10 A
[illegible] 9 A
[illegible] 12 A
[illegible] 8 A

[illegible] Board Exam

[illegible] A has a full load current of [illegible] and motor B, 10 A. What is [illegible] ampacity of the feeder [illegible] conductor supplying this two [illegible]?

[illegible] 9 A
[illegible] 10.5 A
[illegible] 16 A
[illegible] 24.2 A

[illegible] banks, the general lighting [illegible] shall be computed at ____ [illegible] square meters of the floor [illegible]

[illegible] 24
[illegible] 33
[illegible] 30
[illegible] 28

[illegible] panel and cutout boxes shall [illegible] an air space of at least [illegible] between any energized [illegible] parts of enclosed fuses [illegible] the door.

[illegible] 20 mm
[illegible] 13 mm
[illegible] 25 mm
[illegible] 15 mm

83. Open wiring on insulators shall be permitted on systems of up to ____.

A. 600 V
B. 500 V
C. 230 V
D. 300 V

84. Conductors in concealed knob and tube wiring shall maintain a clearance of NOT less than ____ between conductors.

A. 64 mm
B. 50 mm
C. 76 mm
D. 100 mm

RME Board Exam

85. The minimum size of wire used in electrical wiring is the former number 14 AWG. Under the metric system shown in the PEC, the diameter is

A. 2.0 mm
B. 3.2 mm
C. 1.6 mm
D. 2.6 mm

86. Non-metallic sheathed cable shall be secured in place at intervals NOT exceeding ____.

A. 1,300 mm
B. 1,200 mm
C. 1,500 mm
D. 1,800 mm

87. The bending radius of type SNM cable shall NOT be less than ____ times the diameter of the cable.

A. 3
B. 4
C. 5
D. 6

RME Board Exam

88. The ampacity of type UF cable shall be of that ___ conductor.

A. 60 °F
B. 140 °C
C. 60 °C
D. 75 °C

89. Flexible metallic tubing shall NOT be used in lengths longer than _____.

A. 2,000 mm
B. 1,800 mm
C. 1,900 mm
D. none of these

RME Board Exam

90. For each small appliance branch circuit, the feeder load shall be _____ per 20 A circuit.

A. 1,000 VA
B. 1,200 VA
C. 1,500 VA
D. 1,800 VA

91. A lighting and appliance branch circuit panelboard is one having more than _____ percent of its overcurrent device rated 30-A or less.

A. 10
B. 12
C. 15
D. 16

RME Board Exam

92. What is the nominal supply voltage specified by the Philippine Electrical Code for residential homes?

A. 225 volts ac
B. 230 volts ac
C. 240 volts ac
D. 220 volts ac

93. Non-metallic sheathed cable shall be supported within from every cabinet, box or fitting.

A. 150 mm
B. 200 mm
C. 250 mm
D. 300 mm

94. Messenger supported wiring shall NOT be used in _____.

A. hoistways
B. multi-conductor underground feeder
C. metal clad cable
D. all of these

95. Heating cables shall be furnished complete with factory assembled non-heating leads at least _____ in length.

A. 2,000 mm
B. 2,200 mm
C. 2,300 mm
D. 2,100 mm

96. Rosettes shall be rated at 660 W, 250 V with a maximum current rating of _____.

A. 6 A
B. 10 A
C. 4 A
D. 12 A

RME Board Exam

97. When thermal overload relays are used for the protection of a three-phase induction motor, their primary purpose is to protect the motor in case of

A. short circuit between lines
B. reversal of phase sequence
C. high voltage
D. sustained overload

[illegible] AC cable, all bends shall [illegible] so that the cable will [illegible] damage and the radius of [illegible] of the inner edge of [illegible] shall NOT be less than [illegible] times the diameter.

[illegible]

[illegible] Exam

[illegible] electrical plans for [illegible] house include the [illegible] items EXCEPT one. [illegible] is this?

[illegible] Substation plan
[illegible] Location plan
[illegible] Floor plan showing location of service
[illegible] Layout of wiring plan for general lighting and receptacle outlets

[illegible] Temporary electrical power [illegible] lighting installations shall be [illegible] for a period not to [illegible] _____ for Christmas [illegible] lighting, carnivals and [illegible] purposes.

[illegible] 100 days
[illegible] 120 days
[illegible] 90 days
[illegible] 60 days

< Exam ends here >

[illegible] to the next page for [illegible] key and solutions!

Question Bank 7

ANSWER KEY

1. B. To supply ac from the machine
2. D. It will speed up the motor due to decrease in the field current

Notes:

- The speed of a dc motor is inversely proportional to the flux generated by the field poles of the motor
- The flux generated by the electromagnetic poles of the motor is proportional to its field current.
- Using Ohms law, the current flowing in the field winding is inversely proportional to the resistance of the winding.

When the temperature increases, the resistance of the field windings will also increase making the field current to decrease. If the field current decreases, its flux generated will also decrease. And finally since the flux generated decreases, the speed of the motor will increase.

3. C. Piezoelectricity
4. C. Dummy coil
5. B. Lead-acid
6. A. Permanent magnet moving coil
7. D. manganin
8. C. either A or B
9. C. both B and C
10. D. Polyvinyl chloride
11. C. series
12. D. voltage
13. C. increasing the prime mover speed
14. A. Ampere
15. B. a column of mercury
16. A. 75%
17. D. power factor
18. B. volts
19. B. 0.833

Solution:

$$P = EIpf$$

$$pf = \frac{P}{EI} = \frac{110}{110(1.2)}$$

$$pf = 0.833$$

20. C. 23 Ω

Solution:

$$W = Pt$$

$$P = \frac{W}{t} = \frac{20}{8} = 2.5\ kW$$

$$P = \frac{E^2}{R}$$

$$R = \frac{E^2}{P} = \frac{240^2}{2{,}500}$$

$$R = 23.04\ ohms$$

21. C. varying the resistance of the circuit
22. D. none of these
23. C. filter dc currents and pass ac currents
24. C. the sum of all resistance

[illegible] 8.77 A

[illegible]

[illegible] 120 V

[illegible]

[illegible]

[illegible] two voltages can be used
[illegible] 5 ohms

[illegible]

[illegible] in series with the field
[illegible] Two
[illegible] Resistance split-phase motor
[illegible] frequency
[illegible] one watt second
[illegible] Heating alloy
[illegible] a dc current
[illegible] 100 hours

[illegible]

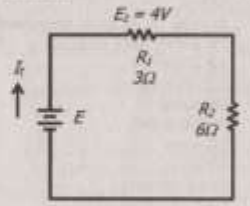
[illegible]

[illegible]

[illegible] 100 hours

37. D. watts
38. D. 12 volts

Solution:



$$I_t = \frac{E_1}{R_1} = \frac{4}{3} = 1.333\ A$$

$$E = I_t(R_1 + R_2)$$

$$= 1.333(3+6)$$

$$E = 12\ V$$

39. D. electrolytes
40. A. a commutator
41. A. rectify armature current
42. D. a conductor
43. D. all of these
44. D. all of these

Note:

In a battery, for higher voltage rating, cells are connected in series and for higher current rating, cells are connected in parallel or both type of connections for both requirements.

45. D. Stray capacitance
46. C. High
47. D. All of these
48. B. Wire wound resistors
49. B. amperage of the circuit
50. A. By using an ohmmeter
51. A. Wireways
52. A. 20 A
53. D. all of these

54. D. 150 mm
55. A. copper
56. D. None of these
57. D. Bonding
58. C. 600 V
59. C. It shall be of type approved for extra hard usage
60. B. 12.7 mm
61. D. 1,100 mm
62. D. Impulse
63. A. 1,500 mm
64. D. 50 mm
65. A. 150 V
66. D. Load center
67. A. One or more
68. C. 60 A
69. A. 90
70. A. 300%
71. A. 1,200 VA
72. B. 125%
73. C. 50 V
74. B. 60 A
75. B. Professional Regulation Commission
76. C. Schedule of maintenance
77. B. 25
78. A. Type THHN
79. B. 8 A
80. B. 20.5 A

Solution:

$$\text{Load} = \sum \text{load} + 25\% \text{ of largest load}$$

$$\text{Load} = 8 + 10 + (0.25 \times 10)$$

$$\text{Load} = 20.5 \text{ A}$$

81. D. 28
82. C. 25 mm
83. A. 600 V
84. C. 76 mm
85. C. 1.6 mm

Note:

The metric equivalent of size #14 AWG is 2.0 mm^2

$$A = \frac{\pi d^2}{4}$$

$$d = \sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4(2)}{\pi}}$$

$$d = 1.595 \text{ mm}$$

86. A. 1,300 mm
87. C. 5
88. C. 60 °C
89. B. 1,800 mm
90. C. 1,500 VA
91. A. 10
92. B. 230 volts ac
93. D. 300 mm
94. A. hoistways
95. D. 2,100 mm
96. A. 6 A
97. D. sustained overload
98. B. 5
99. A. Substation plan
100. C. 90 days

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 8

Part I: Technical Subject

1 negatively charge component of [illegible]

A. Electron
B. Proton
C. Neutron
D. Ion

Board Exam

2 battery whose internal [illegible] is 5 ohms is connected to an external resistor [illegible] ohms. The battery's [illegible] voltage is 15 V, what is the emf of the battery?

A. 17.5 V
B. 15.0 V
C. 12.5 V
D. 14.2 V

3 [illegible] is ____.

A. a meter for measuring the thickness of insulation
B. an instrument for measuring current
C. a hand-cranked ac generator
D. a hand-cranked dc generator

4 [illegible] name for counter emf.

A. Back emf
B. Opposite emf
C. Mutual emf
D. Self induced emf

5. A dc ammeter is connected in series with a battery whose current is to be measured. If the positive terminal of the meter is connected with negative terminal of the battery, what will happen?

A. The pointer of the meter will deflect downscale
B. The pointer of the meter will deflect upscale
C. The pointer of the meter will not move
D. None of these

6. If the 3-phase load is balanced, at least how many wattmeters are needed to measure the power?

A. One
B. Two
C. Three
D. Four

RME Board Exam

7. Charging a lead-acid cell causes the electrolyte to become

A. stronger
B. weaker
C. water
D. stable

8. If the resistance of the circuit is doubled while the applied voltage is held constant. The current will _____.

A. increase by half as much
B. remains the same
C. decrease to half as much
D. twice as much

9. Five carbon-zinc cells are in series. The open circuit voltage at the output is

A. 5.5 V
B. 10 V
C. 7.5 V
D. 6.5 V

10. Electrical symbol represented by a rectangle with a circle inside.

A. Fluorescent lamp outlet
B. Incandescent lamp outlet
C. Lighting panelboard
D. Safety switch

11. At dc steady state, an inductor acts like _____.

A. an open circuit
B. a short circuit
C. a capacitor
D. an insulator

12. The shunt resistance of an ammeter is usually a _____

A. low resistance
B. high resistance
C. either A or B
D. neither A or B

RME Board Exam

13. Damping provides

A. counter torque
B. starting torque on pointer
C. good accuracy
D. braking action on the meter pointer

14. Which of the following motors is well adapted to start large heavy inertia loads?

A. Series wound motor
B. Repulsion induction motor
C. Shunt motor
D. Stepper motor

RME Board Exam

15. Three horsepower is equivalent to ___ kilowatts.

A. 0.764
B. 2.238
C. 0.764
D. 2.292

16. A diode has a specified PIV rating. What do you mean by PIV?

A. Peak instantaneous voltage
B. Peak insulation voltage
C. Peak inverse voltage
D. Peak input voltage

RME Board Exam

17. A circuit has a capacitance of 1 microfarad and an inductance of 0.2 H. Calculate the resonant frequency of the circuit.

A. 65 Hz
B. 60 Hz
C. 50 Hz
D. 55 Hz

18. Which of the following dc motor is used in high-speed applications such as in compressors, blowers, fans, etc.

A. Series motor
B. Shunt motor
C. Cumulative compound motor
D. Differential compound motor

RME Board Exam

19. A battery having a total emf of 7.5 volts and a total internal resistance of 1.25 ohms, what external resistance will send a current of 2 A?

A. 2.0 ohms
B. 1.0 ohm
C. 1.75 ohms
D. 2.5 ohms

connected in parallel to

current capacity of the

voltage capacity of the

resistance capacity of

of these

Exam

proper way to mix the electrolyte for a battery is to add

alkaline water to acid
acid to distilled water
distilled water to acid
acid to alkaline water

V, 3 phase motor takes 8 load at 0.8 power factor How much power in kW take from the line?

kW
kW
kW
kW

Exam

temperature increases, resistance of most also increases,

Brass
Carbon
Silver
Copper

kVA 2,000/200 V single transformer has a rated current of

A
A
A
A

25. What happens if a transformer will be accidentally plugged into a dc circuit?

A. It would blow a fuse
B. The primary would overload and the secondary would be dead
C. The secondary would burn out
D. All of these

26. Which of the following power plant has the longest expected life?

A. Diesel power plant
B. Nuclear power plant
C. Geothermal power plant
D. Hydroelectric power plant

RME Board Exam

27. The first step in removing a generator from parallel operation,

A. remove the load from the off going generator
B. trip the generator off the bus bar
C. increase the cycle of the generator
D. turn off all electrical equipment

28. If a resistor is connected in series with the coil of a galvanometer designed to be used as a voltmeter, the resistor is used to _____.

A. increase the current rating of the voltmeter
B. increase the resistance rating of the voltmeter
C. increase the voltage rating of the voltmeter
D. all of these

29. A circuit or installation that prevents the motor from being reversed without first allowing the motor to stop.

A. Plugging
B. Anti-plugging
C. Braking
D. Jogging

RME Board Exam

30. A car battery supplies a current of 50 A to the starter motor. How much charge passes through the starter in 1/2 minute?

A. 1500 coulombs
B. 1800 coulombs
C. 3000 coulombs
D. 2000 coulombs

31. A series circuit has a resistance of 10 ohms and a reactance of 5 ohms. What is the circuit power factor?

A. 0.50
B. 0.866
C. 0.75
D. 0.89

RME Board Exam

32. A bank of lamps operates a current of 12 A and a voltage of 120 V. What power is taken from the ac mains?

A. 1.44 kW
B. 1.20 kW
C. 1.34 kW
D. 1.22 kW

33. Most utility companies requires a minimum load power factor of

A. 0.50
B. 0.866
C. 0.75
D. 0.80

34. The power factor of the circuit is zero, when the load of the circuit is a pure _____ only.

A. resistance
B. reactance
C. conductance
D. admittance

35. If an atom losses some of its electron or accepts extra electrons from another atom, the atom will be called _____.

A. an element
B. a lattice
C. a neutron
D. an ion

RME Board Exam

36. Hysteresis loss in a transformer depends upon the

A. reactance of windings
B. type of core material
C. applied voltage
D. number of laminations

37. Which of the following gases is given off by lead-acid storage batteries?

A. Oxygen
B. Hydrogen
C. Nitrogen
D. Carbon monoxide

38. Which of the following would cause one bar of a commutator to blacken?

A. A grounded coil
B. An open coil
C. A shorted coil
D. All of these

39. An instrument used to measure electrical current in a circuit?

A. Wattmeter
B. Megger
C. Ammeter
D. Galvanometer

40. The synchronous speed of a 4-pole, 60 cycle ac motor is

A. 2,000 rpm
B. 3,600 rpm
C. 1,800 rpm
D. 1,200 rpm

RME Board Exam

41. A transformer is associated with _____ current.

A. direct
B. alternating
C. neither ac or dc
D. either ac or dc

42. The capacitor used in power factor correction is normally rated in ___.

A. kW
B. kVA
C. kVAR
D. kV

43. What is the first thing to do if a generator overspeeds?

A. Adjust the rheostat
B. Trip the overspeed trip
C. Trip the circuit breaker
D. Secure the steam

44. The power factor of an induction motor is _____.

A. leading
B. lagging
C. unity
D. zero

45. A megger measures ____

A. insulation resistance
B. voltage
C. grounded voltage
D. deenergized circuit

46. Nominal open circuit voltage of a carbon-zinc cell.

A. 1.35 V
B. 2.1 V
C. 3.0 V
D. 1.5 V

47. Which type of ac motors needs a dc excitation?

A. Capacitor-start and run motor
B. Shaded pole motor
C. Wound rotor induction motor
D. Synchronous motor

48. Mega is a prefix equivalent to

A. 1,000
B. 1,000,000
C. 10,000
D. 100,000

RME Board Exam

49. Practical unit of electrical energy

A. watt
B. kilowatt
C. megawatt
D. kilowatt-hour

50. The symbol S_{2P} shall mean ____

A. a two-way switch
B. a two-position switch
C. a two-pole switch
D. duplex switch

Part 2: Philippine Electrical Code

51. Generator's compartments shall be lined with galvanized steel, not less than __ thick.

A. 0.40 mm
B. 0.50 mm
C. 0.30 mm
D. 0.60 mm

52. As a rule branch circuits shall NOT be supplied by

A. an autotransformer
B. a generator
C. a transformer
D. a motor-generator set

RME Board Exam

53. For a rigid steel conduit of trade diameter 50-mm, the field bend shall be so made that the radius of the inner edge shall not be less than a certain radius for conductors without lead sheathed. What is this radius?

A. 450 mm
B. 250 mm
C. 300 mm
D. 375 mm

54. Disruptive discharges between electrodes of a measuring gap.

A. Lightning
B. Flashover
C. Surge
D. Sparkover

55. For all deck or floor plans, the standard scale to be used is

A. 1:50
B. 1:10
C. 1:100
D. 1:500

RME Board Exam

56. The Electrical Code requires electrical plans and drawings shall be drawn on sheets of following standard size. Which one is NOT considered

A. 600 mm x 900 mm
B. 217 mm x 279 mm
C. 760 mm x 1000 mm
D. 500 mm x 760 mm

57. Service entrance cables supported at intervals not exceeding _____.

A. 900 mm
B. 800 mm
C. 760 mm
D. 1,000 mm

RME Board Exam

58. Type SE service entrance shall be permitted in wiring systems where all circuit conductors of the are of the ___ type.

I. rubber-covered
II. thermoplastic
III. metal

A. I, II and III
B. II only
C. II and III only
D. I and II only

59. How many sets of the electrical plans and specifications signed and by a PEE shall be submitted one of the requirements for an electrical permit?

A. 5
B. 4
C. 3
D. 2

where flammable are employed, the area shall be considered location which shall upward to a level ___ the floor.

mm
mm
mm
mm

Exam

contact switch, which the operation sequence of device during starting or during other switching operations.

operation sequence switch
Manual transfer switch
Position Switch
Field circuit sequence switch

from portable boards directly supplying containing lamps of not over shall be protected by current device having a of _____.

A
A
A
A

chassis-grounding terminal battery shall be bonded to vehicle chassis with a copper of _____ size or its

mm^2
mm^2
mm^2
mm^2

64. The length of the cord from the face of the attachment plug cap to the point where the cord enters the mobile home shall NOT be less than ____.

A. 5 m
B. 10 m
C. 8 m
D. 6 m

65. Non-metallic sheathed cables shall be supported within ____ of a non-metallic outlet box without cable clamps.

A. 200 mm
B. 150 mm
C. 180 mm
D. 220 mm

RME Board Exam

66. A test lamp using an ordinary bulb is used to test one of the following. Which one is this?

A. Overload test
B. dc or ac check
C. Polarity check
D. Ground check

RME Board Exam

67. Air conditioning load has a demand load of _____.

A. 80 %
B. 100 %
C. 125 %
D. 150 %

68. If there will be six or more 2-wire branch circuits for a one family dwelling unit, the minimum service entrance capacity shall be _____.

A. 60 A
B. 100 A
C. 90 A
D. 120 A

69. For hallways of _____ or more in length, at least one receptacle outlet shall be installed.

A. 2,000 mm
B. 4,000 mm
C. 5,000 mm
D. 3,000 mm

RME Board Exam

70. In every kitchen, family room, dining room, living room, parlor, library, bedroom or similar rooms or area of dwelling units, receptacle outlets shall be installed so that no point along the floor line in any wall space is more than _____ measured horizontally from an outlet in that space.

A. 2,000 mm
B. 1,800 mm
C. 1,900 mm
D. 2,100 mm

71. An overcurrent device with a circuit opening fusible part that is heated and severed by the passage of overcurrent through it.

A. Overload relay
B. Fuse
C. Thermocouple
D. Magnetic contactor

72. Branch circuit conductors supplying a single motor-compressor shall have an ampacity not less than _____ of either the motor-compressor rated load or the branch circuit selection current, whichever is larger.

A. 100 %
B. 125 %
C. 115 %
D. 130 %

73. The minimum headroom of working space about service equipment, switchboards, panelboards, etc shall be _____.

A. 1,800 mm
B. 2,000 mm
C. 1,700 mm
D. 1,900 mm

74. The ampacity of conductors supplying therapeutic equipment shall NOT be less than _____ the current rating of the equipment.

A. 125 %
B. 115 %
C. 130 %
D. 100 %

75. Each autotransformer up to 600 V shall be protected by an individual overcurrent device rated not more than _____ percent of its rated full load current.

A. 125
B. 150
C. 175
D. 300

RME Board Exam

76. If an electrician does not understand the instruction that were given by the supervisor, which of the following is the best for him to do?

A. He asks that the instruction be repeated and clarified
B. He does the job the way he thinks best
C. He works out the solution to the problem himself
D. He gets one of the other electricians to do the job

[illegible] size of branch circuit shall be connected to supply fixed lighting units with heavy- duty lampholders?

A. 10 A
B. 20 A
C. 30 A
D. 40 A

[illegible] Board Exam

[illegible] branch circuit load for fixed equipment is the larger of [illegible] the VA rating of the nameplate or _____.

A. 1,000 VA
B. 2,000 VA
C. 4,000 VA
D. 3,000 VA

[illegible] unit of an electrical system which is intended to carry but not utilize electric energy.

A. Wire
B. Device
C. Outlet
D. Utilization equipment

[illegible] equipment-grounding conductor of a branch circuit shall be identified by a continuous _____ color.

A. white
B. yellow
C. green
D. gray

[illegible] sum of the continuous ratings of the load consuming apparatus connected to the system or any part thereof.

A. Peak load
B. Connected load
C. Average load
D. Continuous load

RME Board Exam

82. An outlet box should be fastened to a concrete wall by the use of

A. Wood plug and nail
B. Toggle bolts
C. Porcelain insert and screw
D. Expansion bolts

83. The path to ground from circuits equipment and metal enclosures for conductors shall _____.

A. have capacity to conduct safely any fault current
B. have sufficiently low impedance
C. be permanent and continuous
D. all of these

84. For 800 A circuits, the minimum insulation resistance shall be

A. 12,000 ohms
B. 6,000 ohms
C. 5,000 ohms
D. 8,000 ohms

85. Aircraft energizers shall be so designed and mounted that all electric equipment and fixed wiring shall be at least ___ above floor level.

A. 460 mm
B. 500 mm
C. 640 mm
D. 400 mm

86. Capacitors containing more than _____ liters of flammable liquid shall be encased in vaults or outdoor fenced enclosures.

A. 10
B. 12
C. 9
D. 11

RME Board Exam

87. Wiring methods / materials allowed by the Code for gasoline stations include all the following EXCEPT on. Which one is this?

A. Type MI cable with approved terminal fitting
B. Threaded steel intermediate conduit
C. Rigid non-metallic conduit
D. Threaded rigid metal conduit

88. A main bonding jumper shall be a ____.

A. bus
B. screw
C. wire
D. any of these

RME Board Exam

89. What does the symbol consisting of rectangle with solid shading indicate?

A. Fuse cut-out
B. Telephone exchange
C. Safety switch
D. Lighting panelboard

90. What is the maximum load of a 15 A circuit breaker protecting a branch circuit that supplies a continuous load?

A. 15 A
B. 20 A
C. 12 A
D. 10 A

91. Potential transformers installed indoors or enclosed shall be protected with ___ fuses.

A. primary
B. secondary
C. both A and B
D. neither A or B

RME Board Exam

92. Branch circuits shall be rated according to the maximum permitted ____.

A. kW rating
B. voltage rating
C. ampere rating
D. all of these

93. Cells in rubber or composition containers shall require no additional insulating support where the total nominal voltage of all cells in series does not exceed a certain level of voltage. What is this level?

A. 100 V
B. 150 V
C. 200 V
D. 300 V

RME Board Exam

94. Medium voltage cable shall be permitted for installation in the following EXCEPT one. Which one is this?

A. Where installed in cable trays
B. Where exposed to direct sunlight
C. Power systems up to 35,000 volts in dry locations
D. Power systems up to 35,000 volts in wet locations

95. Each of the three 3.5 mm² THW copper conductors are in a conduit has an ampacity of 35 A. If there will be six of them in the conduit, what will be the ampacity of each conductor?

A. 12 A
B. 20 A
C. 16 A
D. 15 A

RME Board Exam

96. When removing insulation [illegible] from the wire before [illegible] the splice, care should [illegible] to avoid nicking the [illegible] slightly cutting into the [illegible] because of the following. Which one is this?

A. the wire might break
B. the ampacity will be reduced
C. the wire tinning (protective coating) will be injured
D. the resistance will increase

97. [illegible] of the following is NOT a standard size of disconnect?

A. 30 A
B. 60 A
C. 90 A
D. 100 A

98. [illegible] connecting means shall be provided in each ungrounded conductor for each capacitor bank and shall NOT be less than [illegible] percent of the rated current of the capacitor.

A. 125
B. 135
C. 150
D. 165

RME Board Exam

99. A 600-V switchboard has exposed parts on one side and [illegible] parts or concrete on the opposite side, what working space between the two sides is required by the Code?

A. 900 mm
B. 1,000 mm
C. 900 mm
D. 1,100 mm

100. Each patient bed location where in patient care is provided shall be supplied by at least ___ branch circuit?

A. one
B. two
C. three
D. four

< Exam ends here >

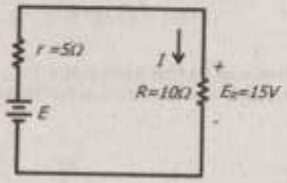
Proceed to the next page for the answer key and solutions!

Question Bank 8

ANSWER KE

1. A. Electron
2. C. 22.5 V

Solution:



$$I = \frac{E_R}{R} = \frac{15}{10} = 1.5A$$

$$E = I(r+R)$$

$$E = 1.5(5+10)$$

$$E = 22.5\ V$$

3. D. a hand-cranked dc generator
4. A. Back emf
5. A. The pointer of the meter will deflect downscale
6. A. One
7. A. stronger
8. C. decrease to half as much

Solution:

$$I_1 = \frac{E}{R} \rightarrow \text{condition 1}$$

$$I_2 = \frac{E}{2R} = \frac{1}{2}\left(\frac{E}{R}\right) \rightarrow \text{condition 2}$$

Note: By inspection, the current decreases to half as much

9. C. 7.5 V

Solution:

Note: The voltage per cell of a carbon-zinc cell is 1.5 V

$$E_{total} = \frac{1.5\ V}{cell} \times 5\ cells$$

$$E_{total} = 7.5\ V$$

10. A. Fluorescent lamp
11. B. a short circuit
12. A. low resistance
13. D. braking action on the pointer
14. A. Series wound motor
15. B. 2.238

Solution:

$$P = 3\ hp \times \frac{0.746\ kW}{1\ hp}$$

$$P = 2.238\ kW$$

16. C. Peak inverse voltage
17. B. 60 Hz

Solution:

$$f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{(0.2)(35 \times 10^{-6})}}$$

$$f = 60\ Hz$$

18. D. Differential compound

current capacity of the

to distilled water

kW

(0.8)(0.8)

78 W or 2.55 kW

Carbon

12.5 A

$$\frac{25,000}{2,000}$$

5 A

The primary would overload and the secondary would be dead

Hydroelectric power plant

27. A. remove the load from the off going generator
28. C. increase the voltage rating of the voltmeter
29. B. Anti-plugging
30. A. 1,500 coulombs

Solution:

$$Q = It$$

$$= (50)\left(0.5\ \text{min} \times \frac{60s}{1\ \text{min}}\right)$$

$$Q = 1500\ coulombs$$

31. D. 0.89

Solution:

$$Z = \sqrt{R^2 + X^2} = \sqrt{10^2 + 5^2}$$

$$Z = 11.18\Omega$$

$$pf = \frac{R}{Z} = \frac{10}{11.18}$$

$$pf = 0.894$$

32. A. 1.44 kW

Solution:

Note: Since not given, assume the pf of the lamps equal to unity.

$$P = EIpf$$

$$P = 120(12)(1.0)$$

$$P = 1440\ watts\ or\ 1.44\ kW$$

33. D. 0.80
34. B. reactance
35. D. an ion
36. C. applied voltage
37. B. Hydrogen
38. A. A grounded coil
39. C. Ammeter

40. C. 1800 rpm

Solution:

$$N = \frac{120f}{P} = \frac{120(60)}{4}$$

$N = 1800$ rpm

41. B. alternating
42. C. kVAR
43. D. Secure the steam
44. B. lagging
45. A. insulation resistance
46. D. 1.5 V
47. D. Synchronous motor
48. B. 1,000,000
49. D. kilowatt-hour
50. C. a two-pole switch
51. A. 0.40 mm
52. A. an autotransformer
53. C. 300 mm
54. D. Sparkover
55. C. 1:100
56. B. 217 mm x 279 mm
57. C. 760 mm
58. D. I and II only
59. A. 5
60. D. 1,500 mm
61. A. Motor operation sequence switch
62. B. 20 A
63. C. 8.0 mm²
64. D. 6 m
65. A. 200 mm
66. D. Ground check
67. B. 100%
68. B. 100 A
69. D. 3,000 mm
70. B. 1,800 mm
71. B. Fuse
72. B. 125%
73. D. 1900 mm
74. D. 100%
75. A. 125
76. A. He asks that the instruction be repeated and clarified
77. D. 30 A
78. A. 5,000 VA
79. B. Device
80. C. green
81. B. Connected load
82. D. Expansion bolts
83. D. all of these
84. C. 5,000 ohms
85. A. 460 mm
86. D. 11
87. C. Rigid non-metallic conduit
88. D. any of these
89. D. Lighting panelboard
90. C. 12 A

Solution:

Note: As a standard rule, for branch circuits serving a continuous load must be loaded only up to 80% of rated capacity.

Load = 80% of Rating

Load = 0.8(15) = 12 A

91. A. primary
92. C. ampere rating
93. B. 150 V
94. B. Where exposed to direct sunlight
95. C. 16 A
96. A. the wire might break
97. C. 50 A
98. D. 135
99. D. 1,100 mm
100. B. two

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 9

Part I - Technical Subject

1. Which of the following is TRUE regarding a reverse power relay?

I. It protects a motor from running in reverse rotation
II. It keeps amperage at safe level
III. It keeps voltage at safe level
IV. It protects a generator from motorizing

ME Board Exam

2. The output of a shunt generator is 100 A at a terminal voltage of 125 V. If the shunt resistance is 25 ohms, what is the armature current?

A. 500 A
B. 495 A
C. 505 A
D. 510 A

ME Board Exam

3. A motor control circuit ___.

I. carries the electric signals to the controller, and carried the main power
II. does not carry the electric signals to the controller, but carries the main power
III. carries the electric signals to the controller, but does not carry main power

A. I only
B. II only
C. III only
D. None of these

4. Electrical instrument use to measure electrical power.

A. Kilowatt-hour meter
B. Wattmeter
C. Clamp ammeter
D. Galvanometer

5. Thee resistors are to be connected in four possible type of circuit connections namely, series, parallel, series-parallel and parallel-series. Which type of connection will give the least amount of equivalent resistance?

A. Series
B. Parallel
C. Series-parallel
D. Parallel-series

RME Board Exam

6. What is the size in square millimeters (mm²) of the cable 250 MCM in size?

A. 150 mm²
B. 135 mm²
C. 125 mm²
D. 145 mm²

7. A universal motor is a ___ motor.

A. shunt wound
B. series wound
C. compound wound
D. any of these

8. Type of diode used to regulate dc power voltage supply.

A. Shockley
B. Zener
C. Tunnel
D. SCR

RME Board Exam

9. To keep the terminals of a lead acid storage battery free from corrosion, it is advisable to

A. keep the electrolyte level low
B. apply petroleum jelly
C. charge the battery at frequent intervals
D. clean the terminals frequently

10. Which of the following is the rotating part of a large alternator?

A. Field
B. Armature
C. Yoke
D. Commutator

11. A material with atoms in which the electrons tend to stay in their orbits.

A. Inductor
B. Conductor
C. Intrinsic
D. Insulator

RME Board Exam

12. Who shall be the executive officer of the Board of Electrical Engineering and shall also conduct the examination given by the Board, as provided in Art. II, Sec 9, of the New Electrical Engineering Law?

A. A member of the Board of Electrical Engineering
B. The President of the Philippines
C. The Commissioner of the Professional Regulations Commission
D. The Chairman of the Board of Electrical Engineering

13. A voltage regulator on a wound generator varies

A. armature current
B. resistance of the circuit
C. resistance of the circuit
D. resistance of both armature and field

RME Board Exam

14. A 100-W bulb is connected series with a room heater W. What will happen if is replaced by a 60-W

A. Heater output will
B. Bulb will not glow
C. Heater output will
D. Heater output remains unchanged

15. Which of the following unbalanced loads is the difficult to handle?

A. delta connected load
B. 4-wire star connected
C. 3-wire star connected
D. all of these

RME Board Exam

16. If a split phase induction fails to start, one of the is

A. there is no voltage
B. faulty cut-out switch
C. open overload device
D. all of these

17. How much charge is stored 2 μF capacitor connected a 50-V supply?

A. 100 μC
B. 25 μC
C. 200 μC
D. 120 μC

that does not provide a path for the flow of the

closed circuit
grounded circuit
series circuit
open circuit

one of the modern types troller. What do you mean

Programmable Logic Counter
Programmable Language
troller
Programmable Laboratory
troller
Programmable Logic
troller

current is the same as

charge current
ground current
ary current
mal current

RME Board Exam

ohm resistors are nected in parallel across a source. The total power by the circuit is

120 W
240 W
360 W
480 W

is the secondary voltage of transformer that has a primary age of 100 V, primary turns and secondary turns of

500 V
25 V
5 V
50 V

23. In a "START-STOP" motor controller using contactors, how many contactors are needed?

A. Only one
B. Two
C. Either A or B
D. Any number

24. SI unit of luminous flux.

A. Lumen
B. Lux
C. Foot-candle
D. Candle

RME Board Exam

25. To obtain proper short circuit protection for a service, one should use a

A. limiting resistor
B. current limiting fuse
C. time delay relay
D. time delay breaker

26. Ratio of maximum load to the total connected load.

A. Diversity factor
B. Utilization factor
C. Power factor
D. Demand factor

27. Reciprocal of resistance.

A. Susceptance
B. Reluctance
C. Conductance
D. Admittance

RME Board Exam

28. A certain motor takes 350 A at 100 V and the hp output is 45. What is its efficiency?

A. 94.6 %
B. 95.9 %
C. 97.2 %
D. 93.5 %

29. A capacitor consists of two ___

A. insulators separated by a conductor
B. conductors separated by an insulator
C. conductors
D. insulators

RME Board Exam

30. The ampere-hour capacity of the battery depends on

A. the area of the plates
B. the distance between the plates
C. the thickness of the plates
D. the strength of the electrolytes

31. If the line to line voltage of a 3-phase grounded system is 208 volts, what is the voltage between any of the three lines and the ground?

A. 208 V
B. 120 V
C. 147 V
D. 69.3 V

32. The RMS value of a sinusoidal wave is equivalent to ___ times the peak value.

A. 1.732
B. 0.577
C. 0.707
D. 1.414

33. A battery is rated 200 Ah. If it is use to supply a constant current of 8 A, how long can the battery last until it becomes unusable?

A. 20 hour
B. 25 hours
C. 15 hour
D. 30 hours

34. Synchronous motors are

A. self-starting
B. not self-starting
C. either A or B
D. neither A or B

RME Board Exam

35. In automobiles, it prevents arcing at the distributor when they began to open

A. Condenser
B. Ignition coil
C. Contact points
D. Spark plug

36. A dc generator that has a voltage rise from no load to load.

A. Differential compound
B. Under compounded
C. Flat compounded
D. Over compounded

37. Which of the following is measured by a megger?

A. Small current
B. Insulation resistance
C. Small voltage
D. Grounded voltage

RME Board Exam

38. A dc motor can easily be identified by

A. commutator
B. size of conductor
C. winding
D. yoke

39. The d' Arsonval meter is a type of a meter movement

A. Moving iron
B. Moving coil
C. Both A and B
D. Neither A or B

40. If forward bias a diode, its cathode is connected to the terminal of the supply.

A. negative
B. positive
C. either A or B
D. neither A or B

41. RME Board Exam

42. A tool that is used to align conduits in multiple ducts is a __

A. Hickey
B. manometer
C. prowler
D. mandrel

43. Which of the following motors has no commutator?

A. Shunt motors
B. Universal motors
C. Induction motors
D. Repulsion motors

44. A transformer will work on what type of supply?

A. dc
B. ac
C. either A and B
D. neither A or B

45. A bridge type rectifier uses how many diodes?

A. One
B. Two
C. Three
D. Four

46. RME Board Exam

47. In a radio, gang condenser is a type of

A. air capacitor
B. electrolytic capacitor
C. paper capacitor
D. variable capacitor

46. A method of stopping a polyphase motor quickly by momentarily connecting the motor for reverse rotation.

A. Plugging
B. Jogging
C. Inching
D. Latching

47. If a motor is to be controlled from two different locations, the START buttons are connected in

A. series
B. parallel
C. series-parallel
D. parallel-series

RME Board Exam

48. How can the polarization index of transformer oil be improved?

A. Filtering
B. Vacuuming
C. Heating
D. All of these

49. If the resistance of the circuit is 25 ohms, what voltage is necessary for a current flow of 4 A?

A. 6.25 V
B. 100 V
C. 0.16 V
D. 400 V

50. What type of dc motors is suitable for heavy-duty load applications such as in mills and crushers?

A. Series
B. Shunt
C. Cumulative compound
D. Differential compound

Part 2: Philippine Electrical Code

51. Fuses shall be plainly marked with _____.

A. ampere rating
B. voltage rating
C. interrupting rating
D. all of these

RME Board Exam

52. If there will six or more 2-wire branch circuits, the service disconnecting means shall NOT be smaller than _____.

A. 100 A
B. 90 A
C. 60 A
D. 30 A

53. Which of the following statements is NOT true about grounding electrode conductor?

A. It shall be solid or stranded
B. It must be continuous
C. Splice or joints are allowed
D. It shall be insulated, covered or bare

54. 8.0 mm^2 TW copper has an ampacity equal to _____.

A. 30 A
B. 50 A
C. 40 A
D. 60 A

55. Sheet metal of flush and recessed fixture housings shall be protected against corrosion and shall NOT be less than ___ thick.

A. 0.65 mm
B. 0.60 mm
C. 0.64 mm
D. 0.63 mm

56. Exposed energized parts of motors and controllers shall be guarded against accidental contact by elevating it ____ or more above the floor.

A. 2,500 mm
B. 2,300 mm
C. 2,600 mm
D. 2,400 mm

57. Which of the following statements is NOT true regarding a rosette?

A. Fusible rosette shall not be installed
B. Rosettes installed in damp or wet locations shall be weatherproof type
C. Separable rosettes that change polarity shall not be used
D. None of these

RME Board Exam

58. To improve the insulation resistance of a motor, it is first cleaned, washed, varnished and baked. Which is very economical and effective method of baking particularly the inside coils of a large motor?

A. Putting incandescent lamps around the winding and cover
B. Hanging resistor strips inside the core and coils
C. Putting it inside the baking oven and control the exact temperature
D. Connecting the terminals to a variable low voltage supply and increase the baking current gradually until the desired baking temperature is attained making sure that the rated current is not exceeded

[illegible] terminals shall be

A. solid plate
B. stranded cable
C. solid wire or rod
D. all of the these

Board Exam

The construction of metal [illegible] and cutout boxes shall be such as to secure strength and rigidity. If constructed of [illegible] sheet steel, the metal [illegible] should NOT be less than

A. 1.55 mm
B. 1.75 mm
C. 1.60 mm
D. 1.35 mm

[illegible] doors of transformer vaults in contact with the earth shall be of concrete NOT less than ___ thick

A. 100 mm
B. 200 mm
C. 300 mm
D. 150 mm

Board Exam

[illegible] raceways are exposed to widely different temperatures [illegible] shall be _____.

A. grounded
B. sealed
C. isolated
D. bonded

[illegible] less than ___ of free non-[illegible] lead shall be within the [illegible] box.

A. 100 mm
B. 150 mm
C. 175 mm
D. 200 mm

64. Any switch or device normally used to start and stop a motor by making and breaking the motor circuit current.

A. Controller
B. Rheostat
C. Autotransformer
D. Double pole double throw switch

65. Where installed in raceways conductors of size ____ and larger shall be stranded.

A. 5.5 mm^2
B. 8.0 mm^2
C. 14 mm^2
D. 3.5 mm^2

66. What type letter for conductors has a trade name "moisture resistant thermoplastic"?

A. TW
B. THHW
C. THWN
D. THHN

67. Where no standard electrical equipment of the exact size or rating required is available, ___ maybe used.

A. the next lower standard size
B. any size available
C. the next larger standard size
D. none of these

68. Hazardous locations, in which volatile flammable liquids or flammable gases are handled, processed or used.

A. Class I, Division 2
B. Class II, Division 2
C. Class II, Division 1
D. Class I, Division 1

69. The permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

A. Welding
B. Molding
C. Bonding
D. Splicing

70. In mobile homes, if a range, clothes dryer or similar appliance is connected by metal covered cable or flexible metal conduit, a length of NOT less than ____ of free cable or conduit shall be provided to permit moving the appliance.

A. 800 mm
B. 700 mm
C. 600 mm
D. 900 mm

RME Board Exam

71. The uses of non-metallic extensions are NOT allowed in all but one of the following. Which one is this?

A. As an aerial cable
B. Where exposed to corrosive vapors
C. Where subject to corrosive vapors
D. Through floors or partitions

72. Metal fixtures, transformers and transformer enclosures on circuits operating at over ___ volts to ground shall be grounded.

A. 250
B. 100
C. 150
D. 300

73. Grounding electrodes shall be installed such that at least ___ of length is in contact with the soil.

A. 2,000 mm
B. 1,500 mm
C. 2,500 mm
D. 2,400 mm

RME Board Exam

74. When the voltage between conductors does not exceed ___ V and the roof has a slope less than 100 mm in 300 mm, the clearance can be reduced

A. 500 mm
B. 800 mm
C. 1000 mm
D. 900 mm

75. The down conductors shall be protected for a minimum distance of ____ above grade level.

A. 1,800 mm
B. 1,600 mm
C. 1,700 mm
D. 1,500 mm

76. If the trade name of the conductor is "heat-resistant rubber", what type letter is it?

A. type RH
B. type RHW
C. type THHW
D. type MTW

RME Board Exam

77. A circle with the letter B is for

A. Buzzer outlet
B. Pushbutton outlet
C. Outlet with blank cover
D. Bell outlet

Board Exam

[illegible] energized parts of [illegible] and controllers operating [illegible] volts or more between [illegible] shall be guarded [illegible] accidental contact by [illegible].

[illegible]

[illegible] derating factors for the [illegible] of wires in a raceway [illegible] apply to conductors in [illegible] having a length NOT [illegible] ____.

[illegible] mm
[illegible] mm
[illegible] mm
[illegible] mm

[illegible] installed in scene docks [illegible] be so located and guarded [illegible] shall provide an air space of [illegible] less than ____ between [illegible] lamps and any combustible [illegible].

[illegible] mm
[illegible] mm
[illegible] mm
[illegible] mm

Board Exam

[illegible] or cables used in dry and [illegible] locations for over 2000 volts [illegible] and ozone resistant [illegible] moisture and heat resistant [illegible] and has a maximum [illegible] operating temperature of 90°C is [illegible] type?

[illegible]
[illegible]
[illegible]
[illegible]

82. Direct burial cables or conductors with a nominal voltage of 660 V or less and placed under a one or two family dwelling driveways and parking areas shall have a minimum cover distance of _____.

A. 480 mm
B. 500 mm
C. 440 mm
D. 460 mm

RME Board Exam

83. A certain residential house has lighting load of 1.1 kVA and an appliance load of 10 A at 220 volts, single phase, two wires, 60 Hz. The branch circuit fuse protections for lighting and appliance loads are ___ and _____ respectively.

A. 30 A, 60 A
B. 20 A, 30 A
C. 15 A, 30 A
D. 15 A, 20 A

84. What type of conductors is used for machine tool wiring in dry or wet locations?

A. type MTW
B. type RHW
C. type MI
D. type UF

RME Board Exam

85. The Building Code (PD 1096) of the Philippines has several referral codes. The only no-referral code is

A. The Philippine Electrical Code
B. Fire Code
C. Structural Code
D. Chemical Engineering Code

86. Cartridge fuses and fuse holders shall have a maximum operating voltage of ___.

A. 150 V
B. 500 V
C. 300 V
D. 250 V

RME Board Exam

87. At least ___ of free conductor shall be left at each outlet, junction and switch point for splices or the connection of fixtures or devices.

A. 200 mm
B. 100 mm
C. 150 mm
D. 300 mm

88. An enclosure either above or below ground, with fire resistant walls, ceiling and floor exclusively built for unattended transformer and their auxiliaries.

A. Transformer housing
B. Transformer yard
C. Transformer vault
D. None of these

89. Fuses, circuit breakers or combinations thereof shall NOT be connected in ___.

A. series
B. parallel
C. both A and B
D. neither A or B

RME Board Exam

90. Which of the following cables is NOT used as an electrical cable?

A. Flat cables
B. Optical fiber cables
C. Armored cables
D. Steel cables

91. Electrodes of pipe or conduit shall NOT be smaller than ____ trade size.

A. 20 mm
B. 15 mm
C. 25 mm
D. 32 mm

92. For single-phase AC or DC motors supplied by a 3-wire, single-phase AC or DC with grounded neutral, the number of overload units required shall be

A. one, in the grounded conductor
B. one, in either ungrounded conductor
C. two, in both ungrounded conductors
D. three, in all conductors

93. The ampacity of branch circuit conductors and the rating or setting of overcurrent devices supplying fixed electric space heating equipment for pipelines and vessels shall be not less than ____ percent of the total load of the heaters.

A. 120 %
B. 110 %
C. 115 %
D. 125 %

94. For wound rotors, to determine the maximum setting of its short circuit protective device, using a fuse or an inverse time circuit breaker, a multiplying factor of ___ of its current rating shall be used.

A. 125 %
B. 150 %
C. 250 %
D. 200 %

95. One equipment shall in sight from another equipment not more than ____ from the other.

A. 10 m
B. 15 m
C. 20 m
D. 5 m

96. For office buildings, a general lighting load of ____ VA/m^2 shall be used.

A. 12
B. 16
C. 24
D. 28

RME Board Exam

97. Motors with a marked temperature rise not over 40 °C shall have an overload protection equal to ____ percent of the motor full load current.

A. 115
B. 125
C. 110
D. 100

98. The minimum temperature at which a given liquid gives off vapor in sufficient concentration to form an ignitable mixture.

A. Kindling temperature
B. Flash point
C. Absolute temperature
D. Heat of fusion

99. Lamp holders installed over highly combustible material shall be located at least ____ above the floor.

A. 2,000 mm
B. 2,500 mm
C. 2,400 mm
D. 2,600 mm

100. One of the approved grounding electrode system is using the metal underground water pipe in direct contact with the earth for ____ or more.

A. 3,000 mm
B. 4,000 mm
C. 2,500 mm
D. 1,500 mm

< Exam ends here >

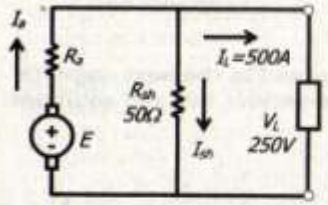
Proceed to the next page for the answer key and solutions!

Question Bank 9

ANSWER KEY

1. D. It protects a generator from motorizing
2. C. 505 A

Solution:



$$I_{sh} = \frac{V_L}{R_{sh}} = \frac{250}{50} = 5\ A$$

$$I_a = I_{sh} + I_L = 5 + 500$$

$$I_a = 505\ A$$

3. C. III only
4. B. Wattmeter
5. B. Parallel
6. C. 125 mm²

Solution:

250 MCM = 250,000 CM

$$d = \sqrt{A} = \sqrt{250{,}000} = 500\ \text{mils}$$

$$d = 500\ \text{mils} \times \frac{1\ \text{in}}{1000\ \text{mils}} \times \frac{25.4\ \text{mm}}{1\ \text{in}}$$

$$d = 12.7\ \text{mm}$$

$$A = \frac{\pi d^2}{4} = \frac{\pi(12.7)^2}{4}$$

$$A = 126.67\ \text{mm}^2$$

7. B. series wound
8. B. Zener
9. A. keep the electrolyte level low
10. A. Field
11. D. Insulator
12. C. The Commissioner of the Professional Regulations Commission
13. C. resistance of the field circuit
14. C. Heater output will decrease

Solution:

$$R = \frac{E^2}{P}$$

Note: For the same voltage rating, the resistance of the bulb varies inversely as the power. By replacing the 100-W with a 60-W bulb means an increase in the resistance of the circuit. And with the total circuit resistance to increase, current drawn decreases making the heater output power to decrease.

15. C. 3-wire star connected load
16. D. all of these
17. A. 100 μC

Solution:

$$Q = CE$$

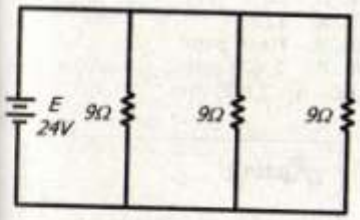
$$Q = (2)(50)$$

$$Q = 100\ \mu C$$

18. D. an open circuit
19. D. Programmable Logic Controller
20. B. ground current

21. C. 192 W

Solution:



$$R_t = \frac{R}{n} = \frac{9}{3} = 3\Omega$$

$$P_t = \frac{E^2}{R_t} = \frac{24^2}{3}$$

$$P_t = 192\ W$$

22. D. 20 V

Solution:

$$\frac{E_1}{E_2} = \frac{N_1}{N_2}$$

$$E_2 = E_1\left(\frac{N_2}{N_1}\right) = 100\left(\frac{40}{200}\right)$$

$$E_2 = 20\ \text{volts}$$

23. A. Only one
24. A. Lumen
25. B. current limiting fuse
26. D. Demand factor
27. C. Conductance
28. B. 95.9%

Solution:

$$P_{in} = EI = (100)(350)$$

$$P_{in} = 35{,}000\ W \times \frac{1\ hp}{746\ W}$$

$$P_{in} = 46.91\ hp$$

$$\eta = \frac{P_{out}}{P_{in}} = \frac{45}{46.91}$$

$$\eta = 95.92\%$$

29. B. conductors separated by an insulator
30. A. the area of the plates
31. B. 120 V
32. C. 0.707
33. B. 25 hours
34. B. not self-starting
35. A. Condenser
36. D. Over compounded
37. B. Insulation resistance
38. A. commutator
39. B. Moving coil
40. A. negative
41. D. mandrel
42. C. Induction motors
43. B. ac
44. D. Four
45. A. air capacitor
46. A. Plugging
47. B. parallel
48. A. Filtering
49. B. 100 V

Solution:

$$E = IR$$

$$E = 4(25)$$

$$E = 100\ \text{volts}$$

50. C. Cumulative compound
51. D. all of these
52. A. 100 A
53. C. Splice or joints are allowed
54. C. 40 A
55. A. 0.65 mm
56. D. 2,400 mm
57. D. None of these
58. C. Putting it inside the baking oven and control the oven temperature
59. D. all of these
60. D. 1.35 mm
61. A. 100 mm

62. B. sealed
63. B. 150 mm
64. A. Controller
65. B. 8.0 mm^2
66. D. THHN
67. C. the next larger standard size
68. A. Class I, Division 2
69. C. Bonding
70. D. 900 mm
71. C. Where subject to corrosive vapors
72. C. 150
73. D. 2,400 mm
74. C. 1,000 mm
75. A. 1,800 mm
76. A. type RH
77. C. Outlet with blank cover
78. A. 50
79. B. 600 mm
80. B. 50 mm
81. A. MI
82. D. 460 mm
83. D. 15 A, 20 A

Solution:

$$I = \frac{P}{E} = \frac{1,100}{220}$$

$I = 5\ A$

Notes:

- For lighting loads, as a rule the minimum branch circuit rating must be 15 A
- For small appliance load, as a rule the minimum branch circuit rating must be 20 A

84. A. type MTW
85. D. Chemical Engineering
86. C. 300 V
87. C. 150 mm
88. C. Transformer vault
89. B. parallel
90. D. Steel cables
91. A. 20 mm
92. B. one, in either ungrounded conductor
93. D. 125%
94. B. 150%
95. B. 15 m
96. D. 28
97. A. 115
98. B. Flash point
99. C. 2,400 mm
100. A. 3,000 mm

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 10

Part I: Technical Subject

1. Which of the following causes an extreme vibration in a motor?

A. Overloads
B. Too much lubrications
C. Worn bearings
D. Shaft misalignment

RME Board Exam

2. A circuit has a resistance of 8 ohms. If a voltmeter connected across its terminals reads 10 V, how much current is flowing through the circuit?

A. 1.25 A
B. 1.50 A
C. 2.10 A
D. 0.80 A

3. Core loss on electrical machines is the same term as _____.

A. copper loss
B. iron loss
C. windage loss
D. exciter loss

4. If a motor is to be controlled from five different locations, how many and what types of switches are to be used?

A. Three 4-way and two 3-way switches
B. Two 4-way and three 3-way switches
C. One 3-way and four 4-way switches
D. None of these

5. The process of adding impurities to a pure semi-conductor.

A. Bonding
B. Charging
C. Doping
D. Energizing

6. DPDT stands for

A. Double pole duplex switch
B. Double pole double throw switch
C. Duplex switch
D. None of these

7. A reduced current method of starting for squirrel cage motors that have two separate stator windings connected in parallel.

A. Primary resistance type
B. Secondary resistance type
C. Autotransformer type
D. Part winding type

RME Board Exam

8. The average dry cell gives an approximate voltage of

A. 1.5 V
B. 1.7 V
C. 1.1 V
D. 1.3 V

9. A resistor that has an infinite resistance is a sign of ____ resistor

A. a shorted
B. an open
C. a grounded
D. all of these

RME Board Exam

10. The hot resistance of an incandescent lamp is 10 ohms and the rated voltage is 50 V. Find the series resistance required to operate the lamp from an 80 V supply.

A. 10 ohms
B. 8 ohms
C. 6 ohms
D. 4 ohms

11. If a motor is to be controlled from two different locations, the STOP buttons are connected in

A. series
B. parallel
C. series-parallel
D. parallel-series

12. A 10-pole AC generator is running at 600 rpm, what is the frequency of the generated voltage?

A. 60 Hz
B. 50 Hz
C. 70 Hz
D. 40 Hz

RME Board Exam

13. Which of the following lamps requires a cooling period prior to restarting?

A. Incandescent
B. Fluorescent
C. Mercury
D. None of these

14. A machine used to transform mechanical energy into electrical energy.

A. Transformer
B. Electric motor
C. Generator
D. Condenser

15. When using Ohm's law, E/R would solve for _____.

A. voltage
B. resistance
C. current
D. power

16. Motors most commonly used in home appliances such as blenders, mixers, vacuum cleaners, etc.

A. Shunt motors
B. Universal motors
C. Capacitor start & run motors
D. Squirrel cage induction motors

17. What is the frequency if an alternating voltage having an equation, e = 311 sin 314t?

A. 60 Hz
B. 40 Hz
C. 50 Hz
D. 30 Hz

RME Board Exam

18. What should be done to prevent moisture damage to electrical apparatus during extended periods of idleness?

A. Fill the motor housing with CO_2 to inert the space
B. Place heat lamps in motor housings
C. Cover with canvas
D. Strap silica gel around the commutator

19. A cell which cannot be recharged.

A. Primary
B. Secondary
C. Either A or B
D. Neither A or B

20. Low power factor in a motor will cause it to

A. have decreased current for its rated output
B. have increased current for its rated output
C. overheat excessively
D. operate below rated voltage

21. In the flow of one cycle of an AC current, the maximum current flow occurs how many times?

A. Only once
B. Four times
C. Twice
D. Three times

22. Three resistors are connected in delta. If the ohmic value of each resistance is 3 ohms, what is the ohmic equivalent of each resistance in wye configuration?

A. 9 ohms
B. 3 ohms
C. 1 ohm
D. 12 ohms

23. What type of motor is usually used in a vacuum cleaner?

A. Synchronous motor
B. Capacitor start motor
C. Series ac motor
D. Split phase motor

RME Board Exam

24. The field winding of a shunt motor has a resistance of 110 ohms and the emf applied to it is 220 V. What is the amount of power consumed in the field excitation?

A. 500 W
B. 440 W
C. 2 kW
D. 22 kW

RME Board Exam

25. Heating elements can be repaired by a _____ tube, which crimps the two broken elements together.

A. aluminum/nickel
B. aluminum
C. wire
D. nickel/silver

26. Electrical symbol represented by a circle with two solid lines inside it.

A. Single convenience outlet
B. Cooking range outlet
C. Special purpose outlet
D. Antenna outlet

27. What does synchronization means?

A. In synchrony
B. Equal speeds
C. At the same time
D. Cycle for cycle

28. Who among the following electrical practitioners has the sole authority to seal electrical plans, etc and to practice electrical engineering in its full scope as defined in RA 7920?

A. Registered Electrical Engineer
B. Registered Master Electrician
C. Professional Electrical Engineer
D. All of these

29. In a series RL circuit, the current _____ the voltage.

A. is in phase with
B. leads
C. lags behind
D. none of these

30. During the open circuit test on transformers, which side is opened?

A. Low side
B. High side
C. Either A or B
D. Both sides

RME Board Exam

31. In a transformer the purpose of the breather is to

A. to provide insulation to the winding
B. extract moisture in air
C. to take insulating oil from conservator
D. to provide cooling to the winding

32. What is the purpose of reduced voltage starters?

A. To increase the motor torque at starting
B. To increase the motor current at starting
C. To reduce the losses at starting
D. To reduce the motor line current at starting

33. Which of the following is not a standard circuit?

A. 3-phase, ac
B. 3-wire, dc
C. 4-phase, 4-wire, ac
D. 3-phase, 4-wire, ac

34. How much current does a 24-ohm resistance that dissipates 600 watts need?

A. 25 A
B. 5 A
C. 0.04 A
D. 1.04 A

35. A 6.6-kV, three-phase star connected alternator supplies 1,000 kW at 0.8 pf lagging. Calculate the line current.

A. 126 A
B. 106 A
C. 115 A
D. 109 A

36. If the active and reactive powers of the circuit are equal in magnitude, the power factor of the circuit is ____.

A. 0.866
B. 0.90
C. 0.50
D. 0.707

37. A certain alternator has 8 poles. At what speed must the alternator runs in order to have a generated emf whose frequency is 40 cps?

A. 580 rpm
B. 750 rpm
C. 700 rpm
D. 600 rpm

RME Board Exam

38. A standard transformer type motor starter has a several taps used for starting a large size motor. Which one is NOT standard?

A. 80 %
B. 63 %
C. 50 %
D. 100 %

39. Which of the following is a source of an alternating current?

A. Rectifier
B. Solar cell
C. Alternator
D. Battery

RME Board Exam

40. In a wiring diagram where two wires come together, it is indicated by which symbol?

A. A broken line
B. A circle
C. A dot
D. A cross

41. Which type of single-phase motors develops more starting torque than any other types?

A. Squirrel cage induction motor
B. Split-phase capacitor start and run motor
C. Repulsion start induction run motor
D. Wound rotor induction motor

42. On a distribution transformer, the terminals labeled X_1 and X_2 are the ___ terminals.

A. ground
B. high voltage
C. low voltage
D. either A, B or C

43. Incorrect motor end play can be corrected by

A. adding or removing washers
B. replacing or lubricating bearings
C. tightening nuts or bolts
D. any of these

44. Meter used to test the armatures and stators of electric motor, generators, and other equipment for short circuit.

A. Test lamp
B. Megohmmeter
C. VOM
D. Growler

RME Board Exam

45. A good electric conductor is one that ___

A. has few electrons
B. produces minimum voltage drop
C. has low conductance
D. is always made of copper

46. A good fuse should have ___ resistance.

A. a very high
B. approximately no
C. either A or B
D. neither A or B

47. In order to show that a resistor has a tolerance of ±10%,

A. the third band must be silver
B. no color in the fourth band
C. the fourth band is gold
D. the fourth band must be silver

RME Board Exam

48. Find the cost of running a 100-W, 220-V lamp for 20 hours at P 3.00 per kW-hr.

A. P 6.00
B. P 12.00
C. P 10.00
D. P 8.00

49. Relay which operates and resets with no intentional time delay.

A. Inverse-time relay
B. Instantaneous-trip relay
C. Electromechanical relay
D. Delay-off relay

RME Board Exam

50. Which of the following is the best conductor of electricity?

A. Copper
B. Aluminum
C. Silver
D. Gold

Part 2: Philippine Electrical Code

51. Conductors passing from windows, doors, porches, fire escapes or similar locations shall maintain a horizontal clearance of _____.

A. 1,000 mm
B. 1,800 mm
C. 1,500 mm
D. 1,200 mm

52. A main disconnecting means shall be provided where fuses are used or where more than _____ circuit breakers are employed.

A. one
B. two
C. three
D. four

53. Splices and taps shall be made only in _____.

A. pull boxes
B. panelboards
C. cut-out boxes
D. junction boxes

54. The horizontal distance between two adjacent supporting points of a conductor.

A. Sag
B. Clearance
C. Space
D. Span

RME Board Exam

55. What is the temperature rating of a TW insulated conductor?

A. 60 °C
B. 90 °C
C. 75 °C
D. 100 °C

56. An assembly of two pieces of insulating material provided with grooves for holding one or more conductors at a definite spacing from the surface wired over and from each other, and with holes for fastening in position.

A. Cleat
B. Split knob
C. Spool insulator
D. Gutter

57. Electrical metallic tubing smaller than _____ electrical trade size shall NOT be used.

A. 12 mm
B. 16 mm
C. 10 mm
D. 15 mm

RME Board Exam

58. The minimum clearance of service drops over sidewalks.

A. 8 ft
B. 14 ft
C. 10 ft
D. 12 ft

59. The supply conductors that extend from the street main or from transformers to the service equipment of the premises supplied.

A. Service drop
B. Service conductors
C. Service
D. Service laterals

60. Concealed knob and tube wiring shall be supported at intervals NOT exceeding

A. 1,200 mm
B. 1,300 mm
C. 1,500 mm
D. 1,400 mm

61. A dead end of a busway shall be

A. open
B. closed
C. either A or B
D. screened

RME Board Exam

62. What is the diameter of a solid wire, which is equivalent to 5.5 mm^2?

A. d = 2.26 mm
B. d = 1.62 mm
C. d = 1.75 mm
D. d = 2.65 mm

63. A factory assembly of one or more conductors insulated with a highly compressed refractory mineral insulation and enclosed in a liquidtight and gastight continuous copper or alloy steel sheath.

A. type MI
B. type NMC
C. type NM
D. type MV

RME Board Exam

64. The combined cross-sectional area of all conductors or cables shall NOT exceed _____ percent of the internal cross-sectional area of the raceway.

A. 50
B. 60
C. 40
D. 70

65. No conductors larger than _____ shall be installed in cellular metal floor raceways.

A. 100 mm^2
B. 38 mm^2
C. 50 mm^2
D. 14 mm^2

66. In mobile homes, receptacle outlets shall not be installed within _____ of a shower or bathtub space.

A. 760 mm
B. 600 mm
C. 500 mm
D. 1,000 mm

67. Rigid non-metallic conduit shall be supported within _____of each box, cabinet or other conduit termination.

A. 900 mm
B. 760 mm
C. 800 mm
D. 600 mm

RME Board Exam

68. To cut rigid steel conduits, an electrician should

A. use a hack saw and ream the ends
B. use a three-wheel pipe cutter
C. use a cold chisel and ream the ends
D. order it to cut to size

69. Every recreational vehicle site with electrical supply shall be equipped with at least one _____, 250-V receptacle.

A. 15 A
B. 20 A
C. 30 A
D. 10 A

70. Conductors in open wiring on insulators shall be rigidly supported within ___ of a dead end connection to a rosette, lamp holder or receptacle.

A. 150 mm
B. 200 mm
C. 300 mm
D. 100 mm

RME Board Exam

71. What is the maximum distance between open service conductor supports for a voltage of up to 300 V?

A. 2,000 mm
B. 1,000 mm
C. 1,500 mm
D. 1,300 mm

72. Concealed knob and tube wiring shall be permitted to be used _.

A. for extensions of existing installations
B. in unfinished attic and roof spaces
C. in the hollow spaces of walls and ceilings
D. all of these

73. Flat cable assembly shall be installed for _____.

A. concealed work only
B. exposed work only
C. both A and B
D. neither A or B

74. What is the smallest electrical trade size for rigid non-metallic conduit?

A. 15 mm
B. 12 mm
C. 25 mm
D. 20 mm

75. Type AC cable shall be secured by approved staples, straps hangers or similar fittings at intervals NOT exceeding _____.

A. 1,300 mm
B. 1,200 mm
C. 1,000 mm
D. 1,500 mm

RME Board Exam

76. Where coaxial cable are attached to building, they should have a separation of at least _____ from electric light or power cables.

A. 100 mm
B. 50 mm
C. 250 mm
D. 200 mm

77. Type MC cable shall be permitted for systems in excess of ___.

A. 500 V
B. 1,000 V
C. 300 V
D. 600 V

RME Board Exam

78. A phase converter is usually employed to convert single-phase to three-phase power supply so that three-phase motors maybe used. For this service, the PEC specifies that the single -phase conductors shall have an ampacity of NOT less than ____ of the full load current rating of motor or load being served where the input and the output voltages are identical.

A. 173 %
B. 240 %
C. 216 %
D. 350 %

79. For smooth sheath cables (type MC) with an external diameter of more than 38 mm, shall have a bending radius of NOT less than ____ times the metallic sheath of the cable.

A. 12
B. 10
C. 15
D. 8

80. Cables that are flame retardant and have limited smoke characteristics shall be permitted and shall be identified using what suffix?

A. FS
B. PS
C. LS
D. UL

81. In wiring using rigid metal conduits, conduit smaller than ____ shall not be used.

A. 15 mm
B. 32 mm
C. 10 mm
D. 25 mm

82. Operation for alternate intervals.

A. Periodic duty
B. Short time duty
C. Varying duty
D. Intermittent duty

83. The overall covering of type NM (non-metallic sheathed) cable shall be

A. flame retardant and moisture resistant
B. flame retardant and fungus resistant
C. flame retardant and corrosion resistant
D. all of these

84. Whose signatures are needed in the application form for an electrical permit?

A. Owner or authorized representative
B. PEE who signed and sealed the electrical plan
C. Electrical practitioner in-charge of the installation
D. All of these

85. Type TC (power and control tray) cable shall be permitted to be used in any of the following EXCEPT one. Which one is this?

A. in raceway
B. in cable trays in hazardous (classified) locations
C. for power, lighting, control, signal and communication circuits
D. where exposed to direct rays of the sun

86. Nails where used as a fastening means, shall be permitted to pass through the interior of the enclosure if located within ____ of the back or ends of the enclosure.

A. 6.4 mm
B. 8.0 mm
C. 6.0 mm
D. 7.5 mm

RME Board Exam

87. What is the minimum insulation resistance of a building's electrical wiring for circuits using 2.0 mm^2 or 3.5 mm^2 conductors?

A. 500,000 ohms
B. 250,000 ohms
C. 1,000,000 ohms
D. 750,000 ohms

88. For non-insulated busbars, the minimum spacing between it and the bottom of the enclosure shall be ____.

A. 255 mm
B. 250 mm
C. 240 mm
D. 205 mm

89. The size of conductors in cablebus system shall be in no case smaller than which of the following?

A. 38 mm^2
B. 50 mm^2
C. 60 mm^2
D. 100 mm^2

90. Electrical non-metallic tubing shall be firmly fastened within ____ of each outlet box, junction box, cabinet or fittings.

A. 300 mm
B. 600 mm
C. 900 mm
D. 1,000 mm

91. A form of air switch in which the moving element is a hinged blade wedge between stationary contact blades when closed.

A. Snap
B. Knife
C. Safety
D. Toggle

92. Where flexible metal conduit is installed as a fixed raceway, it shall be secured within ____ on each side of every outlet box.

A. 300 mm
B. 150 mm
C. 200 mm
D. 100 mm

RME Board Exam

93. In the installation of power resistors, a thermal barrier shall be required if the space between the resistors and any combustible material is less than ____mm. What is this minimum clearance?

A. 150 mm
B. 300 mm
C. 200 mm
D. 250 mm

94. Open conductors passing over residential driveways and those commercial areas not subject to truck traffic where the voltage is limited to 300 V to ground shall maintain a vertical distance of _.

A. 3,100 mm
B. 4,600 mm
C. 3,700 mm
D. 5,500 mm

RME Board Exam

95. In estimating the loading of a branch circuit, what loading shall be used for each receptacle?

A. 160 volt-ampere
B. 120 volt-ampere
C. 180 volt-ampere
D. 150 volt-ampere

96. The conductors including splices and taps shall NOT fill the auxiliary gutter to more than ___ of its area.

A. 70 %
B. 80 %
C. 75 %
D. 60 %

97. What is the maximum number of overcurrent devices of a lighting and appliance branch circuit panelboard shall be installed in any cabinet or cutout box?

A. 42
B. 50
C. 45
D. 48

98. A space of ____ or more shall be provided between the top of any switchboard and any combustible ceiling.

A. 1,500 mm
B. 1,000 mm
C. 1,200 mm
D. 1,800 mm

RME Board Exam

99. Festoon lighting is a string of outdoor lights suspended between two point more than ____ apart.

A. 4,000 mm
B. 3,800 mm
C. 4,500 mm
D. 5,000 mm

100. From signs, chimneys, radio and television antennas or similar, clearances through vertical, diagonal and horizontal shall be NOT less than _____.

A. 1,000 mm
B. 1,100 mm
C. 1,200 mm
D. 900 mm

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 10

ANSWER KEY

1. C. Worn bearings
2. A. 1.25 A

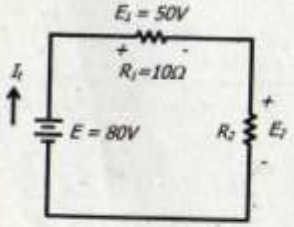
Solution:

$$I = \frac{E}{R} = \frac{10}{8}$$

$$I = 1.25\ A$$

3. B. iron loss
4. A. Three 4-way and two 3-way switches
5. C. Doping
6. B. Double pole double throw switch
7. D. Part winding type
8. A. 1.5 V
9. B. an open
10. C. 6 ohms

Solution:



$$E_2 = E - E_1$$

$$E_2 = 80 - 50$$

$$E_2 = 30\ V$$

$$I_t = \frac{E_1}{R_1} = \frac{50}{10}$$

$$I_t = 5A$$

$$R_2 = \frac{E_2}{I_t} = \frac{30}{5}$$

$$R_2 = 6\ \Omega$$

11. A. series
12. B. 50 Hz

Solution:

$$f = \frac{PN}{120} = \frac{10(600)}{120}$$

$$f = 50\ Hz$$

13. C. Mercury
14. C. Generator
15. C. current
16. B. Universal motors
17. C. 50 Hz

Solution:

Note: For the standard sinusoidal equation, $e = E_m \sin wt$

$$w = 2\pi f$$

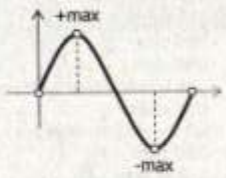
$$f = \frac{w}{2\pi} = \frac{314}{2\pi}$$

$$f = 50\ Hz$$

18. C. Cover with canvas
19. A. Primary
20. B. have increased current for its rated output
21. C. Twice

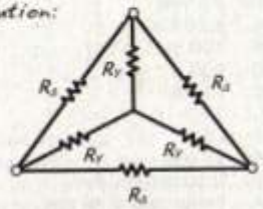
Note: For one cycle of the current, the maximum current will be attained twice, first at positive maximum then second at negative maximum.

Sinusoidal ac current wave:



22. C. 1 ohm

Solution:

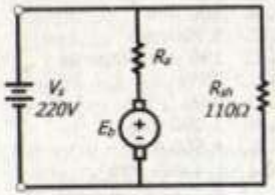


$$R_Y = \frac{1}{3}R_\Delta = \frac{1}{3}(3)$$

$$R_Y = 1\ \Omega$$

23. C. Series ac motor
24. B. 440 W

Solution:



$$P_{sh} = \frac{V_s^2}{R_{sh}} = \frac{220^2}{110}$$

$$P_{sh} = 440\ W$$

25. D. nickel/silver
26. A. Single convenience outlet
27. D. Cycle for cycle
28. C. Professional Electrical Engineer
29. C. lags behind
30. B. High side
31. B. extract moisture in air
32. D. To reduce the motor line current at starting
33. C. 4-phase, 4-wire, ac
34. B. 5 A

Solution:

$$P = I^2R$$

$$I = \sqrt{\frac{P}{R}} = \sqrt{\frac{600}{24}} = 5\ A$$

35. D. 109 A

Solution:

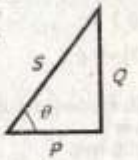
$$P = \sqrt{3}EIpf$$

$$I = \frac{P}{\sqrt{3}Epf} = \frac{1,000}{\sqrt{3}(6.6)(0.8)}$$

$$I = 109.34\ A$$

36. D. 0.707

Solution:



Note: P = active power
Q = reactive power
S = apparent power
θ = power factor angle

$$\theta = \tan^{-1}\frac{Q}{P} = \tan^{-1}(1)$$

$$\theta = 56.4°$$

$$pf = \cos\theta = \cos 45° = 0.707$$

37. D. 600 rpm

Solution:

$$N = \frac{120f}{P} = \frac{120(40)}{8}$$

N = 600 rpm

38. B. 63%
39. C. Alternator
40. C. A dot
41. C. Repulsion start induction run motor
42. C. low voltage
43. D. any of these
44. D. Growler
45. B. produces minimum voltage drop
46. B. approximately no
47. D. the fourth band must be silver
48. A. P 6.00

Solution:

W = Pt

W = (100)(20)

W = 2,000W-hr or 2 kW-hr

Cost = W x P 3

Cost = 2(P 3) = P 6

49. B. Instantaneous-trip relay
50. C. Silver
51. A. 1,000 mm
52. B. two
53. D. junction boxes
54. D. Span
55. A. 60 °C
56. A. Cleat
57. D. 15 mm
58. C. 10 ft
59. B. Service conductors
60. B. 1,300 mm
61. B. closed
62. D. 2.65 mm
63. A. type MI
64. C. 40
65. C. 50 mm²
66. A. 760 mm
67. A. 900 mm
68. A. use a hack saw and ream the ends
69. B. 20 A
70. C. 300 mm
71. D. 1,300 mm
72. D. all of these
73. B. exposed work only
74. D. 20 mm
75. A. 1,300 mm
76. A. 100 mm
77. D. 600 V
78. C. 216%
79. C. 15
80. C. LS
81. A. 15 mm
82. D. Intermittent duty
83. A. flame retardant and moisture resistant
84. D. All of these
85. D. where exposed to direct rays of the sun
86. A. 6.4 mm
87. A. 500,000 ohms
88. A. 255 mm
89. B. 50 mm²
90. C. 900 mm
91. B. Knife
92. A. 300 mm
93. B. 300 mm
94. C. 3,700 mm
95. C. 180 volt-amperes
96. C. 75%
97. D. 48
98. B. 1,000 mm
99. C. 4,500 mm
100. A. 1,000 mm

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 11

Part 1: Technical Subject

1. The total voltage and amperage of four 0.5 A, 1.5 V cells connected in series

A. 1.5 V, 0.5 A
B. 6 V, 0.5 A
C. 1.5 V, 2 A
D. 6 V, 0.5 A

RME Board Exam

2. The power factor rating of an inductive reactive circuit can be increased by adding

A. coils
B. fuses
C. inductors
D. capacitors

3. What is the reciprocal of reactance?

A. Susceptance
B. Conductance
C. Admittance
D. Elastance

4. What is the purpose of connecting cells in series?

A. To in increase the current rating of the combination
B. To decrease the internal resistance of the combination
C. To increase the voltage rating of the combination
D. To increase the power rating of the combination

5. The power rating of resistors are determined through their _____.

A. color bands
B. type
C. physical size
D. all of these

6. The negative plate of a nickel-iron storage battery is made from which material?

A. Steel
B. Nickel
C. Iron
D. Zinc

7. Which of the following will NOT cause a hot motor bearing?

A. Insufficient lubrication
B. Overload
C. Loose brushes
D. Misalignment

8. A relay has a resistance of 30 ohms and an operating current of 0.8 A, how much power is required in order to operate the relay?

A. 24.0 W
B. 37.5 W
C. 19.2 W
D. 15.5 W

RME Board Exam

9. A starter resistor is necessary to start a dc motor because

A. it limits the speed
B. it limits the back emf
C. it starts the motor
D. it limits the starting current to a safe value

10. Commutator segments are normally made from which material?

A. Zinc
B. Copper
C. Brass
D. Carbon

11. Autotransformers used to start large induction motors are frequently called starting ___.

A. reactor
B. autotransformer
C. compensator
D. winding

RME Board Exam

12. An electric motor drives a mechanical load, taking 18.8 A from a 230 V source. Calculate the power input of the motor.

A. 4,364 W
B. 4,536 W
C. 5,825 W
D. 4,324 W

13. Which of the following ac motors has a dc armature winding with a commutator and a centrifugal switch in its rotor?

A. Split-phase capacitor start motor
B. Shaded-pole induction motor
C. Wound rotor induction motor
D. Repulsion start induction run motor

RME Board Exam

14. If a motor overheats, it must be due to

A. misaligned
B. low voltage
C. open circuited field
D. loose parts

15. Instrument use to measure specific gravity of the liquid in a storage battery.

A. Micrometer
B. Hydrometer
C. Calorimeter
D. Viscometer

16. In a single-phase power station the voltmeter and ammeter indicate 110 volts and 50 A respectively, while the wattmeter reads 3,310 watts. What is the power factor of the load being served?

A. 70 %
B. 80 %
C. 50 %
D. 60 %

RME Board Exam

17. The magnetizing current for the field of an alternator is usually supplied by

A. a battery
B. a DC magnet
C. a DC generator
D. a pulse generator

18. The ____of an ac wave is the time in seconds required to complete exactly one cycle of the wave pattern.

A. wavelength
B. period
C. frequency
D. time constant

19. In metric standard, as the no. of the wire gauge increases, the size of the wire ____.

A. remains the same
B. does not change
C. decreases
D. increases

20. Two resistors of 10 and 15-ohm resistances are connected in series across a 60-V supply. What percent of the total power drawn is dissipated in the 10-ohm resistance?

A. 40 %
B. 48 &
C. 64 %
D. 36 %

21. An inductive circuit has a resistance of 100 ohms and an inductance of 2 henries. What is the impedance of the combination at w = 377 radians per second?

A. 754 ohms
B. 761 ohms
C. 682 ohms
D. 500 ohms

22. In a parallel circuit, the total resistance is _____.

A. the sum of all the resistances
B. the reciprocal of all the resistances
C. larger than the largest resistance in the combination
D. smaller than the smallest resistance in the combination

23. At no load the terminal voltage of an alternator is 530 V. At rated load, the voltage drops to 480 V. Calculate is the percentage voltage regulation of the machine.

A. 10.42 %
B. 9.43 %
C. 90.56 %
D. 12.52 %

RME Board Exam

24. A resistance wire wrapped around an insulating core.

A. Film-type
B. Fusible type
C. Carbon composition
D. Wire wound

25. Askarel is a nonflammable, chemically stable, non-sludging synthetic liquid. Askarel is sold under which of the following trade names?

A. Inerteen
B. Pyranol
C. Chlorextol
D. All of these

26. How is ac converted to dc?

A. By means of a regulator
B. By means of a clamping circuit
C. By means of a rectifier
D. All of these

27. In order to achieve maximum power transfer, load resistance should be ___ generator's internal resistance.

A. greater than
B. lower than
C. equal to
D. lower than or greater than but not equal to

RME Board Exam

28. What is the most common type of motor that can be used for either ac or dc?

A. Series motor
B. Repulsion motor
C. Shunt motor
D. Shaded pole motor

29. Which of the following ac motors has its rotor energized by dc?

A. Synchronous motors
B. Repulsion motors
C. Squirrel cage motors
D. Wound rotor motors

RME Board Exam

30. The range of a moving iron ac ammeter is extended by

A. a multiplier
B. changing number of turns of operating coil
C. a shunt
D. none of these

31. The field winding of a self-excited generator is supplied from _____

A. a battery
B. an external rectifier
C. its own generated emf
D. a dc generator

RME Board Exam

32. A capacitor stores _____.

A. voltage
B. power
C. current
D. charge

33. Peak value of an ac wave is the same as _____.

A. effective value
B. instantaneous value
C. maximum value
D. rms value

34. Mega is a prefix equivalent to which of the following?

A. 10^3
B. 10^6
C. 10^9
D. 10^{12}

35. If the length of the wire is doubled and the cross sectional area is reduced to one-half, the resistance of the wire will be __.

A. quadrupled
B. halved
C. doubled
D. quartered

36. If the potential across a circuit is 40 V and the current is 5,000 mA, what is the equivalent resistance of the circuit?

A. 80 Ω
B. 800 kΩ
C. 8 Ω
D. 0.8 Ω

RME Board Exam

37. The frequency of an AC generator running at 600 rpm is 50 Hz. What is the number of poles?

A. 6 poles
B. 8 poles
C. 10 poles
D. 12 poles

38. In parallel circuit, the voltage across each branch is _____ the source voltage.

A. lesser than
B. greater than
C. equal to
D. all of these

RME Board Exam

39. A 25 kVA, 2400 /240 volt transformer has a primary current of 10 A. What is the secondary current?

A. 0.10 A
B. 100 A
C. 20 A
D. 50 A

RME Board Exam

40. Which are mediums for arc extinguishing in a breaker?

I. SF6 gas
II. Oil
III. Vacuum
IV. Air

A. I, III and IV only
B. I and III only
C. I, II and IV only
D. All of these

41. An autotransformer is used in the motor starting circuit to

A. Limit the current
B. Reduce the voltage
C. Control the speed
D. Increase the voltage

42. This is a factor related to the cleanliness of the lamp including room, shade, reflector, etc.

A. Coefficient of utilization
B. Depreciation factor
C. Quality factor
D. Usage factor

RME Board Exam

43. A tramway motor takes an average current of 32 A at 440 volts. What is the power absorbed in kW?

A. 8.14 kW
B. 14.08 kW
C. 4.18 kW
D. 6.25 kW

44. Find the amperage of a 10,000 VA load on a 208 V, 3-phase branch circuit?

A. 31.53 A
B. 22.84 A
C. 17.75 A
D. 27.75 A

RME Board Exam

45. Which resistor is physically larger in size?

A. 100 ohms, 10 W
B. 1 kilohm, 1 W
C. 10 ohms, 50 W
D. 1 megohm, 1/2 W

46. The resistance of an electrical conductor is inversely proportional to its _____.

A. diameter
B. cross sectional area
C. length
D. all of these

47. Which of the following is NOT ordinarily used in determining power factor?

A. Voltmeter
B. Tachometer
C. Ammeter
D. Wattmeter

RME Board Exam

48. Using a 5-hp motor plugged at 230-V line, find the current flowing in the circuit.

A. 17.33 A
B. 16.5 A
C. 17.314 A
D. 16.217 A

49. If the load is removed from a series wound motor, the speed will

A. remains the same
B. decrease
C. increase
D. none of these

50. Synchronous motors always run at speed _____ the synchronous speed.

A. less than
B. greater than
C. equal to
D. any of these

Part 2: Philippine Electrical Code

51. Contact device installed at the outlet for the connection of a single attachment plug.

A. Junction box
B. Reactor
C. Rosette
D. Receptacle

52. Circuits with a voltage of 600 V or less in a rigid metal conduit or in a rigid non-metallic conduit approved for direct burial and placed under driveways and parking areas of a one or two family dwelling units, shall have a minimum cover distance of ___.

A. 300 mm
B. 150 mm
C. 460 mm
D. 600 mm

RME Board Exam

53. With respect to the safety value of the insulation on electrical maintenance tools, it can be said properly that

A. the insulation provides very little real protection
B. its value is mainly to the untrained electrician helper
C. the insulation should not be used as the only protective measure
D. it adequately insures the safety of the user

54. The Philippine Electrical Code requires that no electrical installation, alteration or addition shall be connected or reconnected to any electrical power supply without _____.

A. payment of application fees
B. a certificate of inspection
C. an electrical permit
D. a certificate of completion

55. For ranges of 8.75 kW or more in rating, the minimum branch circuit rating shall be ___.

A. 30 A
B. 40 A
C. 50 A
D. 60 A

56. Service heads and goosenecks in service entrance cable shall be ___ point of attachment of the service drops to the building.

A. above the
B. below the
C. at the center of the
D. at the back of the

57. A disruptive discharge around or over the surface of a solid or liquid insulator.

A. Flashover
B. Sparkover
C. Corona
D. Surge

RME Board Exam

58. Outlets for heavy-duty lamp holders shall be rated ____.

A. 500 VA
B. 600 VA
C. 660 VA
D. 550 VA

RME Board Exam

59. When fastening an outlet to a brick wall, the electrician should use one of the following. Which one is this?

A. Expansion bolts
B. Toggle bolts
C. Temporary nail
D. Wooden plug and nail

60. Where a neutral is NOT available, the grounding impedance shall be installed between the _____.

A. grounding electrode and any of the current carrying conductor
B. grounding electrode and the neutral derived from a grounding transformer
C. grounding electrode and the system neutral of other station
D. all of these

61. Open conductors passing over public streets, alleys, roads, parking areas subject to truck traffic shall maintain a vertical height ___ from finished grade.

A. 3,700 mm
B. 4,600 mm
C. 5,500 mm
D. 3,100 mm

RME Board Exam

62. When soldering two copper surfaces together, they should be kept clean while heating by

A. applying the solder quickly
B. not admitting the open flame to touch the copper surfaces
C. frequently rubbing the tip with emery cloth
D. the use of flux

63. Using copper, the minimum size of service entrance conductors shall be ___.

A. 14.0 mm^2
B. 8.0 mm^2
C. 5.5 mm^2
D. 3.5 mm^2

64. A portion of a lightning protection system extending into the earth.

A. Air terminal
B. Counterpoise
C. Surge arrester
D. Ground terminal

RME Board Exam

65. When testing the insulation integrity of a new or old electrical wiring installation circuit of 5.5 mm^2 conductors, the Code specifies a minimum insulation resistance of what value?

A. 1,000,000 ohms
B. 250,000 ohms
C. 500,000 ohms
D. 100,000 ohms

66. Power conductors on poles, below communication conductors shall maintain a spacing distance of _____.

A. 760 mm
B. 600 mm
C. 800 mm
D. 540 mm

67. What test is usually made on cables after installation?

A. Copper loss test
B. No-load test
C. Insulation resistance test
D. Ampacity test

68. For four to six conductors in a conduit, the derating factor for the conductor ampacity is ____.

A. 70 %
B. 90 %
C. 80 %
D. 60 %

RME Board Exam

69. In general, layout of motors and power outlets not exceeding a total of ___ maybe included in the lighting layout provided such inclusion will not make the reading, interpretation and or checking of the said plan difficult.

A. 8
B. 10
C. 12
D. 6

70. For armories and auditoriums, the general lighting load shall be computed at ___ VA/m^2.

A. 8
B. 12
C. 10
D. 16

71. Plate electrodes of non-ferrous metal shall be at least ___ in thickness.

A. 1.2 mm
B. 1.0 mm
C. 1.5 mm
D. 1.8 mm

72. Conductors are selected at not less than ___ of the nameplate rating of the water heater.

A. 125 %
B. 100 %
C. 120 %
D. 130 %

73. Neutral current up to ___ is computed at 100 % demand.

A. 100 A
B. 150 A
C. 200 A
D. 300 A

74. Direct grade level access is defined as being located not more than ____ above grade level and being readily accessible.

A. 2,000 mm
B. 1,500 mm
C. 1,800 mm
D. 2,500 mm

RME Board Exam

75. Before an ammeter is disconnected from an energized current transformer circuit, one of the procedures should be followed. Which one is this?

A. Primary winding should be shorted
B. Secondary winding shou'd be shorted
C. Secondary winding should be opened
D. Primary winding should be opened

76. Direct buried conductors and cables emerging from the ground shall be protected by enclosures or raceways extending from the minimum cover distance required to a point ___ above finished grade.

A. 2,000 mm
B. 2,500 mm
C. 2,400 mm
D. 3,000 mm

77. It is the intent of the PEC that factory-installed internal wiring or the construction of equipment need not be inspected at the time of installation of the equipment EXCEPT

A. to test for continuity
B. to test for durability
C. to detect alterations or damages
D. all of these

RME Board Exam

78. Give the minimum vertical clearance from finished grade of a service drop conductor installed between buildings on residential properties and driveways?

A. 5,500 mm
B. 4,600 mm
C. 3,700 mm
D. 3,100 mm

79. Where more than one electrode is used, each electrode of one grounding system shall NOT be less than ___ from any other electrodes of another grounding system.

A. 1,800 mm
B. 2,000 mm
C. 2,400 mm
D. 1,900 mm

RME Board Exam

80. When measuring to determine the size of stranded conductor, you would place the wire gage over ___.

A. the insulation
B. all of the strands
C. one strand of the conductor
D. the outer covering

81. The voltage developed between the portable or mobile equipment frame and ground by the flow of maximum ground fault current shall NOT exceed _.

A. 100 V
B. 50 V
C. 150 V
D. 30 V

82. Plug fuses shall not be installed in circuits exceeding ____ between conductors.

A. 125 V
B. 250 V
C. 300 V
D. 150 V

83. A single electrode consisting of a rod, pipe or plate shall have a resistance to ground of ____ or less.

A. 20 ohms
B. 15 ohms
C. 25 ohms
D. 30 ohms

84. Mandatory rules of the PEC are characterized by the use of the word ____.

A. shall
B. should
C. both A and B
D. neither A or B

RME Board Exam

85. Who shall make the final decision in the interpretation of controversial provisions of the Philippine Electrical Code?

A. IIEE Board of Governors
B. Board of Electrical Engineering
C. Building Official
D. IIEE Code Committee

86. For equipment protected by a 20-A overcurrent device, the minimum size of equipment grounding conductor using copper shall be _____.

A. 2.0 mm^2
B. 3.5 mm^2
C. 1.25 mm^2
D. 5.5 mm^2

87. For warehouses or storage, a general lighting load of ____ shall be used.

A. 2 VA/m^2
B. 4 VA/m^2
C. 8 VA/m^2
D. 10 VA/m^2

RME Board Exam

88. A continuous electrical load is one where the maximum current is expected to continue for a minimum duration of time. What is this minimum duration of time?

A. 1 hour
B. 4 hours
C. 3 hours
D. 2 hours

89. The minimum clearance between the overhead ground wires and the highest protection on the protected structure shall be __.

A. 1,600 mm
B. 1,500 mm
C. 1,800 mm
D. 1,700 mm

RME Board Exam

90. S_2 means

A. duplex switch
B. two-pole switch
C. 2-way switch
D. two-throw switch

91. Entrances to rooms and other guarded locations containing exposed energized parts shall be marked with a _____.

A. welcome sign
B. no entry sign
C. warning sign
D. all of these

92. The minimum size of service lateral conductors using copper wires shall be __.

A. 5.5 mm^2
B. 3.5 mm^2
C. 8.0 mm^2
D. 2.0 mm^2

RME Board Exam

93. Underfloor raceways may be occupied up to ___ percent of the area.

A. 55
B. 38
C. 40
D. 30

94. The height of air terminals shall be such as to bring the tip not less than ___ above the object to be protected for 6,000-mm maximum intervals.

A. 250 mm
B. 254 mm
C. 300 mm
D. 150 mm

95. For installations to supply only limited loads of a single branch circuit, service entrance conductors shall NOT be smaller than ____ hard drawn copper.

A. 3.5 mm^2
B. 8.0 mm^2
C. 5.5 mm^2
D. 14.0 mm^2

96. The upper most portion of a lightning protection system.

A. Surge Arrester
B. Lightning rod
C. Ground terminal
D. Air terminal

RME Board Exam

97. The minimum size of service drop copper conductors allowed by the Philippine Electrical Code is one of the following. Which is this size?

A. 3.5 mm^2
B. 5.5 mm^2
C. 2.0 mm^2
D. 8.0 mm^2

98. What is the maximum permitted load of a 20-A branch circuit serving a continuous duty load?

A. 10 A
B. 25 A
C. 20 A
D. 16 A

RME Board Exam

99. Appliance outlets installed in a dwelling unit for specific appliances, such as laundry equipment, shall be installed within ___ of the intended location of the appliance.

A. 1,800 mm
B. 1,500 mm
C. 2,000 mm
D. 1,000 mm

100. Which of the following conductors is applicable only on dry locations?

A. type THW
B. type THWN
C. type RH
D. None of these

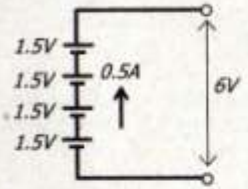
< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 11

ANSWER KEY

1. D. 6 V, 0.5 A



2. D. capacitors
3. A. Susceptance
4. C. To increase the voltage rating of the combination
5. C. physical size
6. C. Iron
7. C. Loose brushes
8. C. 19.2 W
9. D. it limits the starting current to a safe value
10. B. Copper
11. C. compensator
12. D. 4,324 W

Solution:

$P = EI$

$P = (230)(18.8) = 4{,}324\ W$

13. D. Repulsion start induction run motor
14. B. low voltage
15. B. Hydrometer
16. D. 60%

Solution:

$P = EIpf$

$pf = \frac{P}{EI} = \frac{3310}{(110)(50)} = 0.60$

17. A. a battery
18. B. period
19. D. increases
20. A. 40%
21. B. 761 ohms

Solution:

$X_L = wL$

$X_L = 377(2) = 754\ ohms$

$Z = \sqrt{R^2 + X_L^2}$

$Z = \sqrt{(100)^2 + (754)^2}$

$Z = 760.6\ ohms$

22. D. smaller than the smallest resistance in the combination
23. A. 10.42%

Solution:

$\%VR = \frac{E_{no\ load} - E_{full\ load}}{E_{full\ load}}$

$\%VR = \frac{530 - 480}{480} x100\%$

$\%VR = 10.416\%$

24. D. Wire wound
25. D. All of these
26. C. By means of a rectifier
27. C. equal to
28. A. Series motor
29. A. Synchronous motors
30. B. changing number of turns of operating coil
31. C. its own generated emf
32. D. charge
33. C. maximum value
34. B. 10^6

35. A. quadrupled

Solution:

Note: The resistance of a wire is directly proportional to its length and inversely proportional to its cross sectional area.

$R = k\left(\frac{L}{A}\right)$

$\frac{R_{new}}{R_{old}} = \left(\frac{L_{new}}{L_{old}}\right)\left(\frac{A_{old}}{A_{new}}\right)$

$R_{new} = R_{old}\left(\frac{L_{new}}{L_{old}}\right)\left(\frac{A_{old}}{A_{new}}\right)$

$R_{new} = R_{old}\left(\frac{2L_{old}}{L_{old}}\right)\left(\frac{A_{old}}{1/2\ A_{old}}\right)$

$R_{new} = 4R_{old}$

36. C. 8 Ω

Solution:

$R = \frac{E}{I} = \frac{40}{5000 \times 10^{-3}}$

$R = 8\ ohms$

37. C. 10 poles

Solution:

$f = \frac{PN}{120}$

$P = \frac{120f}{N} = \frac{120(50)}{600}$

$P = 10\ poles$

38. C. equal to

39. B. 100 A

Solution:

$\frac{I_2}{I_1} = \frac{N_1}{N_2}$

$I_2 = I_1\left(\frac{N_1}{N_2}\right)$

$I_2 = 10\left(\frac{2400}{240}\right)$

$I_2 = 100\ A$

40. D. All of these
41. B. Reduce the voltage
42. B. Depreciation factor
43. B. 14.08 kW

Solution:

$P = EI$

$P = (440)(32)$

$P = 14{,}080\ W\ or\ 14.08\ kW$

44. D. 27.75 A

Solution:

$S = \sqrt{3}EI$

$I = \frac{S}{\sqrt{3}E} = \frac{10{,}000}{\sqrt{3}(208)}$

$I = 27.75\ A$

45. C. 10 ohms, 50 W

Note: The larger the wattage rating, the bigger is the physical size of the resistor

46. B. cross sectional area
47. B. Tachometer

48. D. 16.217 A

Solution:

$P = EI$

$$I = \frac{P}{E} = \frac{5\ hp \times \frac{746\ W}{1\ hp}}{230} = 16.217\ A$$

49. C. increase
50. C. equal to
51. D. Receptacle
52. C. 460 mm
53. C. the insulation should not be used as the only protective measure
54. B. a certificate of inspection
55. B. 40 A
56. A. above the
57. A. Flashover
58. B. 600 VA
59. A. Expansion bolts
60. B. grounding electrode and the neutral derived from a grounding transformer
61. C. 5,500 mm
62. D. the use of flux
63. B. 8.0 mm^2
64. D. Ground terminal
65. B. 250,000 ohms
66. A. 760 mm
67. C. Insulation resistance test
68. C. 80%
69. B. 10
70. A. 8
71. C. 1.5 mm
72. A. 125%
73. C. 200 A
74. A. 2,000 mm
75. D. Primary winding should be opened
76. C. 2,400 mm
77. C. to detect alterations or damages
78. C. 4,600 mm
79. D. 1,900 mm
80. B. all of the strands
81. A. 100 V
82. B. 250 V
83. C. 25 ohms
84. A. shall
85. B. Board of Electrical Engineering
86. B. 3.5 mm^2
87. A. 2 VA/m^2
88. C. 3 hours
89. C. 1,800 mm
90. A. duplex switch
91. C. warning sign
92. A. 5.5 mm^2
93. C. 40
94. B. 254 mm
95. A. 3.5 mm^2
96. D. Air terminal
97. D. 8.0 mm^2
98. D. 16 A

Solution:

Note: As a rule, the permitted load of a branch circuit serving a continuous duty load shall be 80% only of its rating.

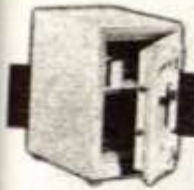
Load = 0.8(20)

Load = 16 A

99. A. 1,800 mm
100. C. type RH

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed



Question Bank 12

Part I: Technical Subject

1. The smallest size of a dry cell.

A. Size AAA
B. Size C
C. Size D
D. Size AA

2. Electrical diagram showing the control components rearranged to simplify the tracing of the circuit.

A. Ladder diagram
B. Schematic diagram
C. Wiring diagram
D. Pneumatic diagram

RME Board Exam

3. An applicant for registered master electricians' examination must as at least completed ____ of a five year Bachelor of Science in Electrical Engineering program and has a specific record of ___ practice in electrical wiring and installation.

A. 3 years, 2 years
B. 2 years, 1 year
C. 3 years, 1 year
D. 2 years, 2 years

4. An ideal voltage source has a ____ resistance.

A. high
B. low
C. moderate
D. none of these

RME Board Exam

5. If a magnetic field is cut across by a coil of conductor____ is generated between the ends of the conductor.

A. electromotive force
B. resistance
C. stronger magnetic field
D. capacitance

6. A device which controls the gate or valve opening of the generator prime mover.

A. Contactor
B. Regulator
C. Governor
D. Converter

7. Electrons in the last orbit of an atom.

A. Bound electrons
B. Free electrons
C. Valence electrons
D. None of these

8. A variable resistance resistor with three terminals.

A. Resistance box
B. Potentiometer
C. Rheostat
D. Varistor

9. Initial flux needed by a self-excited dc generator in order to build-up a voltage.

A. Residual flux
B. Saturation flux
C. Leakage flux
D. Effective flux

48. D. 16.217 A

Solution:

$P = EI$

$$I = \frac{P}{E} = \frac{5\ hp \times \frac{746\ W}{1\ hp}}{230} = 16.217\ A$$

49. C. increase
50. C. equal to
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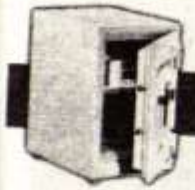

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C. moderate
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RME Board Exam

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B. resistance
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B. Saturation flux
C. Leakage flux
D. Effective flux

RME Board Exam

10. Electric resistances of 7 and 11 ohms are connected in parallel. This combination is then placed in series with a single resistance of 15 ohms and the entire combination is placed across a 110 V dc mains, what current passes through the 15-ohm resistance?

A. 5.71 A
B. 3.17 A
C. 4.27 A
D. 6.77 A

11. Which of the following is one of the common sources of machine breakdown?

A. Poor insulation
B. Moisture
C. Excessive heat
D. All of these

RME Board Exam

12. The following factors affect the required interrupting rating of a circuit breaker to be installed in a switchboard. Which one is NOT one of them?

A. Size and length of the service drop conductors
B. Size of the source transformer
C. Voltage
D. Frequency

13. Five 1.5-V cells are connected in series. If the internal resistance of each cell is 0.25 ohm, what external load resistance will produce a current of 2 A through the cells?

A. 2.5 Ω
B. 3.0 Ω
C. 1.75 Ω
D. 2.25 Ω

14. Reciprocal of capacitance

A. Inductance
B. Elastance
C. Reluctance
D. Daraf

15. The condition of the liquid electrolyte in a battery is measured in terms of its ___.

A. specific gravity
B. viscosity
C. acidity
D. water content

16. An active element on a circuit is the one that ____ to the circuit.

A. supplies energy
B. receives the energy supplied
C. both A and B
D. neither A or B

17. A 6-ohm resistor is connected in parallel with another resistor R. If the equivalent resistance of the combination is 3 ohms, how much is R?

A. 6 ohms
B. 4 ohms
C. 5 ohms
D. 3 ohms

RME Board Exam

18. The function of a protective relay in a circuit breaker is to

A. to provide additional safety in the operation of circuit breaker
B. to limit the arcing current during the operation of a circuit
C. ground any stray voltages
D. to close the contacts when actuating quantity reaches a certain predetermined value

RME Board Exam

19. Sparking between contacts can be reduced by _____.

A. inserting a capacitor in series with the contacts
B. inserting a capacitor in parallel with the contacts
C. inserting a resistance in the line
D. all of these

20. It is basically a mercury lamp with a certain innovation of its arc tube.

A. Metal halide lamp
B. Incandescent lamp
C. Neon lamp
D. Sodium lamp

21. Which of the following is NOT a factor that controls the emf of an unloaded generator?

A. Speed
B. Field current
C. Armature current
D. None of these

RME Board Exam

22. If the current from a short-circuited 1.5 V dry cell is 25 A, what is the internal resistance of the cell?

A. 16.67 ohms
B. 6.67 ohms
C. 0.06 ohm
D. 3.33 ohms

23. Motors commonly used in home appliances such as blenders, mixers, etc.

A. Universal motor
B. Capacitor start motor
C. Capacitor start and run motor
D. Compound motor

24. A motor with short-circuited copper or aluminum bars pressed or embedded into the rotor slots.

A. Repulsion start induction run motor
B. Universal motor
C. Shunt wound motor
D. Squirrel cage induction motor

25. The symbol S_M means what type of switch?

A. main switch
B. manual switch
C. remote control switch
D. master selector switch

RME Board Exam

26. The purpose of a ballast of a fluorescent lamp is which of the following?

A. To regulate the voltage across the lamp
B. To limit the current to the lamp
C. To regulate the lumens output
D. To improve the power factor

27. The capacitance of a capacitor is NOT affected by _____.

A. type of dielectric material
B. distance between plates
C. area of the plates
D. type of material used in the plates

28. A 60 Hz frequency has an angular speed of _____.

A. 314 radians per second
B. 120 radians per second
C. 377 radians per second
D. 188 radians per second

29. Sparking occurs when a motor disconnect is switched off. This is due to the high ___ of the motor windings.

A. inductance
B. capacitance
C. resistance
D. all of these

RME Board Exam

30. If a live conductor is contacted accidentally, the severity of the electrical shock is determined primarily by ___.

A. the size of the conductor
B. the contact resistance
C. the current in the conductor
D. whether the current is ac or dc

31. What is the function of a phase-balanced relay?

A. Opens field contactor in case of unbalance
B. Keeps correct phase balance
C. Interlocks phases
D. Closes field contactor in case of unbalance

RME Board Exam

32. Select the poorest conductor of electricity

A. Carbon
B. Steel
C. Aluminum
D. Silver

33. Which of the following is a typical resistance and power rating of a carbon composition resistor?

A. 4,700 Ω, 1 W
B. 100 Ω, 5 W
C. 1,000 Ω, 10 W
D. 6,800 Ω, 100 W

RME Board Exam

34. The standard method of controlling the output voltage of a 440-V, 60 Hz AC generator is accomplished by adjusting the

A. number of poles
B. prime mover speed
C. alternator's field excitation
D. load on the alternator

35. How do you call the power lost in heat in the windings due to the flow of current through the copper windings?

A. Hysteresis loss
B. Copper loss
C. Eddy current loss
D. Stray load loss

36. What is the purpose of staggering brushes in a dc machine?

A. To reduce chattering
B. To cover more area on the commutator for more power
C. To even out the load
D. To prevent the uneven wear on the commutator

RME Board Exam

37. A 2-pole ac generator is running at 1,500 rpm. What is the frequency?

A. 25 Hz
B. 60 Hz
C. 50 Hz
D. None of these

38. When the mechanical load is removed, which of the following motors run at high speed?

A. Shunt motor
B. Compound motor
C. Synchronous motor
D. Series motor

39. Three resistances of 10, 4 and 6 ohms respectively are connected across each other. If the 6-ohm resistor is shorted, what is their equivalent resistance?

A. 1.9 ohms
B. 0
C. 2.85 ohms
D. 1.333 ohms

40. What is the purpose of the poles and winding in a generator?

A. To cut down the magnetic flux lines
B. To neutralized the effect of armature reaction
C. To produce magnetic flux lines
D. All of these

RME Board Exam

41. A single phase AC motor has a full load current of 30 A. The rating of the two fuses for line protection is

A. 60 A
B. 100 A
C. 30 A
D. 90 A

42. A new fully charged lead-acid battery will measure _____.

A. exactly 12 V
B. more than 12 V
C. below 12 V
D. none of these

43. If the multiplier of the resistor is a silver color, the ohmic value of the resistor is expected to be ___.

A. greater than 1 ohm
B. less than 1 ohm
C. either A or B
D. neither A or B

44. What is the amperage of a 240-V, 3-phase feeder circuit supplying a total load of 128,000 VA?

A. 533 A
B. 256 A
C. 178 A
D. 308 A

RME Board Exam

45. The resistance of a conductor, when its temperature is increased,

A. remains constant
B. varies
C. increases
D. decreases

46. A transformer has a voltage ratio of 1:2, what is the current ratio equal to?

A. 2:1
B. 1:2
C. 1:4
D. 4:1

47. Which of the following is a preferred test used to check switchgear insulation?

A. dc high potential test
B. Megohmmeter test
C. ac high potential test
D. Varley loop test

48. Three 10-ohm resistors are connected in wye configuration. What will be the ohmmeter reading if the terminals of the meter are connected between any two-line terminals of the wye connection?

A. 12 ohms
B. 5 ohms
C. 30 ohms
D. 20 ohms

49. Short circuit test on transformer is used to determine _____.

A. transformation ratio
B. equivalent parameters on the high side
C. polarity of transformer terminals
D. all of these

50. Which of the following parts of an ac motor corresponds to the armature dc motor?

A. Field coils
B. Rotor
C. Stator
D. Armature

Part 2: Philippine Electrical Code

51. Concealed knob and tube wiring shall NOT be used in

A. theaters
B. motion picture studios
C. commercial garage
D. all of these

RME Board Exam

52. As a general rule, equipment rated 1,000 A or more and measuring more than 1,900 mm wide, containing overcurrent devices, shall have an entrance at both ends of the switchboard room. The width and height of each entrance shall be NOT less than the following dimensions. Which one is correct?

A. 800 mm wide x 2,000 mm high
B. 600 mm wide x 2,000 mm high
C. 600 mm wide x 2,200 mm high
D. 800 mm wide x 2,200 mm high

53. The main disconnecting means for all electric driven irrigation machines shall be visible and NOT more than ___ from the machine.

A. 10 m
B. 15 m
C. 12 m
D. 8 m

54. A factory assembly of two or more insulated conductors having an outer sheath of moisture resistant flame-retardant, non-metallic material.

A. Mineral insulated cable
B. Armored cable
C. Medium voltage cable
D. Non-metallic sheathed cable

55. In a watercraft, when the source of electric power is a generator, it shall be automatically started and connected to the emergency switchboard within ___ seconds of loss of the main source of electrical power.

A. 40
B. 50
C. 25
D. 45

RME Board Exam

56. Which is the most important thing to do when a person has been shocked by electricity?

A. Separate the victim from the electric wire as soon as possible making sure that you do not become another victim
B. Call for competent help
C. Apply resuscitation
D. Disconnect the switch

57. The demand factor for two elevators on a single feeder shall be _____.

A. 95 %
B. 96 %
C. 94 %
D. 97 %

58. A hoisting and lowering mechanism equipped with a car which moves in guides in a substantially vertical direction, the floor area of which does not exceed 0.85 square meter and which is used exclusively for carrying materials.

A. Elevator
B. Stairway chair lifts
C. Dumbwaiter
D. None of these

59. Intermediate metal conduit shall be supported at least every ___.

A. 2,500 mm
B. 2,000 mm
C. 1,800 mm
D. 3,000 mm

60. Type AC cable shall be secured by approved staples, straps hangers or similar fittings within ___ from every outlet box, junction box, cabinet or fitting.

A. 200 mm
B. 150 mm
C. 400 mm
D. 300 mm

61. Maximum electrical trade size of liquidtight flexible metal conduit.

A. 125 mm
B. 150 mm
C. 100 mm
D. 200 mm

RME Board Exam

62. A stranded wire is given the same designation as a solid wire if it has the same ___.

A. overall diameter
B. weight per foot
C. cross-sectional area
D. strength

63. Circuits with a voltage of 600 V or less in a rigid non-metallic conduit approved for direct burial without concrete encasement and placed in trench below a 50 mm thick concrete or equivalent shall have a minimum cover distance of _____.

A. 300 mm
B. 400 mm
C. 460 mm
D. 200 mm

RME Board Exam

64. Communication conductors shall be separated at least ___ from conductors of any electric light or power circuits.

A. 50 mm
B. 40 mm
C. 60 mm
D. 75 mm

65. For multiple motors on a single crane or hoist, the minimum circuit ampacity of the power conductors shall be the nameplate full load ampere rating of the largest motor for any single crane motion, plus ___ percent of the nameplate full load ampere rating of the next largest motor.

A. 25 %
B. 30 %
C. 40 %
D. 50 %

66. Receptacles used in circuits operating at less than 50 V shall have an ampere rating of not less than ____.

A. 20 A
B. 10 A
C. 15 A
D. 5 A

RME Board Exam

67. A general-purpose single-phase motor rated 0.5 hp has a current rating of 5A. What should be the setting of the overload relay that is installed to protect the motor? Assume the service factor of the motor to be 1.0.

A. 5.75 A
B. 5.5 A
C. 5.0 A
D. 6.25 A

68. A single enclosed raceway for conductors or cables.

A. Box
B. Duct
C. Cabinet
D. Gutter

69. Type MI cables shall permitted for _____.

A. branch circuits
B. feeder circuits
C. services
D. all of these

70. Generator neutral maybe connected in common, provided that the third harmonic content of the waveform of each generator does NOT exceed ___.

A. 3 %
B. 4 %
C. 5 %
D. 6 %

71. Enclosures for overcurrent devices shall be mounted in what position?

A. Horizontal
B. Vertical
C. Diagonal
D. Any

RME Board Exam

72. To support conduit on a hollow block wall, use one of the following methods. Which one is this?

A. Machine screw
B. Lag screw
C. Toggle bolt
D. Through bolt

73. As applied to lightning protection, an attachment to secure the conductor to the structure or building.

A. Bonder
B. Stapler
C. Support
D. Fastener

74. The bottom of sign and outline lighting enclosures shall NOT be less than ___ above areas accessible to vehicles.

A. 5,000 mm
B. 4,800 mm
C. 4,700 mm
D. 4,900 mm

75. Circuits containing electric discharge lighting transformers exclusively shall NOT be rated in excess of _____.

A. 20 A
B. 30 A
C. 15 A
D. 40 A

76. Each resistance welder shall have an overcurrent device rated or set at not more than ___ percent of the conductor rating.

A. 300
B. 250
C. 175
D. 150

77. The transformer's secondary open circuit voltage used in electric signs shall NOT exceed

A. 15 kV
B. 20 kV
C. 12 kV
D. 10 kV

78. Conductors external to motors and controls in cranes and hoists shall NOT be smaller than ___.

A. 2.0 mm^2
B. 1.25 mm^2
C. 3.5 mm^2
D. 0.75 mm^2

79. An overcurrent device rated or set at NOT more than ___ percent of the conductor rating shall protect conductors that supply one or more motor-generator arc welders.

A. 300
B. 200
C. 150
D. 125

RME Board Exam

80. Which of the motor starters does not stress the motor winding severely?

A. Across the line starter
B. Wye-delta starter
C. Soft-start starter
D. Transformer-type starter

81. Conductors in open wiring on insulators shall be rigidly supported at intervals NOT exceeding _____.

A. 1,200 mm
B. 1,500 mm
C. 1,300 mm
D. 1,400 mm

RME Board Exam

82. What is the minimum depth of clear working space in front of a switchboard rated at 4,160 volts, where there are exposed energized parts on both sides of the workspace?

A 1,000 mm
B. 1,900 mm
C. 1,600 mm
D. 2,000 mm

83. A 2.0 mm^2 TW copper conductor has an ampacity equal to _____.

A. 20 A
B. 10 A
C. 15 A
D. 25 A

RME Board Exam

84. Rigid metal conduit shall be firmly fastened within _____ of each outlet box.

A. 800 mm
B. 900 mm
C. 760 mm
D. 600 mm

85. Type TW conductors have a maximum operating temperature of ___.

A. 75 °C
B. 50 °C
C. 60 °C
D. 90 °C

RME Board Exam

86. Which of the following statements is NOT correct?

A. The use of an inductive ballast for fluorescent lamps is usually because it is the most efficient
B. Lighting fixtures having exposed ballasts shall be so installed that they will not be in contact with combustible materials
C. A ballast which incorporates an autotransformer to raise the voltage to more than 300 V shall be supplied only by a supply system which is grounded
D. A receptacle outlet installed outdoors shall be located so that water accumulation is not likely to touch the outlet cover or plate

87. Smallest electrical trade size for flexible metal conduit.

A. 15 mm
B. 20 mm
C. 25 mm
D. 10 mm

RME Board Exam

88. When pulling wires into a conduit, a certain percent of the conduit area should unoccupied. What is the purpose for this?

A. To permit pulling in additional wires later
B. To permit pulling out of the wires for replacement even if the insulation has swelled
C. To allow pulling in the wire without strain on the conductors or abrasion
D. To permit circulation of air so that the insulation will not be damage by heat

89. Enclosures of metal for electrodes of electric discharge tubings shall NOT be less than _____ thick sheet metal.

A. 0.40 mm
B. 0.35 mm
C. 0.45 mm
D. 0.50 mm

RME Board Exam

90. If a bare live conductor is touched accidentally, the severity of the electric shock is determined primarily by

A. the size of the conductor
B. the type of the power supply, whether AC or DC
C. the contact resistance between the bare wire and the person at the point of contact
D. the current flowing in the conductor

91. A factory assembly of one or more conductors each individually insulated and enclosed in a loose fit non-metallic flexible conduit as an integrated gas spacer.

A. type MC
B. type NMC
C. type FCC
D. type IGS

92. A generator set used for standby power systems shall have a time delay feature permitting a ____-minute setting to avoid retransfer in case of short time reestablishment of the normal source.

A. 10
B. 8
C. 12
D. 15

93. Type UF cable shall be permitted for use _____.

A. underground including direct burial to earth
B. underground but concealed with a rigid metal conduit
C. underground but not direct burial to earth
D. none of these

RME Board Exam

94. Intermediate metal conduit shall be shipped in standard lengths of _____.

A. 5,000 mm
B. 4,000 mm
C. 2,000 mm
D. 3,000 mm

95. The smallest copper conductor of type MC cable shall be _____.

A. 2.0 mm^2
B. 1.25 mm^2
C. 0.75 mm^2
D. 3.5 mm^2

96. The grounded conductor of type FC (flat conductor) cable shall be identified by means of a distinctive and durable white or_____ marking.

A. green
B. natural gray
C. brown
D. yellow stripe

97. Individually covered or insulated grounding conductors shall have a continuous outer finish that is either green, or green with one or more _____ stripes.

A. white
B. gray
C. yellow
D. violet

RME Board Exam

98. Hazardous locations are classified by the Philippine Electrical Code in how many classes?

A. Two classes
B. Four classes
C. Three classes
D. One class

99. The branch circuit conductors supplying one or more units of a data processing system shall have an ampacity NOT less than _____ of the total connected load.

A. 110 %
B. 125 %
C. 100 %
D. 115 %

100. As applied to circuit breaker, this term indicates that there is purposely introduced a delay in the tripping action of the circuit breaker. Which one?

A. Delay-on
B. Instantaneous trip
C. Inverse time
D. Delay-off

< Exam ends here >

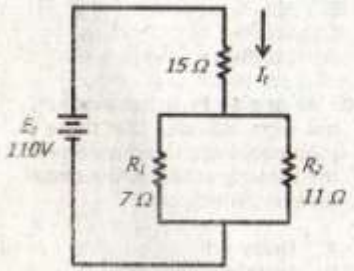
Proceed to the next page for the answer key and solutions!

Question Bank 12

ANSWER KEY

1. A. Size AAA
2. B. Schematic diagram
3. C. 3 years, 1 year
4. B. low
5. A. electromagnetic force
6. C. Governor
7. C. Valence electrons
8. B. Potentiometer
9. A. Residual flux
10. A. 5.71 A

Solution:



$$R_t = \frac{7(11)}{7+11} + 15$$

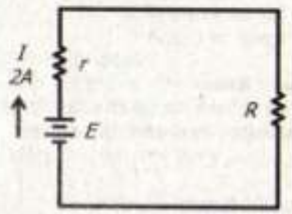
$$R_t = 19.277\ \Omega$$

$$I_t = \frac{E_t}{R_t} = \frac{110}{19.277}$$

$$I_t = 5.706\ A$$

11. D. All of these
12. A. Size and length of the service drop conductors
13. A. 2.5 Ω

Solution:



$$E = 5(1.5) = 7.5\ V$$

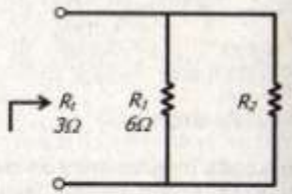
$$r = 5(0.25) = 1.25\ \Omega$$

$$I = \frac{E}{r+R}$$

$$R = \frac{E}{I} - r = \frac{7.5}{2} - 1.25 = 2.5 \text{ ohms}$$

14. B. Elastance
15. A. specific gravity
16. A. supplies energy
17. A. 6 ohms

Solution:



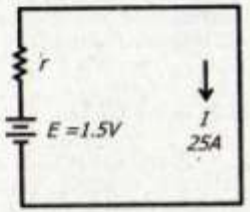
$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{3} = \frac{1}{6} + \frac{1}{R_2}$$

$$R_2 = 6\ \Omega$$

18. D. to close the contacts when actuating quantity reaches a certain predetermined value
19. B. inserting a capacitor in parallel with the contacts
20. A. Metal halide lamp
21. C. Armature current
22. C. 0.06 ohm

Solution:



$$E = Ir$$

$$r = \frac{E}{I} = \frac{1.5}{25}$$

$$r = 0.06\ \Omega$$

23. A. Universal motor
24. D. Squirrel cage induction motor
25. D. master selector switch
26. B. To limit the current to the lamp
27. D. type of material used in the plates
28. C. 377 radians per second
29. A. inductance
30. B. the contact resistance
31. A. Opens field contactor in case of unbalance
32. A. Carbon
33. A. 4,700 Ω, 1 W
34. B. prime mover speed

Note: Voltage can be controlled also by varying the field excitation, but the most common method practically used is adjusting the prime mover speed.

35. B. Copper loss
36. D. To prevent the uneven wear on the commutator
37. A. 25 Hz

Solution:

$$f = \frac{PN}{120} = \frac{2(1500)}{120}$$

$$f = 25\ Hz$$

38. D. Series motor
39. B. 0

Solution:

Note: Since the 6-ohm resistance is shorted, its resistance becomes zero.

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R_t} = \frac{1}{10} + \frac{1}{4} + \frac{1}{0}$$

$$\frac{1}{R_t} = 0.1 + 0.25 + \infty$$

$$\frac{1}{R_t} = \infty$$

$$R_t = \frac{1}{\infty}$$

$$R_t = 0\ \Omega$$

40. C. To produce magnetic flux lines
41. D. 90 A

Solution:

Note: The rating shall not be greater than 300% of the full load current of the motor.

$$Rating = 3(30)$$

$$Rating = 90\ A$$

42. B. more than 12 V
43. B. less than 1 ohm
44. D. 308 A

Solution:

$S = \sqrt{3}EI$

$I = \frac{S}{\sqrt{3}E} = \frac{128,000}{\sqrt{3}(240)}$

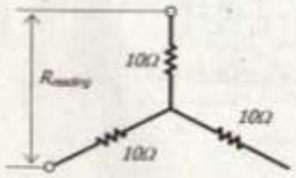
$I = 307.92$ A

45. C. increases
46. A. 2:1

Note: In a transformer, the voltage ratio is opposite of the current ratio

47. C. ac high potential test
48. D. 20 ohms

Solution:



$R_{reading} = 2(10)$

$R_{reading} = 20\ \Omega$

49. B. equivalent parameters on the high side
50. C. Stator
51. D. all of these
52. B. 600 mm wide x 2,000 mm high
53. B. 15 m
54. D. Non-metallic sheathed cable
55. D. 45
56. A. Separate the victim from the electric wire as soon as possible making sure that you do not become another victim
57. A. 95%
58. C. Dumbwaiter
59. D. 3,000 mm
60. D. 300 mm
61. C. 100 mm
62. C. cross sectional area
63. A. 300 mm
64. A. 50 mm
65. D. 50%
66. C. 15 A
67. A. 5.75 A

Solution:

Note: For motors having a service factor of 1.0, the overload device must not be more than 115% of the full load current of the motor.

Setting = 1.15(5)

Setting = 5.75 A

68. B. Duct
69. D. all of these
70. C. 5%
71. B. Vertical
72. C. Toggle bolt
73. D. Fastener
74. D. 4,900 mm
75. B. 30 A
76. A. 300
77. A. 15 kV
78. B. 1.25 mm²
79. B. 200
80. B. Wye-delta starter
81. C. 1,300 mm
82. B. 1,900 mm
83. C. 15 A
84. B. 900 mm
85. C. 60 °C
86. A. The use of an inductive ballast for fluorescent lamps is usually because it is the most efficient

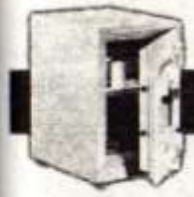
87. A. 15 mm
88. C. To allow pulling in the wire without strain on the conductors or abrasion
89. D. 0.50 mm
90. C. the contact resistance between the bare wire and the person at the point of contact
91. D. type IGS
92. D. 15
93. A. underground including direct burial to earth
94. D. 3,000 mm
95. C. 0.75 mm²
96. B. natural gray
97. C. yellow
98. C. Three classes
99. B. 125%
100. C. Inverse time

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Notes

Notes



Question Bank 13

Part 1: Technical Subject

1. An operation in which the motor runs when the pushbutton is pressed and will stop when the pushbutton is released.

   A. Clipping
   B. Jogging
   C. Plugging
   D. Commissioning

RME Board Exam

2. It is not advisable to leave a lead acid storage battery in a discharged state for a long time mainly because

   A. the plates will become sulphated
   B. electrolyte will attack the condenser
   C. electrolyte will become weak
   D. acid will evaporate

3. An instrument used to measure temperature.

   A. Thermometer
   B. Tachometer
   C. Synchroscope
   D. Thermocouple

RME Board Exam

4. What is the angular velocity for a 25-cycle circuit?

   A. 3.1416 radians per second
   B. 157 radians per second
   C. 377 radians per second
   D. 314 radians per second

5. A term universally employed to measure wire diameters.

   A. Millimeter
   B. Circular mil
   C. Meter
   D. Mil

RME Board Exam

6. In a radio, gang condenser is a type of

   A. electrolytic capacitor
   B. paper capacitor
   C. ceramic capacitor
   D. air capacitor

7. To keep the terminals of a lead-acid storage battery free from corrosion, it is advisable to

   A. keep electrolyte level low
   B. apply petroleum jelly
   C. charge the battery at frequent intervals
   D. clean the terminals frequently

8. For a series RC circuit, the circuit power factor is _____.

   A. lagging
   B. leading
   C. in-phase
   D. zero

RME Board Exam

9. A ___ is a device with functions that is similar to a rectifier.

   A. transformer
   B. contactor
   C. inverter
   D. commutator

10. Which of the following is a typical usage of an autotransformer?

A. Motor control transformer
B. Grounding transformer
C. Distribution transformer
D. Multi-voltage transformer

11. The electrolyte used in carbon-zinc dry cell is a combination of ____ dissolved in water.

A. sulphuric acid and manganese dioxide
B. powdered carbon and zinc chloride
C. ammonium chloride and zinc chloride
D. none of these

12. Which of the following statements is NOT true regarding a cell?

A. The plates must be immersed in some electrolyte solution such as an acid, an alkali or a salt
B. Decreasing the distance between plates, decreases the internal resistance of the cell
C. The plates must be of different metals
D. Increasing the size of the electrodes, increases the emf of the cell

RME Board Exam

13. The ____ rating of a circuit breaker is the maximum short circuit current which the breaker will interrupt safely.

A. instantaneous
B. interrupting capacity
C. optimum current
D. optimum voltage

RME Board Exam

14. A 2-pole ac generator is running at 1,500 rpm. What is the frequency?

A. 25 Hz
B. 50 Hz
C. 60 Hz
D. 45 Hz

15. An ohmmeter measures

A. very high power
B. resistance
C. insulation resistance
D. temperature

16. If a transformer bank is using an open delta connection, how many single-phase transformers are interconnected?

A. Only one
B. Two
C. Three
D. More than three

17. What is the advantage of star connection over mesh connection for the same phase voltage?

A. It has a higher line voltage
B. It has a higher line current
C. It gives a higher apparent power
D. All of these

18. A cell with an emf of 1.45 V is connected to an external resistance of 2 ohms. If the current drawn by the external resistance is 0.5 A, what is the internal resistance of the cell?

A. 0.80 Ω
B. 0.90 Ω
C. 0.10 Ω
D. 0.25 Ω

RME Board Exam

19. Which of the following metals has the highest melting point?

A. copper
B. gold
C. silver
D. tungsten

20. In an open delta connected system,

A. phase voltage is greater than line voltage
B. phase voltage is lesser than line voltage
C. phase voltage is equal to line voltage
D. phase voltage is zero

21. Electrical symbol represented by a broken line.

A. Open wiring
B. Circuit homerun
C. Underground wiring
D. Emergency wiring

22. Which of the following defines an insulator?

A. A substance that offers a low resistance to current flow
B. A substance that offers a high resistance to current flow
C. A form of a condenser
D. A substance that absorbs electricity

RME Board Exam

23. Among the multimeters, the ____ features compactness, simplicity and portability.

A. VOM
B. VOTM
C. VTVM
D. all of these

24. A squirrel cage induction motor has a _____ starting torque.

A. very low
B. zero
C. very high
D. moderate

25. How many wattmeters are needed to measure unbalanced three-phase loads whose phase impedances cannot be opened?

A. One
B. Two
C. Three
D. Four

RME Board Exam

26. The inert gas present in an incandescent bulb is primarily intended to

A. increase lumen output
B. activate the surface of the filament
C. decrease filament evaporation
D. reduce the hazards when the glass bulb is shattered

27. When a lead acid battery is in a nearly discharge condition, the electrolyte is in its _____ state.

A. stable
B. strongest
C. weakest
D. normal

RME Board Exam

28. A device used to measure the mechanical output of a motor or a generator is called

A. watt-hour meter
B. sphygmomanometer
C. engine indicator
D. dynamometer

RME Board Exam

29. Minimum oil circuit breakers are used for HV system. The oil is used to

A. ensure effective operation
B. prevent grounds
C. cool the breaker
D. quench the arc and as an insulator

30. Which of the following metals has the highest electrical & thermal conductivity?

A. Gold
B. Platinum
C. Palladium
D. Silver

RME Board Exam

31. When the speed of the alternator increases, the frequency

A. varies exponentially
B. remains the same
C. increases
D. decreases

32. Which of the following is NOT a cause for a generator to vibrate?

A. Misalignment
B. Loose pigtails
C. Loose bolts
D. Faulty speed governor

RME Board Exam

33. An arc lamp takes 10 A at 50 V. Find the value of the resistance to be placed in series so that the lamps may burn correctly from a 110-V supply.

A. 5 ohms
B. 11 ohms
C. 6 ohms
D. 10 ohms

RME Board Exam

34. A 15-hp, 220 V shunt motor has an efficiency of 87% at full load. The resistance of the field is 440 ohms. What is the full load armature current?

A. 67.59 A
B. 57.96 A
C. 75.69 A
D. 49.58 A

35. If a three-phase load is unbalanced, the most suitable system connection is a

A. 3-wire star connection
B. 3-wire closed delta connection
C. 3-wire open delta connection
D. 4-wire star connection

RME Board Exam

36. The transformer oil used in a transformer provides

A. insulation and cooling
B. insulation, cooling and lubrication
C. insulation and lubrication
D. cooling and lubrication

RME Board Exam

37. An RME whose certificate of registration has been revoked may, after the lapse of ___ year(s) from the surrender thereof, be reissued with issued with such certificate upon approval by the Commission after he has established to the Board that he is still fit to continue practicing his profession.

A. 3
B. 1
C. 2
D. 5

38. What is the rated primary current of a 250 kVA, 480/230-volt 3-phase transformer?

A. 521 A
B. 628 A
C. 301 A
D. 1086 A

RME Board Exam

39. Mica is commonly used for ___.

A. paneboards
B. pole insulators
C. appliance insulation
D. commutator bar segments

40. Coulomb is to charge as a joule is to ___.

A. heat
B. emf
C. energy
D. power

41. Which of the following instruments can be used to measure wire diameters?

A. Wire gauge
B. Micrometer
C. Megger
D. Multitester

42. An over-excited synchronous motor operates at _____ power factor.

A. leading
B. lagging
C. unity
D. zero

43. Lap windings in dc generators are used for _____ applications.

A. low voltage, low current
B. low voltage, high current
C. high voltage, high current
D. high voltage, low current

44. What type of prime movers drives a high-speed alternator?

A. Diesel motor
B. Gas turbine
C. Steam turbine
D. Hydraulic turbine

45. If the excitation on one alternator in parallel operation is adjusted, which of the following parameter of the alternator will change?

A. Load
B. Frequency
C. Power factor
D. All of these

RME Board Exam

46. The _____ shall be the executive officer of the board (BEE)?

A. President of the Philippines
B. BEE board
C. Commissioner
D. Chairman of the board (BEE)

47. What is a dead board?

A. A board with no switches
B. A board which is overloaded
C. A board with no power
D. A board with no circuit breaker

48. A 3-phase wye connected solidly grounded alternator is under test. Between one terminal and ground, the voltmeter registers 120 V, between any two terminals, the voltmeter is expected to register _____.

A. 360 V
B. 208 V
C. 170 V
D. 240 V

49. Most common semi-conductor in used today.

A. Germanium
B. Silicon
C. Arsenic
D. None of these

RME Board Exam

50. The purpose of the ballast in a fluorescent lamp assembly is

A. to regulate the voltage across the lamp
B. to improve the overall power factor
C. to limit the current through the lamp
D. to regulate the lumens output

Part 2: Philippine Electrical Code

51. Where a conduit enters a box, fitting or other enclosure, what shall be provided to protect the wire from abrasions?

A. Lock nut
B. Stud bolt
C. Fastener
D. Bushing

52. In hospitals, the general lighting load required shall be _____.

A. 24 VA/m^2
B. 12 VA/m^2
C. 16 VA/m^2
D. 28 VA/m^2

53. Rod electrodes of steel or iron shall be at least ___in diameter.

A. 10 mm
B. 12 mm
C. 14 mm
D. 16 mm

RME Board Exam

54. Bonding jumpers which connect communications cable grounding conductors and the grounding electrode of the building shall NOT be smaller than what copper size?

A. 5.5 mm^2
B. 8.0 mm^2
C. 14.0 mm^2
D. 3.5 mm^2

55. Each plate electrode shall expose NOT less than ____ of surface to exterior soil.

A. one-fifth square meter
B. one-fourth square meter
C. one-third square meter
D. one-half square meter

56. Non-metallic sheathed cable shall NOT have a bending radius less than ___ times the diameter of the cable.

A. 8
B. 7
C. 5
D. 6

57. Conductors after the final overcurrent device and before the load served.

A. Branch circuit conductors
B. Service conductors
C. Feeder conductors
D. None of these

58. Type FCC cable shall be permitted for the following applications EXCEPT one. Which one is this?

A. for branch circuits
B. for service entrance
C. in damp locations
D. in heated floors

RME Board Exam

59. In every drawing, the title block shall be a standard strip, which shall contain the name of the project, owner, title of the sheet, scale used, name and signature of the PEE. How wide is this strip?

A. 35 mm
B. 30 mm
C. 40 mm
D. 45 mm

60. Intermittent operation in which the load conditions is regularly recurrent.

A. Varying duty
B. Intermittent duty
C. Periodic duty
D. Short time duty

RME Board Exam

61. Underground cable feeder and branch circuit cables shall be permitted for use in any of the following applications EXCEPT one. Which one is this?

A. Where embedded in poured concrete
B. For interior wiring
C. For direct burial
D. Where used in corrosive locations

62. A factory assembly of two or more insulated conductors with or without associated bare or covered grounding conductor under a non-metallic sheath, approved for installation in cable trays or in raceways.

A. type NM
B. type FCC
C. type TC
D. type USE

RME Board Exam

63. The minimum size of conductors to be used for lighting purposes is

A. 1.5 mm^2
B. 1.25 mm^2
C. 1.75 mm^2
D. 2.0 mm^2

64. Conductors on poles shall have a separation of NOT less than ___ where not placed on racks or brackets.

A. 300 mm
B. 250 mm
C. 400 mm
D. 150 mm

65. Non-metallic surface extensions shall be secured in place by approved means at intervals NOT exceeding _____.

A. 100 mm
B. 500 mm
C. 300 mm
D. 200 mm

RME Board Exam

66. Any unguarded metal sheathed service cable, service conduits, metal fixtures and similar non-current carrying parts, if located in urban districts and where liable to be charged to more than a certain voltage to ground shall be isolated or guarded so as not to be exposed to accidental contact by unauthorized persons. What is this voltage?

A. 1,000 V
B. 500 V
C. 150 V
D. 300 V

67. Auxiliary gutters may enclose conductors or busbars but shall NOT enclose which of the following?

A. Switches
B. Overcurrent devices
C. Appliances
D. All of these

RME Board Exam

68. Where an intermediate metal conduit is used, there shall not be more than the equivalent of ___ quarter bends between pull points.

A. 2
B. 4
C. 3
D. 5

69. Rigid metal conduit shall be supported at least every _____.

A. 2,000 mm
B. 2,500 mm
C. 3,000 mm
D. 1,500 mm

RME Board Exam

70. Service entrance conductors passing over roofs shall have a clearance over the roof which they pass of

A. 1,000 mm
B. 2,000 mm
C. 1,500 mm
D. 2,500 mm

71. Liquidtight metal conduit smaller than _____ electrical trade size shall NOT be used.

A. 20 mm
B. 15 mm
C. 12 mm
D. 10 mm

72. Rigid metal conduits smaller than ____ electrical trade size shall NOT be used.

A. 15 mm
B. 20 mm
C. 12 mm
D. 16 mm

RME Board Exam

73. Flexible metal conduit shall be secured by an approved means at intervals NOT exceeding ___.

A. 1,200 mm
B. 1,300 mm
C. 1,500 mm
D. 1,400 mm

74. Which of the following premises wiring installations is NOT covered in the scope of the Philippine Electrical Code?

A. Parking lots
B. Dockyards
C. Quarries and mines
D. Motor vehicles

75. An auxiliary conductor used in connection with remote measuring devices or for operating apparatus at a distant point.

A. Tie wire
B. Jumper wire
C. Pilot wire
D. Dummy wire

76. A unit or assembly of units or sections and associated fittings, forming a rigid structural system used to support cables.

A. Cable tray
B. Cable bus
C. Wire way
D. Busway

77. The conductors including splices and taps shall NOT fill the wireway to more than ____ percent of its area at that point.

A. 65
B. 70
C. 75
D. 80

RME Board Exam

78. Overcurrent in transformers affect all of the following EXCEPT

A. breather effectiveness
B. mechanical stresses
C. life insulation
D. rise in temperature

79. The rating the branch circuit using flat cable assemblies shall NOT exceed ___.

A. 40 A
B. 30 A
C. 20 A
D. 15 A

80. One or more non-metallic surface extensions shall be permitted to be run in any direction from an existing outlet, but NOT on the floor or within ___ from the floor

A. 50 mm
B. 100 mm
C. 75 mm
D. 25 mm

81. Service drop conductors passing over residential property and driveways and those commercial areas not subject to truck traffic shall have a vertical clearance of

A. 4,600 mm
B. 5,500 mm
C. 3,700 mm
D. 4,800 mm

82. The equipment bonding jumper shall be permitted to be installed inside or outside of a raceway or enclosures where installed on the outside, the length of the equipment bonding jumper shall NOT exceed _____.

A. 2,000 mm
B. 1,500 mm
C. 1,800 mm
D. 1,200 mm

RME Board Exam

83. An electrician should consider all electrical equipment live unless he definitely knows that they are not. The main reason of this practice is to avoid

A. personal injury
B. energizing the wrong circuit
C. de-energizing the wrong circuit
D. unnecessary work

84. Electrical floor assemblies shall NOT be installed _____.

A. where subject to corroded vapors
B. outdoors
C. in wet or damp locations
D. all of these

85. In cases where there are energized parts normally exposed on the front of switchboards or motor control centers, the working space in front shall NOT be less than ___.

A. 1,000 mm
B. 1,500 mm
C. 2,000 mm
D. 1,800 mm

RME Board Exam

86. The rating of the branch circuit serving a continuous load shall NOT exceed ___ percent of the continuous load.

A. 100
B. 130
C. 125
D. 115

87. Cabinet and cutout boxes shall have an air space of at least ___ between the base of the device and the wall of any metal cabinet or cutout box in which the device is mounted.

A. 1.5 mm
B. 1.8 mm
C. 2.0 mm
D. 2.4 mm

88. Service conductors in cable shall NOT be smaller than _____.

A. 5.5 mm^2
B. 8.0 mm^2
C. 3.5 mm^2
D. 14.0 mm^2

89. At least how many receptacle outlet(s) shall be installed in the bathroom?

A. One
B. Two
C. Three
D. None of these

RME Board Exam

90. What is the maximum allowable voltage drop from the distribution panel to the farthest load?

A. 10 %
B. 5 %
C. 3 %
D. 2 %

91. Conductors in concealed knob and tube wiring shall maintain a clearance of NOT less than ____ between the conductor and the surface over which it passes.

A. 30 mm
B. 25 mm
C. 28 mm
D. 26 mm

RME Board Exam

92. The use of rigid metal conduits shall be permitted under all atmospheric conditions subject to the following conditions EXCEPT one. Which one is this?

A. Aluminum fittings and enclosures shall be permitted to be used with rigid steel conduits.
B. Ferrous metal conduits shall be permitted to be installed in concrete
C. Conduits shall be permitted to be used in sand fill which is subject to permanent moisture
D. Where the ferrous raceways are protected solely by enamel, the use is permitted only indoors

93. An exposed wiring method using cleats, knobs, tubes and flexible tubing for the protection and support of single insulated conductor run in or on building and not concealed by the building structure.

A. Open wiring on insulators
B. Concealed knob and tube wiring
C. Armored cable wiring
D. Metal clad cable wiring

94. The radius of the inner edge of any bend for type MI cables shall NOT be less than ____ times the diameter of the cable.

A. 5
B. 6
C. 7
D. 8

95. General purpose and appliance branch circuits using type FCC cable shall have ratings NOT exceeding ____.

A. 20 A
B. 15 A
C. 30 A
D. 40 A

RME Board Exam

96. Communication conductors shall NOT be attached to a cross arm below electric light and power conductors under Art 10.1.3.1 (a) (2).

A. No one cares
B. True
C. False
D. Allowed with approval from unitlity

97. Interlocked type armored cable or corrugated sheath cables shall have a bending radius of NOT less than ____ times the external diameter of the metallic sheath.

A. 7
B. 10
C. 12
D. 5

98. Type AC cable shall be permitted in one of the following. Which one is it?

A. for branch circuits
B. for feeders
C. in cable trays where identified for such usage
D. all of these

99. In banks and office buildings, a unit load of _____ VA per square meters shall be included for the general purpose receptacle outlets when the actual number of outlets is unknown.

A. 6
B. 8
C. 10
D. 12

RME Board Exam

100. Where receptacles are connected to a 30-A branch circuit, the maximum allowable cord and plug connected load shall not be more than

A. 30 A
B. 24 A
C. 16 A
D. 20 A

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 13

ANSWER KEY

1. B. Jogging
2. A. the plates will become sulphated
3. A. Thermometer
4. B. 157 radians per second

Solution:

$w = 2\pi f$

$w = 2\pi(25)$

$w = 157$ rad/sec

5. D. Mil
6. D. air capacitor
7. B. apply petroleum jelly
8. B. leading
9. D. commutator
10. D. Multi-voltage transformer
11. C. ammonium chloride and zinc chloride
12. D. Increasing the size of the electrodes, increases the emf of the cell
13. B. interrupting capacity
14. A. 25 Hz

Solution:

$$f = \frac{PN}{120}$$

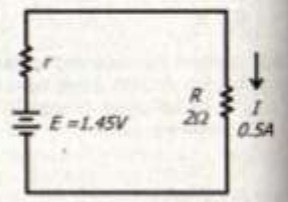
$$f = \frac{(2)(1500)}{120}$$

$f = 25$ Hz

15. B. resistance
16. B. Two
17. A. It has a higher line voltage

18. B. 0.90 Ω

Solution:



$$I = \frac{E}{r+R}$$

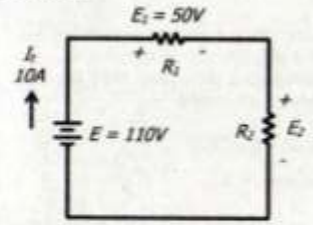
$$r = \frac{E}{I} - R = \frac{1.45}{0.5} - 2$$

$r = 0.90$ ohm

19. B. gold
20. C. phase voltage is equal to line voltage
21. A. Open wiring
22. B. A substance that offers a high resistance to current flow
23. A. VOM
24. A. very low
25. B. Two
26. A. increase lumen output
27. C. weakest
28. D. dynamometer
29. D. quench the arc and as an insulator
30. D. Silver
31. C. increases
32. B. Loose pigtails

33. C. 6 ohms

Solution:



$E_2 = E - E_1$

$E_2 = 110 - 50$

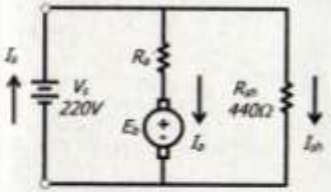
$E_2 = 60$ V

$$R_2 = \frac{E_2}{I_1} = \frac{60}{10}$$

$R_2 = 6\ \Omega$

34. B. 57.96 A

Solution:



$$P_{in} = \frac{P_{out}}{\eta} = \frac{15(746)}{0.87}$$

$P_{in} = 12{,}862$W

$$I_s = \frac{P_{in}}{V_s} = \frac{12{,}862}{220}$$

$I_s = 58.46$ A

$$I_{sh} = \frac{V_s}{R_{sh}} = \frac{220}{440} = 0.5\text{A}$$

$I_a = I_s - I_{sh}$

$I_a = 58.46 - 0.5$

$I_a = 57.96$A

35. D. 4-wire star connection
36. A. insulation and cooling
37. B. 1
38. C. 301 A

Solution:

$S = \sqrt{3}EI$

$$I = \frac{S}{\sqrt{3}E} = \frac{250{,}000}{\sqrt{3}(480)}$$

$I = 300.7$ A

39. D. commutator bar segments
40. C. energy
41. B. Micrometer
42. A. leading
43. B. low voltage, high current
44. C. Steam turbine
45. C. Power factor
46. A. President of the Philippines
47. C. A board with no power
48. B. 208 V

Solution:

$E_{\text{line to line}} = \sqrt{3}E_{\text{line to ground}}$

$E_{\text{line to line}} = \sqrt{3}(120)$

$E_{\text{line to line}} = 207.84$ V

49. B. Silicon
50. C. to limit the current through the lamp
51. D. Bushing
52. C. 16 VA/m^2
53. D. 16 mm
54. C. 14.0 mm^2
55. A. one-fifth square meter
56. C. 5
57. A. Branch circuit conductors

58. B. for service entrance
59. C. 40 mm
60. C. Periodic duty
61. B. For interior wiring
62. C. type TC
63. D. 2.0 mm^2
64. A. 300 mm
65. D. 200 mm
66. D. 300 V
67. D. All of these
68. B. 4
69. C. 3,000 mm
70. D. 2,500 mm
71. B. 15 mm
72. A. 15 mm
73. B. 1,300 mm
74. D. Motor vehicles
75. C. Pilot wire
76. A. Cable tray
77. C. 75
78. A. breather effectiveness
79. B. 30 A
80. A. 50 mm
81. A. 4,600 mm
82. C. 1,800 mm
83. A. personal injury
84. D. all of these
85. A. 1,000 mm
86. C. 125
87. C. 2.0 mm
88. A. 5.5 mm^2
89. A. One
90. B. 5%
91. D. 26 mm
92. C. Conduits shall be permitted to be used in sand fill which is subject to permanent moisture
93. A. Open wiring on insulators
94. A. 5
95. A 20 A
96. B. True
97. A. 7
98. D. all of these
99. B. 8

100. B. 24 A

Solution:

Note: As a rule, the permitted load of a branch circuit serving a continuous duty load shall be 80% only of its rating.

Load = 0.8(30)

Load = 24 A

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 14

Part 1: Technical Subject

1. A ground should have a _____ resistance.

   A. high
   B. low
   C. negative
   D. infinite

2. If a motor runs but fails to stop even if the stop button is pressed, which one is a probable cause?

   A. The fuse has blown out.
   B. The overload contact did not operate
   C. The holding circuit interlock was welded
   D. All of these

3. The switch symbol S_{RC} shall mean a _____ switch.

   A. room control
   B. roller type control
   C. remote control
   D. rocker-type control

RME Board Exam

4. What is the purpose of having the contacts of a compensator starter immersed in oil?

   A. Provide better contact cooling under heavy current
   B. Minimize time delay under overload condition
   C. Provide less contact friction
   D. Minimize arcing effect between contacts

5. If the mechanical load of a series motor is suddenly released, the motor will __

   A. speed up
   B. stop operating
   C. slow down
   D. continue to operate at the same speed

RME Board Exam

6. A circuit breaker normally operates

   A. when the switch is put on
   B. when the line is to be checked
   C. when the power is to be supplied
   D. whenever fault on the line occurs

7. One of the biggest problem in split phase induction motor is

   A. noise
   B. high starting current
   C. that it cannot be started at full voltage
   D. all of these

RME Board Exam

8. Four resistances of 10, 4, 6 and 5 ohms are connected in series to a battery having a voltage across its terminals of 75 V. The current is _____.

   A. 6 A
   B. 3 A
   C. 4 A
   D. 5 A

9. A current of 10 A divides between two branches in parallel, one having a resistance of 4 ohms and the other 6 ohms. How is the current in the 4-ohm resistance?

A. 6 A
B. 4 A
C. 7 A
D. 3 A

RME Board Exam

10. In dc generator the cause of rapid brush wear maybe

A. rough commutator segments
B. severe sparking
C. imperfect contact
D. any of these

11. What is residual magnetism?

A. It is magnetism remaining in a substance after it has been removed from the influence of a magnetic field
B. It is magnetism in a transformer
C. It is magnetism in a natural magnet
D. It is magnetism in a solenoid magnet

12. What is the cause of a magnetic contactor to chatter?

A. High current
B. Low resistance
C. Overload
D. Low voltage

13. A test lamp is used to check for which of the following?

A. Low voltage
B. Continuity
C. Polarity of battery terminals
D. Lamp condition

RME Board Exam

14. A 10-A electric fan with a power factor of 0.85 was connected to one 220-V convenience outlet. Calculate the power in the circuit.

A. 1,870 W
B. 2,200 W
C. 2,000 W
D. 2,588 W

15. The property of conductors to oppose the free flow of electric current is expressed in ___.

A. volts
B. amperes
C. ohms
D. watts

RME Board Exam

16. What percentage of maximum (peak) voltage is the effective (RMS) voltage?

A. 100%
B. 57.7%
C. 63.7%
D. 70.7%

17. Which of the following generator's regulation is preferred?

A. below 5 %
B. 50 %
C. 100 %
D. above 50% but less than 100 %

RME Board Exam

18. The filament of an incandescent electric bulb is usually made of

A. iron
B. tungsten
C. nickel
D. carbon

19. How do you call the negative terminal of the diode?

A. Anode
B. Cathode
C. Triode
D. Pentode

20. A contact connected in a control circuit that will ensure that a particular sequence of operation is followed.

A. Sequential
B. Seal-in
C. Transition
D. Electrical interlock

RME Board Exam

21. A semi-conductor which is made up of the semi-conductor material in its extremely pure form is

A. N-type
B. P-type
C. extrinsic
D. intrinsic

22. If two 100-W, 230 V incandescent lamps are connected in series across a 230-V source, what happens?

A. Both lamps will get burnt
B. Both lamps will consume more power
C. Each lamp will give more output lights
D. Each lamp will give lesser output lights

23. Ammeter which is preferable for high frequency current measurements?

A. Hot-wire type
B. Permanent-magnet type
C. Moving iron type
D. Thermocouple type

24. Which of the following statements is true regarding series connection of resistances?

A. The current flowing through one resistor is equal to the current flowing through the other resistors in the combination
B. The voltage drop across one resistor is equal to the voltage drop across the other resistors in the combination
C. The power consumed in one resistor is equal to the power consumed in the other resistors in the combination
D. All of these

25. Moving coil meters are used in

A. ac circuits
B. dc circuits
C. both ac and dc circuits
D. magnetic circuits only

26. Which of the following is an outstanding feature of a shunt motor?

A. It has a high starting torque
B. It has a speed that varies inversely with the load
C. It has a constant speed over a wide load range
D. It is a low speed type motor

27. As a precaution against electric shock, the metal housings of electrically powered hand tools shall be

A. covered with plastic
B. connected to a switch
C. properly grounded
D. isolated

RME Board Exam

28. A high school graduate can take the registered master electricians' examination if he has a subsequent specific record of at least ____ years of apprenticeship in electrical wiring, installations of electrical equipment.

A. 6
B. 3
C. 4
D. 5

29. Which of the following is the electrolyte used in a nickel-iron storage battery?

A. Potassium hydroxide
B. Sulphuric acid
C. Hydrochloric acid
D. Calcium hydroxide

30. The energy supplied to a water heater in 10 minutes using a current of 5 A at 120 volts is how many joules?

A. 600 J
B. 360 kJ
C. 6 kJ
D. 36 J

31. Contactor is another name for a

A. manual switch
B. magnetic starter
C. automatic switch
D. magnetic control

RME Board Exam

32. The shaft torque of a dc motor is less than its armature torque because of ___ losses.

A. mechanical
B. iron
C. copper
D. rotational

RME Board Exam

33. Armature cores are laminated to reduce ____.

A. armature copper losses
B. eddy current losses
C. weight of core
D. length of armature windings

34. Order of rotation of the coil voltage in a balanced 3-phase system.

A. Phase sequence
B. Period
C. Alteration
D. Frequency

RME Board Exam

35. Compute the resistance of 180 meters of silver wire having a resistivity of 1.6×10^{-8} ohm-meter and having a cross section of 0.3 mm^2.

A. 4.9 ohms
B. 10.5 ohms
C. 9.6 ohms
D. 6.9 ohms

36. A 100-V, 60 Hz ac source is connected across a 100 μF capacitor. How much is the current through the capacitor?

A. 3.8 A
B. 1.0 A
C. 2.5 A
D. 1 A

RME Board Exam

37. What limits the size of an induction motor that can be started across the line?

A. Distribution system network
B. Horsepower rating
C. Branch circuit protection
D. Power supply

38. In ac circuits, the product of total voltage and total current is called ____.

A. total power
B. reactive power
C. real power
D. apparent power

RME Board Exam

39. In a circuit three resistors of 10, 15 and 20 ohms are connected in series. Find the potential at the source if the current flowing is 4 A.

A. 90 V
B. 180 V
C. 135 V
D. 45 V

40. Gearmotors are selected based on which of the following?

A. speed requirement
B. torque requirement
C. both A and B
D. neither A or B

41. Which of the following are the principal parts of a transformer?

A. Core, primary and secondary windings
B. Primary core and secondary windings
C. Core, insulation and windings
D. Primary windings and magnetic flux

RME Board Exam

42. When voltage and current have their zero and peak values at the same time, they are in ____.

A. grouped
B. equal
C. in motion
D. phase

43. Series motors drive their load through which of the following?

A. Chain drives
B. Pulley drives
C. Belt drives
D. Direct couplings

44. In order for a material to be called a conductor, what is the maximum number of valence electrons it can have?

A. Only one
B. Two
C. Three
D. None of these

45. Which of the following is a property of a resonant circuit?

A. Total voltage and total current are in phase
B. Power factor is zero
C. Total reactance is zero
D. All of these

RME Board Exam

46. In the SI unit, the unit of power is expressed in

A. kN-m
B. kW-hr
C. J-m
D. J/s

47. Basically electric motors operate on the principle of

A. induction
B. repulsion
C. either A or B
D. neither A or B

48. Transformers are operated with

A. dc current
B. ac current
C. ac or dc current
D. synchronous current

49. A grounding transformer may be connected zigzag or _____

A. delta-wye
B. wye-delta
C. wye-wye
D. delta-delta

RME Board Exam

50. A wattmeter indicates ____.

I. real power
II. apparent power if pf is not unity
III. power factor

A. II only
B. I, II and III
C. III only
D. I only

Part 2: Philippine Electrical Code

51. A wiring method using knobs, tubes, and flexible non-metallic tubing for the protection and support of single insulated conductors concealed in hollow spaces of walls and ceilings of buildings.

A. Open wiring on insulators
B. Open wiring with knobs, tubes, etc
C. Concealed knob and tube wiring
D. Knob and tube wiring

52. The minimum number of branch circuits shall be determined from the _____.

A. total computed load and the size of disconnect needed
B. total computed load and the rating of the circuits used
C. size or rating of the circuits used
D. minimum number required by the PEC

53. The ampacity of the branch circuit conductors and the rating or setting of overcurrent protective devices supplying fixed electric space heating equipment consisting of resistance elements with or without a motor shall NOT be less than ___ of the total load of the motors and the heaters.

A. 125 %
B. 130 %
C. 115 %
D. 120%

RME Board Exam

54. The disconnecting means for motor circuits rated up to 600 volts, shall have an ampere rating of at least _____ percent of the full load current of the motor.

A. 200
B. 115
C. 150
D. 125

55. A device for transferring one or more load conductor connections from one power source to another.

A. Disconnecting switch
B. Master switch
C. Isolating switch
D. Transfer switch

56. Where rear access is required to work on de-energized parts on the back of enclosed equipment, a minimum working space of _____ horizontally shall be provided.

A. 1,000 mm
B. 900 mm
C. 800 mm
D. 600 mm

57. A one family dwelling unit shall have a disconnecting means of at least _____ where the initial computed load is 10 kVA or more.

A. 60 A
B. 90 A
C. 100 A
D. 30 A

RME Board Exam

58. Underground communications conductors in a raceway, handhole or manhole containing electric light and power conductors, shall be in a section _____from such conductors by means of a separator (brick, concrete or tile) under Art 10.1.3.2(a).

A. combined
B. separated
C. included
D. inside

59. For a transformer and dc rectifier arc welder having a time rating of one hour, the supply conductors shall NOT be less than _____ percent of its rated primary nameplate current.

A. 90
B. 80
C. 75
D. 85

RME Board Exam

60. Refers to the power plant mounted on wheels as used in the railroad transportation industry.

A. Electric locomotive
B. Electric train
C. LRT
D. None of these

61. If the terminal of the equipment grounding conductor is not visible, the conductor entrance hole shall be marked with the word _____.

A. green
B. white
C. gray
D. black

RME Board Exam

62. Power and control tray cables (type TC) maybe used under one of the following condition. Which one is this?

A. Where exposed to physical damage
B. Where installed as open cable on brackets
C. Where installed in industrial establishment where a registered master electrician will service the installation
D. Where direct buried underground

63. Type NMC (non-metallic sheathed cable) shall have an outer covering which has the following characteristics. Which one is NOT included?

A. flame retardant
B. moisture resistant
C. corrosion resistant
D. none of these

64. Fixture wires shall NOT be used

A. for installation in lighting fixtures
B. for connecting lighting fixtures to the branch circuit conductors
C. as branch circuit conductors
D. none of these

65. Large batteries are those connected to a charging device with an output of more than __.

A. 1.0 kW
B. 1.5 kW
C. 2.0 kW
D. 2.5 kW

RME Board Exam

66. Which component of a dc motor is used to control the speed?

A. Carbon brush assembly
B. Armature winding
C. Commutator
D. Field winding

67. Switches used in watercrafts, shall be capable of breaking and making safely a load current equal to ____ of their rated current at the rated voltage.

A. 100 %
B. 130 %
C. 125 %
D. 150 %

RME Board Exam

68. A repulsion motor equipped with one of the following. Which one is this?

A. A set of slip rings
B. A commutator
C. Both commutator and slip ring
D. Neither a commutator nor a slip ring

69. Communication conductors shall have a vertical clearance of NOT less than ___ from all points of roofs above, which they pass.

A. 2,500 mm
B. 2,000 mm
C. 2,400 mm
D. 2,200 mm

RME Board Exam

70. A frequency meter is connected as a potential device, which is connected across the line because of one of the following reasons. Which one is this?

A. A transformer maybe used for different voltages
B. The reading will be independent of the varying current
C. Only the voltage has frequency
D. It is safer than a series device

71. A luminous discharge due to ionization of the air surrounding a conductor caused by a voltage gradient exceeding a certain critical value.

A. Corona
B. Skin effect
C. Johnson's effect
D. Surge

RME Board Exam

72. Which of the following is NOT one of the considerations that must be evaluated in judging equipments?

A. Electrical insulation
B. Arcing effects
C. Wire bending and connection space
D. Longevity

73. Branch circuit that supplies a number of outlets for lighting and appliance.

A. Multi-purpose branch circuit
B. Special branch circuit
C. Individual branch circuit
D. General purpose branch circuit

74. Receptacle and attachment plugs shall be permitted to be of lower ampere rating than the branch circuit but NOT less than ____ percent of the fixture full load current.

A. 100
B. 125
C. 115
D. 130

75. Type FCC cable shall NOT be used in any of the following EXCEPT

A. outdoors
B. indoors
C. wet locations
D. hazardous locations

RME Board Exam

76. In each conduit run entering an enclosure for switches, circuit breakers, relays and others that may produce high temperatures, seals on the conduit shall be installed within a certain length before entering the enclosure. What is this length?

A. 900 mm
B. 750 mm
C. 250 mm
D. 460 mm

77. The grounding electrode shall be which of the following?

A. The nearest available effectively grounded structural metal member of the structure
B. The nearest available effectively grounded metal water pipe
C. The nearest concrete encased electrode
D. Any of these

78. A motor-generator arc welder has a 70 % duty cycle, the supply conductors shall NOT be less than ____ of its rated primary nameplate current.

A. 86 %
B. 80 %
C. 84 %
D. 88 %

RME Board Exam

79. Rigid non-metallic conduit approved for direct burial without concrete encasement shall have a minimum burial of

A. 500 mm
B. 400 mm
C. 460 mm
D. 440 mm

80. The ground counterpoise when installed in earth shall be placed ___ above all cable in a trench.

A. 75 mm
B. 100 mm
C. 80 mm
D. 50 mm

81. A load where maximum current is expected to continue for three hours or more.

A. Continuous load
B. Connected load
C. Maximum load
D. Average load

82. For signaling circuits NOT exceeding ____ volts, the current required shall not exceed one ampere.

A. 24
B. 12
C. 30
D. 40

83. All metal parts associated with the hot tub shall be bonded using copper bonding jumper, insulated, covered, or bare, not smaller than _____.

A. 5.5 mm^2
B. 8.0 mm^2
C. 14.0 mm^2
D. 3.5 mm^2

84. Communication conductors shall NOT be smaller than _____.

A. 2.0 mm^2
B. 1.25 mm^2
C. 3.5 mm^2
D. 5.5 mm^2

RME Board Exam

85. Non-metallic boxes not over _____ cu. cm shall be permitted only on non-metallic wiring method.

A. 1,725
B. 1,520
C. 1,700
D. 1,640

86. For non-dwelling receptacle loads, the demand factor for the first 10 kVA or less shall be

A. 60 %
B. 70 %
C. 80 %
D. 100 %

87. All lighting fixtures, submersible pumps and other submersible equipment used in fountains shall operate at ___ or less between conductors.

A. 230 V
B. 300 V
C. 250 V
D. 500 V

88. The ampacity of the conductors and the rating or setting of overcurrent devices in a circuit of a solar photovoltaic system shall NOT be less than ___ of the computed current.

A. 100 %
B. 115 %
C. 125 %
D. 130 %

89. In the schedule of loads for lighting, which of the following contents is NOT necessary?

A. Protective device rating
B. Panel as numbered in the feeder diagram
C. Number of lighting outlets per circuit
D. Frequency rating

RME Board Exam

90. A wye-delta starter for a single voltage three phase squirrel cage induction motor would require the connection of a certain number of wires from the motor. How many wires would be needed?

A. 3 wires
B. 9 wires
C. 6 wires
D. 12 wires

91. Where a feeder supplies continuos load or any combination of continuous and non-continuous load. The rating of the overcurrent device shall NOT be less than the non-continuous load plus _____ of the continuous load.

A. 125 %
B. 110 %
C. 150 %
D. 175 %

RME Board Exam

92. What size using non-time delay fuse does the Code require for a 2 hp, 208 volts, single-phase motor?

A. 40 A
B. 30 A
C. 35 A
D. 20 A

93. If potential exceeding _____ are employed, a permanent warning sign shall be displayed.

A. 600 V
B. 500 V
C. 300 V
D. 1,000 V

94. The ampacity of the conductors can be derated at most, how many times?

A. Twice
B. Only once
C. Thrice
D. Four times

95. Faceplates of insulating material shall be non-combustible and NOT less than ___ in thickness.

A. 2.0 mm
B. 2.3 mm
C. 3.0 mm
D. 2.5 mm

96. At least how many receptacle outlet(s) shall be installed outdoors for a one family dwelling unit?

A. One
B. Two
C. Three
D. None of these

RME Board Exam

97. For raceway 20 mm trade size or larger containing conductors 22 mm^2 or larger, the minimum length of the box in straight pulls shall NOT be less than ___ times the trade diameter of the largest raceway.

A. 8
B. 10
C. 6
D. 12

98. Type MC cables shall NOT be used in which of the following?

A. Where exposed to corrosive materials
B. As direct burial to earth
C. Where exposed to cinder fills
D. All of these

99. Using aluminum or copper clad aluminum conductors, the minimum size of service entrance conductors shall be ___.

A. 8.0 mm^2
B. 14. 0 mm^2
C. 5.5 mm^2
D. 3.5 mm^2

100. Ground counterpoise conductor shall be soft copper wire NOT smaller than

A. 5.5 mm^2
B. 2.0 mm^2
C. 3.5 mm^2
D. 8.0 mm^2

< Exam ends here >

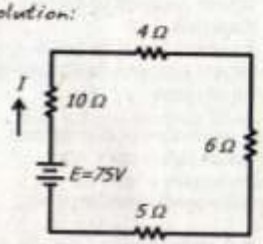
Proceed to the next page for the answer key and solutions!

Question Bank 14

ANSWER KEY

1. B. low
2. C. The holding circuit interlock was welded
3. C. remote control
4. D. Minimize arcing effect between contacts
5. A. speed up
6. D. whenever fault on the line occurs
7. A. noise
8. B. 3 A

Solution:



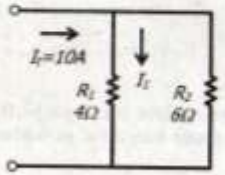
$$I = \frac{E}{R_t}$$

$$I = \frac{75}{10+4+6+5}$$

$$I = 3\ A$$

9. A. 6 A

Solution:



Using current division theorem:

$$I_1 = \frac{I_t R_2}{R_1+R_2} = \frac{10(6)}{4+6}$$

$$I_1 = 6\ A$$

10. D. any of these
11. A. It is magnetism remaining in a substance after it has been removed from the influence of a magnetic field
12. D. Low voltage
13. B. Continuity
14. A. 1,870 W

Solution:

$$P = EIpf = 220(10)(0.85)$$

$$P = 1870\ W$$

15. C. ohms
16. D. 70.7%
17. A. below 5%
18. B. tungsten
19. B. Cathode
20. D. Electrical interlock
21. D. intrinsic
22. D. Each lamp will give lesser output lights

Note: Since connected in series, the current flowing in each lamp will be lesser than the rated current of each lamp, thus it will draw lesser power or give lesser output lights.

23. D. Thermocouple type
24. A. The current flowing through one resistor is equal to the current flowing through the other resistors in the combination

25. B. dc circuits
26. C. It has a constant speed over a wide load range
27. C. properly grounded
28. D. 5
29. A. Potassium hydroxide
30. B. 360 kJ

Solution:

$$W = Pt = EIt$$

$$W = (120)(5)\left(10\ \cancel{min} \times \frac{60\ s}{1\ \cancel{min}}\right)$$

$$W = 360{,}000\ J \text{ or } 360\ kJ$$

31. B. magnetic contactor
32. D. rotational
33. B. eddy current losses
34. A. Phase sequence
35. C. 9.6 ohms

Solution:

$$A = 0.3\ \cancel{mm^2} \times \left(\frac{1\ m}{1000\ \cancel{mm}}\right)^2$$

$$A = 3 \times 10^{-7}\ m^2$$

$$R = \rho\frac{L}{A} = \left(1.6\times10^{-8}\right)\left(\frac{180}{3\times10^{-7}}\right)$$

$$R = 9.6\ \Omega$$

36. A. 3.8 A

Solution:

$$X_C = \frac{1}{2\pi fC} = \frac{1}{2\pi(60)(100\times10^{-6})}$$

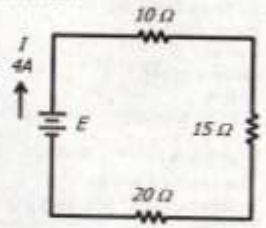
$$X_C = 26.52\ \Omega$$

$$I = \frac{E}{X_C} = \frac{100}{26.52}$$

$$I = 3.8\ A$$

37. B. Horsepower rating
38. D. apparent power
39. B. 180 V

Solution:



$$E = IR_t$$

$$E = 4(10+15+20)$$

$$E = 180\ V$$

40. C. both A and B
41. A. Core, primary and secondary windings
42. D. phase
43. D. Direct couplings
44. C. Three
45. D. All of these
46. D. J/s
47. C. either A or B
48. B. ac current
49. B. wye-delta
50. D. I only
51. C. Concealed knob and tube wiring
52. B. total computed load and the rating of the circuits used
53. A. 125%
54. B. 115
55. D. Transfer switch
56. C. 800 mm
57. A. 60 A
58. B. separated
59. C. 75
60. A. Electric locomotive
61. A. green

62. C. Where installed in industrial establishment where a registered master electrician will service the installation
63. D. none of these
64. C. as branch circuit conductors
65. C. 2.0 kW
66. D. Field winding
67. D. 150%
68. C. Both commutator and slip ring
69. C. 2,400 mm
70. B. The reading will be independent of the varying current
71. A. Corona
72. B. Arcing effects
73. D. General purpose branch circuit
74. B. 125
75. B. indoors
76. D. 460 mm
77. D. Any of these
78. A. 86%
79. C. 460 mm
80. A. 75 mm
81. A. Continuous load
82. A. 24
83. B. 8.0 mm^2
84. A. 2.0 mm^2
85. D. 1,640
86. D. 100%
87. C. 250 V
88. C. 125%
89. D. Frequency rating
90. C. 6 wires
91. A. 125%
92. A. 40 A

Solution:

Note: From the PEC table, the current drawn by a 2 hp single phase motor is 13.2 A

Rating = 300% of FLA

Rating = 3(13.2) = 39.6 A = 40 A

93. A. 600 V
94. C. Thrice
95. B. 2.3 mm
96. A. One
97. A. 8
98. D. All of these
99. B. 14.0 mm^2
100. D. 8.0 mm^2

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 15

Part 1: Technical Subject

1. Another name for an AC generator.

A. Dynamometer
B. Alternator
C. Dynamotor
D. Converter

2. How can the phase sequence of a three-phase system be reverse?

A. By changing sizes of supply conductors
B. By improving system power factor
C. By increasing generators' excitation
D. By interchanging any two line conductors

RME Board Exam

3. An electron is ____.

A. an orbiting particle
B. a proton
C. the smallest part of an atom with a positive charge
D. a neutron

4. The torque of a series motor is directly proportional to

A. the counter emf
B. the armature current
C. the square of the counter emf
D. the square of the armature current

5. In a step down transformer, the primary will have

A. half as many turns
B. fewer turns
C. more turns
D. twice as many turns

6. Lux is a unit equivalent to ___.

A. lumen-meter
B. lumens per meter
C. lumens per square meter
D. lumens per cubic meter

RME Board Exam

7. A copper transmission line that is 1.5 miles in length is used to transmit 10 kilowatts from a 600-V generating station. Calculate the line current.

A. 16.67 A
B. 17.5 A
C. 18.0 A
D. 16.9 A

8. A synchronous motor will reverse its rotation when _____.

A. any two of the three stator lines are interchange
B. the field excitation is increased
C. the field excitation is decreased
D. none of these

9. Which of the following is NOT a part of an atom?

A. electron
B. proton
C. neutron
D. coulomb

10. What is the ratio of output power to input power?

A. Demand factor
B. Power factor
C. Efficiency
D. Gain

11. In a parallel circuit with unequal resistance on each branch, ___.

A. the current on each branch are equal
B. the voltage across each branch are equal
C. the power drawn on each branch are equal
D. none of these

RME Board Exam

12. The specific resistance of a wire depends on _____.

I. its length
II. its material
III. its cross-sectional area

A. I and II only
B. I, II and III
C. I and III only
D. II and III only

13. What is the mean reason why electrical appliances are connected in parallel rather in series?

A. Parallel connection is simpler than a series connection.
B. Each appliance will draw more current if connected in series
C. It makes the operation of each appliance independent with each other
D. Appliances connected in series are noisy.

RME Board Exam

14. Fuse in motor circuits provides

A. short circuit protection
B. open circuit protection
C. over current protection
D. none of these

15. Ampere is equivalent to

A. coulomb-second
B. coulomb per second
C. volts per coulomb
D. coulomb per volt

16. Electrical tool used to drive or pull out nails in the piece of wood.

A. Ball pen hammer
B. Soft faced hammer
C. Claw hammer
D. All of these

17. Insulators have ___ temperature coefficient of resistance.

A. positive
B. negative
C. either A or B
D. neither A or B

RME Board Exam

18. To increase the range of an ac ammeter, which of the following is most commonly used?

A. an inductance
B. a current transformer
C. a straight shunt
D. a PT

19. The side of the transformer with more turns is the _____ side.

A. primary
B. secondary
C. low voltage
D. high voltage

20. A universal motor is a _____ wound motor.

A. parallel
B. series
C. series-parallel
D. parallel-series

RME Board Exam

21. An applicant for re-examination shall be allowed to re-take _____ only in the subject in which he has obtain a grade below 50 percent.

A. two times
B. three times
C. any number of times
D. once

22. What is the ohmic value of a resistor having the color bands: brown, green, red, and gold.

A. 120 Ω
B. 1.2 kΩ
C. 1.5 kΩ
D. 15 kΩ

RME Board Exam

23. The advantage of the iron-nickel battery over the lead acid battery is that

A. it needs less maintenance
B. it has much higher efficiency
C. the cell voltage of the iron-nickel battery is higher
D. it is much cheaper

24. This term means that the motor will stop when there is a supply voltage failure and the motor will not restart automatically when the supply voltage is restored.

A. No voltage release
B. No voltage protection
C. No voltage control
D. None of these

25. A lamp is to be controlled from two different locations. How many and what types of switches are to be used?

A. Two 4-way switches
B. One duplex switch
C. One 3-way and one 4-way switches
D. Two 3-way switches

RME Board Exam

26. An oven takes 15 A at 220 V. It is desired to reduce the current to 12 A. Find the resistor that must be connected in series.

A. 8.33 ohms
B. 4.63 ohms
C. 6.33 ohms
D. 3.66 ohms

RME Board Exam

27. Megger is an instrument used to measure

A. insulation resistance
B. very high resistance
C. inductance of a coil
D. very low resistance

28. In a three-phase circuit, the phases are out of phase by ___ apart.

A. 150°
B. 120°
C. 90°
D. 180°

29. Which of the following is an advantage of a 3-phase system over a 1-phase system?

A. It can deliver more power
B. It is cheaper to transmit
C. Two voltage levels are available
D. All of these

30. Which type of capacitors used to filter dc components?

A. Electrolytic
B. Mica
C. Ceramic
D. Plastic

RME Board Exam

31. ____ results in loss of electrical energy from the circuit.

A. Admittance
B. Reluctance
C. Susceptance
D. Resistance

32. Instrument use to measure electrical energy.

A. Wattmeter
B. Dynamometer
C. Kilowatt-hour meter
D. Power factor meter

33. Secondary cells are frequently called _____.

A. storage cells
B. accumulators
C. either A or B
D. neither A or B

34. A positively charged ion.

A. Anion
B. Cathode
C. Anode
D. Cation

RME Board Exam

35. What is the total wattage of 4-12 ohm resistors connected in parallel with 120-volt applied across?

A. 300
B. 2400
C. 4000
D. 4800

36. A three-way switch is equivalent to a ___ switch.

A. SPDT
B. DPDT
C. SPST
D. DPST

37. A 10-mH inductor has a reactance of ___ at 60 Hz.

A. 0.377 ohm
B. 3.77 ohms
C. 37.7 ohms
D. 7.37 ohms

38. Best suited motor to drive small air compressors.

A. Universal motor
B. Shaded pole motor
C. Split-phase motor
D. Capacitor start motor

RME Board Exam

39. Interrupting medium in a contactor maybe

A. SF_6
B. oil
C. air
D. any of these

40. Alternators are rated in

A. kW
B. kVA
C. kVAR
D. HP

RME Board Exam

41. It is a type of switch used in cars that must have a key inserted before it can be operated.

A. twist switch
B. battery switch
C. ignition switch
D. cut-out switch

42. The diameter of a wire is usually expressed in mils. How many mils are there in one inch?

A. 1,000
B. 10,000
C. 100,000
D. 100

RME Board Exam

43. Power factor is equal to _____.

A. Z/X
B. Z/R
C. X/R
D. cos θ

44. Volt is the same unit as

A. joule per second
B. joule per coulomb
C. ampere per ohm
D. watt per ohm

45. Where does the power supply for a megger come from?

A. A 110-volt ac circuit
B. A 24-volt dc circuit
C. Flashlight batteries
D. A hand-driven generator

46. The ordinary 6-volt lead acid storage battery consists of how many cells?

A. 6 cells
B. 3 cells
C. 4 cells
D. 5 cells

RME Board Exam

47. At what speed must an 8-pole, AC generator runs so that its frequency shall be 40 Hz?

A. 750 rpm
B. 600 rpm
C. 900 rpm
D. 500 rpm

48. Using the rule of thumb, most generators will withstand an overload of how much percent?

A. 25%
B. 10%
C. 30%
D. 50%

49. What is the proper color of a commutator?

A. Dark brown
B. Glazed chocolate
C. Shiny brown
D. Reddish brown

RME Board Exam

50. A transformer has a primary voltage of 120 volts and a secondary voltage of 480 volts. If there are 40 turns on the primary, the secondary contains ___ turns.

A. 100
B. 990
C. 910
D. 160

Part 2: Philippine Electrical Code

RME Board Exam

51. An assembly drawing for a switchboard appears to have some errors. As a supervisor, what step will you take?

A. Report the apparent error to your supervisor
B. Make the connections per drawing but be prepared to correct it if ordered
C. Hold the job until you have checked with the person who initialed the plans
D. Proceed making correction on the drawing

RME Board Exam

52. Vertical clearances of all service drop conductors above roofs shall NOT be less than one of the following values.

A. 2,000 mm
B. 2,750 mm
C. 3,000 mm
D. 2,500 mm

53. In no case shall the grounding conductor be smaller than ____ copper.

A. 5.5 mm^2
B. 8.0 mm^2
C. 3.5 mm^2
D. 2.0 mm^2

54. Hazardous location in which flammable gases or vapors are present in the air in quantities sufficient to produce explosives or ignitable mixtures.

A. Class IV
B. Class III
C. Class II
D. Class I

RME Board Exam

55. According to its make, conduits maybe classified as

A. rigid metal
B. rigid non-metal
C. flexible metal
D. all of these

56. The system neutral conductor shall NOT be connected to ground, EXCEPT through the neutral _____.

A. grounding impedance
B. grounding electrode
C. grounding transformer
D. derived from other system

57. In damp or wet locations, cabinets and cutout boxes of the surface type shall be mounted with at least ____ air space between the enclosure and the wall.

A. 6.0 mm
B. 6.4 mm
C. 7.0 mm
D. 7.5 mm

58. The minimum diameter of a solid air terminal under class I material requirements shall be ____ for copper and _____ for aluminum.

A. 9.5 mm, 12.7 mm
B. 12.7 mm. 9.5 mm
C. 8.0 mm, 12.5 mm
D. 12.5 mm, 8.0 mm

59. Circuits with a nominal voltage of 600 V or less in a rigid metal conduit or intermediate metal conduit and placed in a trench below a 50 mm thick concrete or equivalent shall maintain a minimum cover distance of ___.

A. 150 mm
B. 250 mm
C. 460 mm
D. 300 mm

60. Where the distance requirement in making holes cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate or bushings at least ___ thick and of approved length and width to cover the area of the wiring.

A. 2.0 mm
B. 1.5 mm
C. 1.8 mm
D. 1.6 mm

RME Board Exam

61. The Philippine Electrical Code, Part 1 does not cover wiring of equipment installed within or to or from one of the following. Which one is this?

A. Trailers
B. Mobile homes
C. Water crafts
D. Airplanes

62. The lightning conductor or ground terminal shall extend vertically NOT less than ___ into the earth.

A. 2,000 mm
B. 3,000 mm
C. 4,000 mm
D. 2,500 mm

63. Which of the following sizes of fuse NOT standard?

A. 80 A
B. 45 A
C. 125 A
D. 75 A

64. The circuit supplying an autotransformer type dimmer shall NOT exceed ___ between conductors.

A. 240 V
B. 250 V
C. 230 V
D. 200 V

65. A spark occurring between nearby metallic objects or from such objects to the lightning protection system or to ground.

A. Flashover
B. Sideflash
C. Sparkover
D. Discharge

66. Covers for boxes shall be permanently marked. The marking shall be on the outside of the box using the block type letters at least ____ in height.

A. 10 mm
B. 12 mm
C. 15 mm
D. 20 mm

67. The smallest electrical trade size of intermediate metal conduit.

A. 15 mm
B. 20 mm
C. 12 mm
D. 25 mm

RME Board Exam

68. When wiring a raceway at least a certain length of free conductors shall be left at each outlet. What is this minimum length?

A. 75 mm
B. 100 mm
C. 150 mm
D. 200 mm

69. Rigid metal conduit shall be shipped in standard lengths of _.

A. 3,000 mm
B. 6,000 mm
C. 4,000 mm
D. 5,000 mm

RME Board Exam

70. Where a rigid metal conduit is used, there shall NOT be more than the equivalent of ___ quarter bends between pull points.

A. three
B. four
C. five
D. two

71. If the setting of the overcurrent device in a circuit ahead of the equipment is 60 A, the minimum equipment grounding conductor using copper shall be ____.

A. 5.5 mm^2
B. 3.5 mm^2
C. 2.0 mm^2
D. 8.0 mm^2

72. An exposed wiring support system using a messenger wire to support insulated conductors.

A. Metal clad cable wiring
B. Concealed knob and tube wiring
C. Messenger cable wiring
D. Messenger supported wiring

73. Air terminal shall be within _____ of outermost projection of roof edge.

A. 700 mm
B. 760 mm
C. 800 mm
D. 600 mm

74. Electrical equipment except x-ray tube inside anesthetizing room shall.be located at least _____ above the floor.

A. 2,000 mm
B. 2,500 mm
C. 2,400 mm
D. 2,300 mm

75. In replacing a busted fuse which of the following is important?

A. same size and type
B. same size but different rating
C. same type but different rating
D. different size and type

RME Board Exam

76. Which of the following wires has 75-ohm impedance?

A. Foam-filled twin lead
B. Coaxial
C. Flat twin lead
D. None of these

77. Exposed non-current carrying metal parts of fixed equipment likely to become energized shall be grounded under the following conditions. Which one is NOT included?

A. where located in wet or damp locations
B. where in electrical contact with wooden floor
C. where in a classified hazardous locations
D. where supplied with a metal raceway or other wiring methods

RME Board Exam

78. In a battery room, it is important that no hot spots due to loose connections or sparking will occur, due to a serious event may happen. What can this be?

A. An explosion might follow
B. A short circuit may occur
C. An electric shock can happen to an electrician
D. The electrolyte might overheat

79. For the purpose of lightning protection, class I ordinary building is one that is at less than _____ in height.

A. 20 m
B. 22 m
C. 24 m
D. 23 m

RME Board Exam

80. For dwelling units, the demand factor for the first 3000 volt-amperes of load is

A. 95 %
B. 85 %
C. 100 %
D. 80 %

81. The maximum electrical trade size of flexible metallic tubing shall be _____.

A. 15 mm
B. 20 mm
C. 32 mm
D. 100 mm

82. The entire area of the aircraft hangar, including any adjacent communication areas not suitably cut-off from the hangar shall be classified as hazardous up to a level of ___ above the floor.

A. 400 mm
B. 460 mm
C. 500 mm
D. 480 mm

RME Board Exam

83. In which method of starting a motor is the starting current a minimum?

A. star-delta
B. starter-rotor starter
C. direct on line
D. autotransformer

84. Electrical non-metallic tubing shall be clearly and durably marked at least every

A. 2,000 mm
B. 1,000 mm
C. 3,000 mm
D. 1,500 mm

RME Board Exam

85. In television studios, wiring for stage, set lighting, stage effects and other electric equipment which are fixed shall be done with approved flexible cables protected by circuit breakers. The approved rating is which one of the following?

A. 30 A
B. 40 A
C. 20 A
D. 10 A

86. Plug fuses and fuse holders shall NOT be installed or used in circuits exceeding ___ between conductors.

A. 200 V
B. 250 V
C. 230 V
D. 150 V

87. All switches and circuit breakers used as switches shall be so installed that the center of the grip of the operating handle when in its highest position shall NOT be more than _____ above the floor or working flatform.

A. 2,000 mm
B. 1,800 mm
C. 1,500 mm
D. 2,100 mm

RME Board Exam

88. A convenience outlet circuit consisting of 8 outlets connected across a 220-V supply considering 180 W per outlet, what is the maximum circuit current?

A. 4.56 A
B. 6.54 A
C. 8 A
D. None of these

RME Board Exam

89. Open wiring on insulators shall be supported at intervals NOT longer than what distance?

A. 1,300 mm
B. 500 mm
C. 2,000 mm
D. 750 mm

90. Electrical metallic tubing shall be securely fastened in place at least every ___.

A. 2,000 mm
B. 1,800 mm
C. 3,000 mm
D. 1,500 mm

91. Direct burial cables or conductors with nominal voltage of 600 V or less and passes under streets, hi-ways, roads, alleys, driveways and parking lots shall have a minimum cover distance of _____.

A. 500 mm
B. 600 mm
C. 460 mm
D. 550 mm

92. The zone of protection of an overhead ground wire is conventionally taken as a

A. cone
B. cylinder
C. triangular prism
D. all of these

93. Line and ground connecting conductors to surge arresters shall NOT be smaller than _____ copper or _____ aluminum.

A. 2.0 mm^2, 2.0 mm^2
B. 3.5 mm^2, 2.0 mm^2
C. 3.5 mm^2, 3.5 mm^2
D. 2.0 mm^2, 3.5 mm^2

94. Ventilating pipes for motors, generators or other rotating electric machinery or for enclosures for electric equipment shall be of metal NOT less than __ in thickness.

A. 0.50 mm
B. 0.45 mm
C. 0.40 mm
D. 0.60 mm

RME Board Exam

95. The term given to an insulated stranded wire.

A. Durability
B. Cord
C. Length
D. Volume

96. The minimum spacing between bare metal parts of opposite polarity where mounted on the same surface shall be _____ for voltages rated not over 250 V nominal.

A. 26 mm
B. 32 mm
C. 30 mm
D. 28 mm

97. A protective device for limiting surge voltages by discharging or by passing surge current.

A. Arrester
B. Circuit breaker
C. Lightning rod
D. Thermocouple

98. For office buildings, a general lighting load of _____ VA/m^2 shall be used.

A. 12
B. 16
C. 24
D. 28

99. For straight pulls, the length of the pull box shall NOT be less than ___ times the outside diameter of the largest non-shielded conductor or cable.

A. 42
B. 48
C. 32
D. 30

100. Liquidtight flexible non-metallic conduit shall NOT be used in lengths longer than

A. 1,500 mm
B. 1,800 mm
C. 2,000 mm
D. 2,500 mm

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 15

ANSWER KEY

1. B. Alternator
2. D. By interchanging any two line conductors
3. A. an orbiting particle
4. D. the square of the armature current
5. C. more turns
6. C. lumens per square meter
7. A. 16.67 A

Solution:

$P = EI$

$I = \frac{10,000}{600}$

$I = 16.67\ A$

8. A. any two of the three stator lines are interchange
9. D. coulomb
10. C. Efficiency
11. B. the voltage across each branch are equal
12. B. I, II and III
13. C. It makes the operation of each appliance independent with each other
14. A. short circuit protection
15. B. coulomb per second
16. C. Claw hammer
17. B. negative
18. B. a current transformer
19. D. high voltage
20. B. series
21. C. any number of times
22. C. 1.5 kΩ

Solution:

Note: Brown and read has a digit equivalent of 1 and 5 respectively. Red as multiplying factor is equal to 100. Gold as tolerance is equal to ±10%.

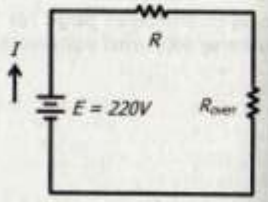
Value = 15 x 100
Value = 1,500 Ω or 1.5 kΩ

23. A. it needs less maintenance
24. B. No voltage protection
25. D. Two 3-way switches
26. D. 3.66 ohms

Solution:

$R_{oven} = \frac{E}{I} = \frac{220}{15}$

$R_{oven} = 14.667\ \Omega$



$I = \frac{E}{R + R_{oven}}$

$R = \frac{E}{I} - R_{oven}$

$R = \frac{220}{12} - 14.667$

$R = 3.66\ ohms$

27. A. insulation resistance
28. B. 120°
29. D. All of these
30. A. Electrolytic
31. D. Resistance

32. C. Kilowatt-hour meter
33. C. either A or B
34. D. Cation
35. D. 4,800

Solution:

$R_t = \frac{R}{n} = \frac{12}{4} = 3\ \Omega$

$P_t = \frac{E_t^2}{R_t} = \frac{120^2}{3}$

$P_t = 4,800\ W$

36. A. SPDT
37. B. 3.77 ohms

Solution:

$X_L = 2\pi fL = 2\pi(60)(10 \times 10^{-3})$

$X_L = 3.77\ ohms$

38. D. Capacitor start motor
39. D. any of these
40. B. kVA
41. C. ignition switch
42. A. 1,000
43. D. cos θ
44. B. joule per coulomb
45. D. A hand-driven generator
46. B. 3 cells

Note: Each lead cell has an open circuit emf of 2 volts

47. B. 600 rpm

Solution:

$N = \frac{120f}{P} = \frac{120(40)}{8}$

$N = 600\ rpm$

48. A. 25%
49. B. Glazed chocolate

50. D. 160

Solution:

$\frac{E_1}{E_2} = \frac{N_1}{N_2}$

$N_2 = N_1\left(\frac{E_2}{E_1}\right) = 40\left(\frac{480}{120}\right)$

$N_2 = 160\ volts$

51. C. Hold the job until you have checked with the person who initialed the plans
52. D. 2,500 mm
53. B. 8.0 mm²
54. D. Class I
55. D. all of these
56. A. grounding impedance
57. B. 6.4 mm
58. A. 9.5 mm, 12.7 mm
59. A. 150 mm
60. D. 1.6 mm
61. D. Airplanes
62. B. 3,000 mm
63. D. 75 A
64. C. 230 V
65. B. Sideflash
66. B. 12 mm
67. A. 15 mm
68. C. 150 mm
69. A. 3,000 mm
70. B. four
71. A. 5.5 mm²
72. D. Messenger supported wiring
73. D. 600 mm
74. C. 2,400 mm
75. A. same size and type
76. B. Coaxial
77. B. where in electrical contact with wooden floor
78. A. An explosion might follow
79. D. 23 m
80. C. 100%
81. B. 20 mm
82. B. 460 mm
83. A. star-delta
84. C. 3,000 mm

85. C. 20 A
86. B. 250 V
87. A. 2,000 mm
88. B. 6.54 A

Solution:

$$P = \frac{180\ W}{outlet} \times 8\ outlets$$

$$P = 1440\ W$$

$$I = \frac{P}{E} = \frac{1440}{220}$$

$$I = 6.54\ A$$

89. A. 1,300 mm
90. C. 3,000 mm
91. B. 600 mm
92. C. triangular prism
93. D. 2.0 mm^2, 3.5 mm^2
94. A. 0.50 mm
95. B. Cord
96. B. 32 mm
97. A. Arrester
98. D. 28
99. C. 32
100. B. 1,800 mm

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 16

Part 1: Technical Subject

1. A megger is used to measure

A. kilohms
B. megohms
C. milliohms
D. microhms

2. Which of the following is NOT included in the field of practice of a Registered Master Electrician?

A. Installation of electric machinery
B. Maintenance and repair of electric machinery
C. Sale and distribution of electric machinery
D. All of these

RME Board Exam

3. Sensitivity of the voltmeter is expressed in

A. volts/ohm
B. ohm/volts
C. 1 ohm-volt
D. ohm-volt

4. Which of the following is one of the reason why the armature core of a dc machine is placed close to the pole face of the magnet?

A. To minimize leakage flux
B. To reduce copper losses
C. To control the flux flow
D. To facilitate commutation

5. What is the nominal open circuit voltage of a lithium cell?

A. 3.0 V
B. 1.5 V
C. 1.35 V
D. 2.1 V

6. In star-connected system the line current is ___ the phase current.

A. greater than
B. lesser than
C. equal to
D. either greater or lesser but not equal to

RME Board Exam

7. The approximate power factor of an incandescent lamp is

A. 1.0
B. 0.8
C. 0.9
D. 0.7

8. Which dc motor is suitable to drive elevators?

A. Series motor
B. Shunt motor
C. Differential compound motor
D. Cumulative compound motor

9. For a current to flow, what are basic circuit requirements?

A. Voltage source, and a conductor
B. Voltage source and a switch
C. Voltage source, a switch and a conductor
D. Voltage source, a dielectric and a conductor

RME Board Exam

10. What is the actual load in watts if the current drawn is 40 amperes with a voltage and power factor of 110 volts and 95 percent, respectively?

A. 7,240 W
B. 18 W
C. 418 W
D. 4,180 W

11. What causes the grooves around the circumference of a commutator?

A. Open armature circuit
B. High mica
C. Improper brushes
D. Improper brush staggering

RME Board Exam

12. In a series circuit, the unit that is the same in all the parts of the circuit is the _____.

A. resistance
B. current
C. voltage
D. power

13. When measuring resistance with a multi-tester, make sure the circuit is

A. grounded
B. closed or energized
C. open or de-energized
D. not grounded

RME Board Exam

14. To prevent accidental starting of a motor that is to be worked on,

A. ground the motor leads
B. ground the frame
C. remove the fuses
D. connect a lamp across the motor leads

RME Board Exam

15. Of the following, the best indication of the charge of a lead acid battery is the

A. open circuit cell voltage
B. temperature of the electrolyte
C. specific gravity
D. level of the electrolyte

16. Which of the following is a factor contributes to excessive wear on the contacts of a contactor?

A. Excessive jogging
B. High voltage to the coil
C. Low voltage to the coil
D. All of these

17. What is the hot resistance of a 100-watt, 220 V incandescent lamp?

A. 440 ohms
B. 484 ohms
C. 510 ohms
D. 465 ohms

18. Which of the following is a possible way of minimizing corrosion effects?

A. Avoidance of metal combinations that are not compatible
B. Avoiding the presence of an electrolyte
C. Electrical insulation between dissimilar metals that have to be used together
D. All of these

19. Which of the following contacts should never be filed?

A. Copper
B. Silver
C. Both A and B
D. Neither A or B

RME Board Exam

20. Three resistances of 8.4 ohms, 6.8 ohms and 4.8 ohms are connected in series across a 100-V source. What is the voltage across the 6.8-ohm resistor?

A. 28 V
B. 34 V
C. 24 V
D. 42 V

21. If a current of one ampere lows in a 200-ohm resistance for 1/2 minute, how much energy does the resistance draw?

A. 6 kJ
B. 1 kJ
C. 3 kJ
D. 5 kJ

RME Board Exam

22. A low voltage is measured on a higher scale of the voltmeter. The measurement would have

A. low precision
B. low accuracy
C. low resolution
D. all of these

23. Unit of inductance

A. Farad
B. Ohm
C. Henry
D. Siemen

24. The emf a cell depends upon the following EXCEPT one. Which one is this?

A. Concentration of electrolyte used
B. Type of electrolyte used
C. Type of material used as electrodes
D. Spacing between electrodes

25. Using rule of thumb a circuit breaker can hold approximately ____ times their rating for different periods of time based on the frame size of the unit.

A. 3
B. 4
C. 2
D. 5

RME Board Exam

26. What is the common method of cooling transformer?

A. Natural cooling
B. Air cooling
C. Air blast cooling
D. Oil cooling

27. To obtain the most satisfactory and economical designs for busbars in power stations and substations, consideration must be given to choose NOT only of material but also of _____.

A. color
B. availability
C. volume
D. shape

28. The total voltage and amperage of four 0.5 A, 1.5 A cells connected in parallel is

A. 1.5 V, 2 A
B. 1.5 V, 0.5 A
C. 6 V, 0.5 A
D. 6 V, 2 A

RME Board Exam

29. A voltmeter consists of a meter movement in series with _____.

A. a battery
B. a high resistance resistor
C. a resistor of negligible resistance
D. a battery and a resistor

RME Board Exam

30. The main part in a battery ignition system

A. ignition coil
B. distributor
C. battery and spark plug
D. all of these

31. Which relay functions when the circuit impedance, admittance or reactance increases or decreases beyond predetermined values?

A. Undervoltage relay
B. Overload relay
C. Distance relay
D. Reverse power relay

RME Board Exam

32. A probable cause for a turbo-generator tripping out on overspeed is a sudden ____.

A. large increase in load
B. loss of field excitation
C. loss of steam pressure
D. total loss of load

33. In the nameplate data of an electric motor, what does "PH" means?

A. Horsepower output of the motor
B. Frequency rating
C. Number of phases
D. Rise in temperature

RME Board Exam

34. If the input to a 5 to 1 step down transformer is 100 A at 2200 volts, the output is approximately

A. 500 A at 2200 V
B. 100 A at 440 V
C. 500 A at 440 V
D. 20 A at 11,000 V

35. In the absence of a voltmeter, which of the following instruments is used to measure potential difference?

A. Clamp-on ammeter
B. Oscilloscope
C. Wattmeter
D. Tachometer

RME Board Exam

36. How long a piece of aluminum wire 1 mm in diameter is needed to give a resistance of 4 ohms? Assume resistivity of aluminum is 2.8×10^{-8} ohm-meter.

A. 95 meters
B. 120 meters
C. 128 meters
D. 112 meters

37. This tool is used to cut away the rough edges inside the end of the pipe after it has been cut with a cutter.

A. Pipe threader
B. Reamer
C. Puller
D. Hickey

RME Board Exam

38. The total capacitance of four parallel capacitors which are 10, 15, 25 and 30 microfarads, respectively is

A. 60 μF
B. 40 μF
C. 80 μF
D. 20 μF

39. Which of the following works only with dc supply?

A. Vacuum cleaner
B. Electroplating
C. Electric stove
D. Universal motor

RME Board Exam

40. A circle of circular cross section has a diameter of 0.20 of an inch. Its area in circular mils is

A. 40,000 CM
B. 20,000 CM
C. 60,000 CM
D. 30,000 CM

41. Direct on line starting means ___.

A. reduced current at starting
B. full line voltage is applied at starting
C. reduced line voltage at starting
D. starting without using a contactor

RME Board Exam

42. The property of a coil that tends to oppose any change of current through it is called

A. resonance
B. mutual inductance
C. inductance
D. oscillation

43. If the specific gravity of the electrolyte of a lead acid cell decreases, the internal resistance of the cell is ____.

A. increased
B. decreased
C. not affected
D. zero

RME Board Exam

44. The starting capacitor of a single-phase motor is generally a ____.

A. ceramic capacitor
B. paper capacitor
C. electrolytic capacitor
D. none of these

RME Board Exam

45. Oil is used in many large transformers to

A. lubricate the coil
B. insulate the coil
C. lubricate the core
D. insulate the core

46. A sinusoidal current wave which has an effective value of 10 A, has a maximum value of ____.

A. 14.14 A
B. 17.32 A
C. 10 A
D. 7.07 A

47. The purpose of equalizing bars on a dc generator is to equalize which of the following?

A. Speed
B. Series field current
C. Load
D. Shunt field current

RME Board Exam

48. The term "15-ampere" is commonly used in identifying a/an

A. conduit
B. fuse
C. insulator
D. outlet box

49. Electrical symbol represented by a circle with a letter F inside.

A. Fused-type outlet
B. Wall fan outlet
C. Fluorescent lamp outlet
D. Ceiling fan outlet

50. The primary consideration in the grouping of cells is the required

A. voltage
B. current
C. internal resistance
D. power rating

Part 2: Philippine Electrical Code

51. Defined as the shortest distance measured between a point on the top surface of any direct buried conductor, cable, conduit and the top surface of finish grade.

A. Trench
B. Cover
C. Tray
D. Duct

RME Board Exam

52. Surface metal raceway should not be allowed in the following locations, EXCEPT

A. where it is subject to corrosive vapors
B. where location is dry and ventilated
C. where the voltage is over 300 volts
D. where subject to sever physical damage

53. For all single phase motors, to protect them from short circuits and ground faults, a multiplying factor of ___ of its full load current rating shall be used the protective device selected is a non-time delay fuse and ___ if the protective device is a time delay fuse.

A. 300 %, 175 %
B. 300 %, 150 %
C. 250 %, 175 %
D. 250 %,150 %

54. A factory assembly of parallel conductors formed integrally with an insulating material web specifically designed for field installation in metal surface raceway.

A. type FC
B. type MI
C. type TC
D. type FCC

55. Surface mounted incandescent fixture shall be permitted to be installed in clothes closets provided there is a minimum clearance of ____ between the fixture and the nearest point of the storage area.

A. 150 mm
B. 200 mm
C. 250 mm
D. 300 mm

56. Snap switches shall not be grouped or ganged in enclosures unless they can be so arranged that the voltage between adjacent switches does NOT exceed ___.

A. 250 V
B. 300 V
C. 150 V
D. 100 V

RME Board Exam

57. Where passing through wood cross members in plastered partitions, conductors in concealed knob and tube wiring shall be protected by insulating tubes extending NOT less than ___ beyond the wood member.

A. 80 mm
B. 70 mm
C. 76 mm
D. 64 mm

RME Board Exam

58. A type of cable which is a single or multi-conductor solid dielectric insulated cable rated 2001 volts or higher.

A. MC
B. MV
C. FCC
D. AC

59. Each unit length of heating cable shall have a permanent legible marking of each non-heating lead located within ____ of the terminal end.

A. 75 mm
B. 70 mm
C. 80 mm
D. 85 mm

60. Heavy-duty lighting track is a lighting track identified for use exceeding ___.

A. 15 A
B. 20 A
C. 30 A
D. 10 A

61. Thermal insulation shall not be installed within ___ of the recessed fixture enclosure.

A. 40 mm
B. 35 mm
C. 38 mm
D. 42 mm

62. Branch circuit conductors supplying a single motor shall have an ampacity NOT less than ___ percent of the motor full load current rating.

A. 115
B. 120
C. 125
D. 130

RME Board Exam

63. An exposed or enclosed upright panel carrying switches and other protective, controlling and measuring devices for electric machinery or equipment.

A. Switchgear
B. Panelboard
C. Switchboard
D. Switch box

RME Board Exam

64. This type of loads will NOT require Electrical Permits not Certificate of Inspection. Which type is this?

A. Fixed water heater
B. Fixed electric range
C. Window type room air conditioners
D. Portable appliance rated not more than 1,200 volt-amperes

65. Lighting track load shall NOT be installed where less than ____ above the finished floor EXCEPT where protected from physical damage.

A. 1,800 mm
B. 1,500 mm
C. 2,000 mm
D. 1,000 mm

RME Board Exam

66. In indoor wet locations, the entire wiring system including all boxes, fittings, control boards and panelboards shall be installed on walls with a minimum clearance. What is this clearance?

A. 10 mm
B. 5 mm
C. 20 mm
D. 15 mm

67. Where circuit breakers are used to protect the primary side of a transformer over 600 V nominal, their continuous current rating shall NOT exceed ___ of the rated primary current.

A. 250 %
B. 300 %
C. 175 %
D. 200 %

RME Board Exam

68. The primary winding of a step down transformer shall be protected on the primary side by an overcurrent device rated NOT more than a certain percentage of the primary current. Which is this percentage?

A. 110 %
B. 125 %
C. 80 %
D. 150 %

69. For a two-wire FCC cable system with grounding, the grounding conductor shall be _____ conductor.

A. the middle
B. the rightmost
C. the leftmost
D. any

RME Board Exam

70. To cut rigid metal conduits, an electrician should do one of the following. Which one is this?

A. Order it cut to size from the supplier
B. Use a three-wheel pipe cutter
C. Use a cold chisel and ream the ends
D. Use a hack saw and ream the ends

71. Type NM cable shall NOT be installed _____.

A. where exposed to corrosive material
B. where embedded in concrete
C. in a shallow chase in masonry, concrete or adobe
D. all of these

72. Dry type transformers installed indoors and rated 112.5 kVA or less shall have a separation of at least _____ from combustible material.

A. 500 mm
B. 400 mm
C. 300 mm
D. 200 mm

73. A factory assembly of two or more insulated conductors in an extruded core of moisture resistant, flame retardant non-metallic material covered with an overlapping spiral metal tape and wire shield and jacketed with an extruded moisture, flame, oil, corrosion, fungus and sunlight resistant non-metallic material.

A. type SNM cable
B. type NM cable
C. type SE cable
D. type AC cable

74. Where the overload relay selected using the factor 125 % is not sufficient to start the motor or to carry the load, the multiplying factor shall be increased but shall NOT exceed _____ percent.

A. 130
B. 140
C. 150
D. 125

75. An insulator designed to electrically insulate the end of a type FCC cable.

A. Spool insulator
B. Bonding insulator
C. Insulating end
D. Cable connector

76. Intermediate metal conduit shall be firmly fastened within ___ of each outlet box, junction box, cabinet or fitting.

A. 750 mm
B. 1,000 mm
C. 800 mm
D. 900 mm

RME Board Exam

77. Consists of three or more flat copper conductor placed edge to edge separated and enclosed within an insulating assembly.

A. Armored cable
B. Flat cable assemblies
C. Sheathed cable
D. Flat conductor cable

78. Lampholders installed in wet or damp locations shall be of the _____ type.

A. heavy-duty
B. waterproof
C. weatherproof
D. all of these

79. An assembly of two insulated conductors within a non-metallic jacket or an extruded thermoplastic covering.

A. Shielded non-metallic sheathed cable
B. Non-metallic sheathed cable
C. Non-metallic extension
D. None of these

RME Board Exam

80. As compared with solid wires, stranded wires of the same cross sectional area have the following advantage EXCEPT one. Which one is this?

A. It is larger in overall diameter
B. It is easier to skin off the insulation
C. It is better for high voltage
D. It has a higher current rating

81. The single-phase conductors supplying the phase converter shall have an ampacity NOT less than _____ times the full load current rating of the motor or load being served.

A. 2.50
B. 1.25
C. 2.16
D. 1.75

82. Dry type transformers rated over _____ volts, shall be installed in vaults.

A. 25,000
B. 10,000
C. 35,000
D. 50,000

83. In walls or ceilings of concrete, tile, or other non-combustible materials, boxes and fittings shall be installed that the front edge of the box or fitting will NOT set back of the finished surface more than _____.

A. 5.0 mm
B. 6.4 mm
C. 6.2 mm
D. 7.6 mm

84. Wiring located above heated ceilings shall be spaced not less than ____ above the heated ceiling and shall be considered as operating at an ambient of 50 °C.

A. 100 mm
B. 50 mm
C. 75 mm
D. 40 mm

85. In selecting the maximum setting of an instantaneous trip CB to be used to protect all AC motors from short circuit, a multiplying factor of ____shall be used.

A. 250 %
B. 300 %
C. 150 %
D. 700 %

RME Board Exam

86. Are rectangular sheet metal enclosures equipped with removable covers providing access to conductors inside.

A. Metal clad cable
B. Multiple cable conductors
C. Busways
D. Wireways

87. A branch circuit supplying a fixed storage type water heater having a capacity of 450 liters or less shall have a rating not less than ____ of the nameplate rating of the water heater.

A. 100 %
B. 115 %
C. 120 %
D. 125 %

88. For three-phase motors supplied by any 3-phase system, the number of overload units required shall be _____.

A. three, one in each phase
B. two, in any two of each phase
C. one, in any one phase
D. none of these

RME Board Exam

89. What is the maximum number of overcurrent devices of a lighting and appliance panel board that shall be installed in a cabinet?

A. 36 devices
B. 24 devices
C. 48 devices
D. 52 devices

90. Each length of the rigid metal conduit shall be clearly and durably identified in every ___ as required.

A. 3,000 mm
B. 2,000 mm
C. 4,000 mm
D. 1,000 mm

91. Flexible metal conduit shall be supported within ____ on each side of every outlet box, junction box, cabinet or fitting.

A. 300 mm
B. 200 mm
C. 460 mm
D. 150 mm

92. The maximum electrical trade size of electrical metallic tubing shall be _____.

A. 125 mm
B. 150 mm
C. 100 mm
D. 200 mm

RME Board Exam

93. For installations of 2.0 mm^2 conductors in 600-V circuits. What is the minimum insulation resistance allowed by the Philippine Electrical Code?

A. 1,000,000 ohms
B. 750,000 ohms
C. 250,000 ohms
D. 500,000 ohms

94. Resistance type heating elements in electric space heating equipment shall be protected at NOT more than __.

A. 50 A
B. 30 A
C. 40 A
D. 60 A

95. What is the smallest electrical trade size of a liquidtight flexible non-metallic conduit?

A. 15 mm
B. 12 mm
C. 20 mm
D. 25 mm

96. Askarel insulated transformers installed indoors and rated over _____ kVA shall be furnished with a pressure relief vent.

A. 37.5
B. 25
C. 50
D. 15

RME Board Exam

97. The following are types of protection for single phase induction motors, EXCEPT

A. overload protection
B. ground fault protection
C. under voltage protection
D. single phasing protection

98. Busways shall be securely supported at intervals NOT exceeding ____unless otherwise designed and marked.

A. 1,000 mm
B. 2,000 mm
C. 2,500 mm
D. 1,500 mm

99. In straight pulls, the length of the pull box shall NOT be less than _____ times the trade diameter of the largest raceway.

A. 8
B. 6
C. 10
D. 5

100. Boxes intended to enclose flush devices shall have an internal depth of NOT less than _____.

A. 24 mm
B. 20 mm
C. 16 mm
D. 28 mm

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 16

ANSWER KEY

1. B. megohms
2. C. Sale and distribution of electric machinery
3. B. ohm/volts
4. A. To minimize leakage flux
5. A. 3.0 V
6. C. equal to
7. A. 1.0
8. D. Cumulative compound motor
9. A. Voltage source, and a conductor
10. D. 4,180 W

Solution:

$P = EIpf$

$P = (110)(40)(0.95)$

$P = 4{,}180\ W$

11. D. Improper brush staggering
12. B. current
13. C. open or de-energized
14. C. removed the fuses
15. A. open circuit cell voltage
16. D. All of these
17. B. 484 ohms

Solution:

$$P = \frac{E^2}{R}$$

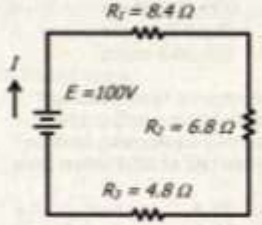
$$R = \frac{E^2}{P} = \frac{220^2}{100}$$

$R = 484\ \Omega$

18. D. All of these
19. B. Silver

20. B. 34 V

Solution:



$$I = \frac{E}{R_t} = \frac{100}{8.4+6.8+4.8}$$

$I = 5\ A$

$E_2 = IR_2 = 5(6.8)$

$E_2 = 34\ V$

21. A. 6 kJ

Solution:

$P = I^2R = (1)^2(200)$

$P = 200$ watts

$$W = Pt = 200\left(1/2\ \text{min} \times \frac{60\ s}{1\ \text{min}}\right)$$

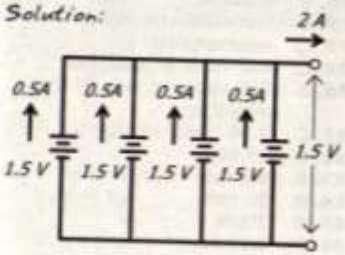
$W = 6000$ watt-sec or J

$W = 6$ kJ

22. D. all of these
23. C. Henry
24. D. Spacing between electrodes
25. A. 3
26. D. Oil cooling
27. D. shape

28. A. 1.5 V, 2 A

Solution:



$I_t = 0.5+0.5+0.5+0.5$

$I_t = 2A$

$E_t = 1.5V$

29. B. a high resistance resistor
30. D. all of these
31. C. Distance relay
32. D. total loss of load
33. C. Number of phases
34. C. 500 A at 440 V

Solution:

$\frac{I_1}{I_2} = \frac{N_2}{N_1}$ → current ratio

$$I_2 = I_1\left(\frac{N_1}{N_2}\right) = 100\left(\frac{5}{1}\right)$$

$I_2 = 500\ A$

$\frac{E_1}{E_2} = \frac{N_1}{N_2}$ → voltage ratio

$$E_2 = E_1\left(\frac{N_2}{N_1}\right) = 2200\left(\frac{1}{5}\right)$$

$E_2 = 440\ V$

35. B. Oscilloscope

36. D. 112 meters

Solution:

$$A = \frac{\pi d^2}{4} = \frac{\pi(0.001)^2}{4}$$

$A = 7.854 \times 10^{-7}$

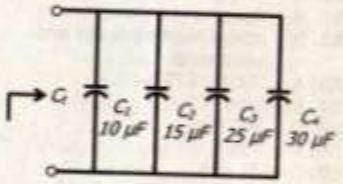
$R = \rho\frac{L}{A}$

$$L = \frac{RA}{\rho} = \frac{4(7.854 \times 10^{-7})}{2.8 \times 10^{-8}}$$

$L = 112.2\ m$

37. B. Reamer
38. C. 80 μF

Solution:



$C_t = C_1 + C_2 + C_3 + C_4$

$C_t = 10+15+25+30$

$C_t = 80\ \mu F$

39. B. Electroplating
40. A. 40,000 CM

Solution:

$$d = 0.20\ \text{in} \times \frac{1000\ \text{mils}}{1\ \text{in}}$$

$d = 200$ mils

$A = d^2 = (200)^2$

$A = 40{,}000$ CM

41. B. full line voltage is applied at starting
42. C. inductance
43. A. increased
44. C. electrolytic capacitor
45. B. insulate the coil
46. A. 14.14 A

Solution:

$$I_{rms} = \frac{I_m}{\sqrt{2}}$$

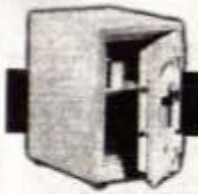
$$I_m = \sqrt{2}(I_{rms}) = \sqrt{2}(10)$$

$$I_m = 14.14 \text{ A}$$

47. B. Series field current
48. B. fuse
49. D. Ceiling fan outlet
50. A. voltage
51. B. Cover
52. B. where location is dry and ventilated
53. A. 300%, 175%
54. A. type FC
55. D. 300 mm
56. B. 300 V
57. C. 76 mm
58. B. MV
59. A. 75 mm
60. B. 20 A
61. C. 38 mm
62. C. 125
63. C. Switchboard
64. D. Portable appliance rated not more than 1,200 volt-amperes
65. B. 1,500 mm
66. A. 10 mm
67. B. 300%
68. B. 125%
69. A. the middle
70. D. Use a hack saw and ream the ends
71. D. all of these
72. C. 300 mm
73. A. type SNM cable
74. B. 140
75. C. Insulating end
76. D. 900 mm
77. D. Flat conductor cable
78. C. weatherproof
79. C. Non-metallic extension
80. B. It is easier to skin off the insulation
81. C. 2.16
82. C. 35,000
83. B. 6.4 mm
84. B. 50 mm
85. D. 700%
86. D. Wireways
87. D. 125%
88. A. three, one in each phase
89. C. 48 devices
90. A. 3,000 mm
91. A. 300 mm
92. C. 100 mm
93. D. 500,000 ohms
94. D. 60 A
95. C. 20 mm
96. B. 25
97. D. single phasing protection
98. D. 1,500 mm
99. A. 8
100. A. 24 mm

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed



Question Bank 17

Part 1: Technical Subject

1. A potentiometer is used to control the _____ of the circuit.

A. current
B. resistance
C. voltage
D. all of these

RME Board Exam

2. A registered master electrician's field of practice includes

A. maintenance and repair of electrical equipment
B. manufacture of electrical equipment
C. sale and distribution of electrical equipment
D. supervision of operation and maintenance of electrical equipment

3. Which of the following losses in dc machines vary with the load?

A. Stray power losses
B. Core losses
C. Copper losses
D. Mechanical losses

4. Under RA 7920, the Board of Electrical Engineering (BEE) is composed of how many examiners?

A. 5
B. 2
C. 3
D. 4

5. Two 100-V incandescent lamps rated 60 W and 200 W are connected in series across a 200-V supply. What current will flow through each lamp?

A. 0.84 A
B. 0.92 A
C. 0.72 A
D. 0.68 A

RME Board Exam

6. The electrician tapered reamer is used for

A. reaming the holes in bushings
B. reaming the ends of rigid conduit after it is cut
C. reaming the threads on couplings
D. making holes in panel boxes

7. Basically a transistor is equivalent to _____.

A. two diodes connected back to back
B. a diode in series with a resistor
C. a capacitor in parallel with an inductor
D. a series resistor and inductor

8. Which of the following does NOT affect the inductance of a coil?

A. number of turns
B. current flowing through the coil
C. distance between turns
D. shape of the coil

RME Board Exam

9. In a squirrel cage induction motor, which component is NOT a part of the motor?

A. Stator
B. Slip rings
C. Fan blades
D. Rotor

10. How can a bad armature winding be repaired temporarily?

A. By rewinding the bad segment
B. By cutting and removing out the bad segment
C. By removing the ends, insulating and bridging the bars
D. It cannot be done

11. In order to be able to calculate the amount of current through a resistor by Ohm's law, it is necessary for that resistor to be what type?

A. Linear
B. Non-linear
C. Unilateral
D. Logarithmic

RME Board Exam

12. Of the following, the poorest conductor of electricity is ___.

A. aluminum
B. silver
C. carbon
D. copper

13. Current measuring instruments must be connected ___.

A. in series with the circuit
B. in parallel with the circuit
C. in series-parallel connection
D. depending on magnitude of current to be measured

14. Resistor whose resistance value depends on the amount of light present.

A. LED
B. Varactor
C. Thermistor
D. LDR

RME Board Exam

15. If three resistors of 175 ohms, 75 ohms, and 17 ohms, respectively are connected in parallel. The combined resistance will be

A. between 175 ohms and 75 ohms
B. between 75 ohms and 17 ohms
C. less than 17 ohms
D. greater than 175 ohms

16. Electrical symbol represented by a box with letter MCC inside.

A. Motor control center
B. Motor control cabinet
C. Main control cabinet
D. Main control center

17. Which of the following is a correct color band of a 100-ohm carbon composition resistor?

A. brown, black silver
B. brown, black, red
C. brown, black, brown
D. brown, black, black

RME Board Exam

18. Where constant speed is required, the motor should be a

A. wound rotor motor
B. compound motor
C. series motor
D. shunt motor

19. The hot resistance of the filament of an incandescent lamp is higher than its cold resistance, due to _____.

A. the length of the filament has increased due to thermal expansion
B. the cross sectional area of the filament when heated increases
C. the temperature coefficient of resistance of the filament is positive
D. none of these

20. What is the VA rating of a 7920 VA machine used at continuous duty?

A. 7,920 VA
B. 6,336 VA
C. 5,148 VA
D. 9,900 VA

RME Board Exam

21. The following are included in the specific powers, functions, duties and responsibilities of the Board of Electrical Engineering, EXCEPT

A. Issue subpoena duces tecum, to secure the attendance of respondents or witnesses or the production of documents relative to the investigation conducted by the Board.
B. Coordinate with the Commission and the Department of Education Culture and Sports (DECS) in prescribing, amending and or revising the courses
C. Supervise and regulate the practice of electrical engineering in the Philippines.
D. None of these

22. An open coil has

A. infinite resistance and inductance
B. zero resistance and inductance
C. zero resistance and infinite inductance
D. infinite resistance and zero inductance

RME Board Exam

23. According to Kirchhoff's Law, the sum of the currents entering a point in the circuit is equal to the

A. sum of the voltage around the loop
B. sum of the applied voltages
C. sum of the currents leaving that point
D. sum of the impedances in the circuit

24. When using any electrical instruments to test or troubleshoot an electrical circuit, an electrician should consider first ___.

A. the safety usage of the instrument
B. the background of the problem he is dealing with
C. his personal safety before anything else
D. none of these

RME Board Exam

25. The minimum number of wattmeters necessary to measure the power in the load of a balanced 3-phase, 4-wire system is

A. 3
B. 2
C. 4
D. 1

RME Board Exam

26. A VTVM is more reliable in measuring voltages across low impedance as compared to a multitester because

A. its sensitivity is high
B. it offers high input impedance
C. it does not alter the measured voltage
D. all of these

27. A measure of the lumen output per watt input produced by the lamp.

A. Lux
B. Efficacy
C. Coefficient of utilization
D. Quality factor

28. How many amperes will a 200 A fuse hold to allow a motor to start and run (rule of thumb)?

A. 400 A
B. 600 A
C. 800 A
D. 1,000 A

29. How do you call a small variable shunt connected across the series field coils to permit adjustment of the degree of compounding?

A. Potentiometer
B. Diverter
C. Rheostat
D. Variac

30. Carbon resistors can be obtained with a power rating from ____.

A. 1/8 to 2 W
B. 1/4 to 2 W
C. 1/2 to 3 W
D. 1 to 3 W

31. A rheostat is a device that regulates the strength of an electric current by ____.

A. increasing the magnetic field in the circuit
B. varying the voltage in the circuit
C. varying the resistance in the circuit
D. varying the current in the circuit

RME Board Exam

32. Transformers are rated in

A. kWH
B. kVA
C. kW
D. kV

33. Commercially used in insulating magnet wire due to lowest in cost and best in space factor.

A. Rubber
B. Askarel
C. Polyvinyl chloride
D. Enamel

RME Board Exam

34. Electrolyte of a storage battery is formed by adding

A. water to sulphuric acid
B. sulphuric acid to water
C. hydrochloric acid to water
D. water to hydrochloric acid

35. The terminal voltage of a battery falls from 12 V to 10 V when a 10-ohm resistor is connected across its terminals. What is the internal resistance of the battery?

A. 1.5 Ω
B. 2.0 Ω
C. 1.0 Ω
D. 0.75 Ω

36. Squeezing the turns of a coil together will __ its inductance.

A. increase
B. decrease
C. either A or B
D. not affect

37. Alternating current can be changed to direct current using a device called __.

A. inverter
B. synchronizer
C. rectifier
D. amplifier

RME Board Exam

38. The most effective method of starting a large squirrel cage motor is by the use of

A. transformer reduced voltage method
B. star-delta switching
C. dropping resistors
D. partial winding method

39. Which of the following expressions correctly states Ohm's law?

A. Amps equals volts times resistance
B. Resistance equals volts divided by amps
C. Volts equals amps divided by resistance
D. All the above are correct

40. The terminal side of the capacitor that is banded with a dark line around it is the

A. base
B. gate
C. anode
D. cathode

RME Board Exam

41. The internal resistance of a discharge battery

A. is less
B. remains the same
C. is more
D. is negative

42. Which of the following method is used to test or troubleshoot a capacitor?

A. Resistance measurement
B. Spark test
C. Bridging
D. All of these

43. Split phase motors are all noisy because they vibrate at a frequency _____ the operating frequency.

A. equal to
B. twice
C. thrice
D. less than

RME Board Exam

44. A 50-kVA transformer has a primary voltage of 6600 volts and a secondary voltage of 250 volts. It has 52 secondary turns. Find the number of primary turns.

A. 1337 turns
B. 1373 turns
C. 1713 turns
D. 1733 turns

45. A 2 μF capacitor has a reactance of 1500 ohms. What is the frequency of the ac source?

A. 53 Hz
B. 47 Hz
C. 50 Hz
D. 60 Hz

RME Board Exam

46. The self-starter in cars draws current

A. lowest
B. equal
C. highest
D. zero

47. According to Ohm's law, current is directly proportional to _____.

A. temperature
B. resistance
C. voltage
D. charge

RME Board Exam

48. What is the overall efficiency of a 5-hp that draws 20 A at 240 volts?

A. 90 %
B. 87.8 %
C. 80 %
D. 77.7 %

49. A hot smoky device is often a sign of _____.

A. a good circuit
B. a short circuit
C. a ground
D. all of these

50. Static electricity is often produced by _____.

A. pressure
B. heat
C. magnetism
D. friction

Part 2: Philippine Electrical Code

51. Where the voltage between conductors does not exceed 300 V and the roof has a slope of not less than 100 mm in 300 mm, a reduction to _____ of the distance of the service conductors from the roof surface shall be permitted.

A. 900 mm
B. 1,000 mm
C. 1,100 mm
D. 800 mm

52. A wall screen or fence less than _____ in height shall NOT be considered as a preventing access unless it has other features that provide a degree of isolation equivalent to the height of the fence in question.

A. 2,000 mm
B. 2,500 mm
C. 3,000 mm
D. 1,500 mm

RME Board Exam

53. Branch circuit conductors supplying a single phase motor shall have an ampacity NOT exceeding

A. 100 %
B. 125 %
C. 200 %
D. 115 %

54. Pits within _____ horizontally from the flammable vapor source, shall be considered a hazardous location under Class I, Division 1 location.

A. 6,000 mm
B. 5,000 mm
C. 7,600 mm
D. 4,600 mm

55. Type TW conductor is a __ type.

A. moisture and heat resistant
B. moisture and heat resistant thermoplastic
C. moisture resistant and thermoplastic
D. heat resistant and thermoplastic

RME Board Exam

56. Flat conductor cables maybe installed in any of the following location EXCEPT one. Which one is this?

A. On hard concrete flooring
B. In wet locations
C. For branch circuits
D. In damp locations

57. Where contactors are used as the disconnecting means for fuses, an individually externally operable switch, such as tumbler switch for the control of each contactor shall be located at a distance of not more than ___ from the contactor.

A. 1,500 mm
B. 1,800 mm
C. 2,000 mm
D. 2,400 mm

RME Board Exam

58. For voltages above 600 V, the minimum insulation resistance shall be _____.

A. 1,500,000 ohms per kilovolt rating
B. 500,000 ohms per kilovolt rating
C. 1,000,000 ohms per kilovolt rating
D. 2,000,000 ohms per kilovolt rating

59. Operation of loads and for intervals of time, both of which maybe subject to wide variations.

A. Periodic duty
B. Intermittent duty
C. Continuous duty
D. Varying duty

60. For equipment rated 1200 A and over, 1,900 mm wide containing overcurrent devices and control devices at least one entrance of NOT less than _____ wide and ___ high shall be provided at each end.

A. 600 mm, 2,000 mm
B. 600 mm, 2,500 mm
C. 800 mm, 2,000 mm
D. 800 mm, 2,500 mm

RME Board Exam

61. A device actuated by the operation of some devices with which it is directly associated, to govern succeeding operations of some or allied devices.

A. Selsyn
B. Automatic
C. Interlock
D. Relay

62. The minimum distance of open conductors of not over 600 V nominal and above finished grade, side walks or from any flatform or projection which they might be reached where the supply conductors are limited to 150 V to ground and accessible to pedestrians only.

A. 3,100 mm
B. 3,700 mm
C. 4,600 mm
D. 5,500 mm

RME Board Exam

63. Concealed knob and tube wiring maybe used in which of the following locations?

A. Theaters
B. Hazardous locations
C. Commercial garages
D. Hollow spaces of walls and ceilings

64. No electrical installation, alteration and or addition shall be connected or r-connected to any power supply or any other sources of electrical energy without

A. an electrical permit
B. an application for inspection
C. certificate of payment
D. certificate of final inspection

65. Batteries and direct current circuits shall be physically separated by a t least a ___ gap or other approved means from circuits of a different power source.

A. 12 mm
B. 15 mm
C. 20 mm
D. 10 mm

RME Board Exam

66. Four (4) 3-phase motor are supplied by one common feeder cable. The full load current ratings of the motors are 10 A, 20 A, 30 A and 40 A. what should be the minimum ampacity of the feeder cable?

A. 110 A
B. 125 A
C. 150 A
D. 100 A

67. The branches of the emergency system in a hospital shall be installed and connected to the alternate power source so that all functions shall automatically restored to operation within ___ after interruption of the normal source.

A. 5 seconds
B. 3 seconds
C. 10 seconds
D. 8 seconds

RME Board Exam

68. Lead wires furnished as part of a weather proof lampholder shall be stranded and rubber covered and approved for such service, shall not be less than what wire size?

A. 3.5 mm^2
B. 2.0 mm^2
C. 0.75 mm^2
D. 5.5 mm^2

69. At least one receptacle outlet shall be installed directly above a show window for each ___ linear meter length or a major fraction thereof.

A. three
B. one
C. two
D. four

70. An insulated conductor intended for use as a grounded conductor where contained within a flexible cord shall be identified by a white or a _____ outer finish color.

A. green
B. natural gray
C. yellow
D. green with yellow stripes

RME Board Exam

71. Which of the following wiring cables is most suitable for shipboard installations?

A. Flat cable assembly
B. Shielded non-metallic sheathed cable
C. Metal clad cable
D. Armored cable

72. All exposed incandescent lamps in dressing rooms, where less than _____ from the floor, shall be equipped with open end guards riveted to the outlet or otherwise locked in place.

A. 2,500 mm
B. 2,400 mm
C. 3,000 mm
D. 2,800 mm

73. Specifications written on the plans or submitted on separate standard size sheets shall show

A. types of wiring, i.e. service entrance, branch circuits, feeders, etc
B. nature of electrical service, i.e. no. of phase, voltage, frequency, etc
C. special equipment to be installed indicating ratings
D. all of these

74. The underground service conductors between the street main, including any risers at pole or other structure or from transformers and the first point of connection to the service entrance conductors.

A. Service drop
B. Service cable
C. Service lateral
D. Service neck

RME Board Exam

75. What is the maximum allowable voltage drop from the main circuit breaker to the farthest lamp load?

A. 10 percent
B. 5 percent
C. 2 percent
D. 3 percent

76. For 101 A to 200 A circuits, the minimum insulation required shall be _____.

A. 50,000 ohms
B. 100,000 ohms
C. 250,000 ohms
D. 75,000 ohms

77. For direct current motors, the multiplying factor to be used in selecting the size of overcurrent device using an inverse time CB shall be ___ percent of its full load current.

A. 125
B. 150
C. 175
D. 200

RME Board Exam

78. Flexible cords and cables shall be used for the following applications, EXCEPT

A. elevator wirings
B. pendants
C. fixed wirings
D. wiring of fixtures

79. A branch circuit that supplies only one utilization equipment.

A. Individual branch circuit
B. Special purpose branch circuit
C. Appliance branch circuit
D. Single branch circuit

80. In halls, corridors, closets and stairways of any occupancy EXCEPT one family dwelling unit, a general lighting load of ___ VA/m^2 shall be considered.

A. 2
B. 3
C. 4
D. 5

RME Board Exam

81. In starting a large dc motor, a starter is primarily used in order to

A. save electrical power
B. limit the starting current
C. add more power
D. reduce the voltage drop

82. The rating of any cord and plug connected utilization equipment shall NOT exceed _____ of the branch circuit rating.

A. 100 %
B. 80 %
C. 125 %
D. 90 %

83. Which of the following is NOT a standard kVA rating of a single-phase transformer?

A. 175
B. 150
C. 167
D. 100

RME Board Exam

84. The frequency of the output voltage of an ac generator depends on which of the following?

A. Excitation circuit
B. Load
C. Power factor
D. Speed

85. An appliance which is fixed in one place to another in normal use.

A. Fixed appliance
B. Stationary appliance
C. Portable appliance
D. None of these

RME Board Exam

86. Busways shall NOT be installed in the following EXCEPT

A. where there are corrosive fumes
B. where they are located in the open and are visible
C. where they are subject severe physical damage
D. where they are in damp locations

87. Hazardous locations in which easily ignitable fibers are stored and handled.

A. Class III, Division 2
B. Class III, Division 1
C. Class II, Division 2
D. Class II, Division 1

88. If there are no overcurrent protective device rated 30 A or less with neutral connection, this panelboard is classified as a ___.

A. lighting panelboard
B. appliance panelboard
C. power panelboard
D. back-up panelboard

89. The maximum load consumed or produced by a unit or group of units in a stated period of time.

A. Peak load
B. Average load
C. Connected load
D. Continuous load

90. In commercial garages, repair and storage areas, the entire area up to a level of _____ above the floor shall be considered to be Class I, Division 2 hazardous location.

A. 400 mm
B. 500 mm
C. 460 mm
D. 450 mm

RME Board Exam

91. In this new Electrical Engineering Law, what is the official designation of "master electrician?

A. Master Electrician
B. Registered Electrician
C. Licensed Electrician
D. Registered Master Electrician

92. A transformer of the multiple winding type with the primary and secondary winding physically separated which inductively couples its secondary winding to the grounded feeder system that energize its primary winding.

A. Distribution transformer
B. Grounding transformer
C. Instrument transformer
D. Isolation transformer

RME Board Exam

93. In judging the suitability of an electrical equipment for proper mounting, the following factors should be considered, one of which is the LEAST important. Which one is this?

A. Type of enclosure
B. Wire bending space
C. Electrical insulation
D. Mechanical strength

94. Thermal barrier shall be required if the space between the resistors and reactors and any combustible material is less than

A. 600 mm
B. 400 mm
C. 500 mm
D. 300 mm

95. The allowable ampacities of conductors rated from 0 to 2,000 volts, 60 °C to 90 °C and not more than three of them in raceway, cable or earth is based on an ambient temperature of

A. 35 °C
B. 40 °C
C. 25 °C
D. 30 °C

RME Board Exam

96. According to the Code the minimum insulation level for neutral conductor of residential installation which have solidly grounded system shall be ___.

A. 300 V
B. 600 V
C. 750 V
D. 1,000 V

97. The ampacity of conductors that connect a capacitor to the terminals of a motor circuit conductors shall not be less than ___ the ampacity of the motor circuit conductors and in no case less than 135 % of the rated capacitor current.

A. one-third
B. one-fourth
C. one-half
D. one-fifth

98. Conductors passing over roof surface, a vertical clearance of _____ shall be maintained.

A. 2,500 mm
B. 1,500 mm
C. 2,000 mm
D. 3,000 mm

99. The point of connection between the facilities of the serving utility and the premises wiring.

A. Load center
B. Service head
C. Junction box
D. Service point

100. The current in amperes a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

A. Ampacity
B. Capacitivity
C. Rating
D. Amperage

< Exam ends here >

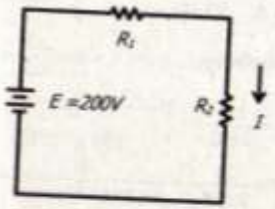
Proceed to the next page for the answer key and solutions!

Question Bank 17

ANSWER KEY

1. C. voltage
2. A. maintenance and repair of electrical equipment
3. C. Copper losses
4. C. 3
5. B. 0.92 A

Solution:



$$R = \frac{E^2}{P}$$

$$R_1 = \frac{100^2}{60} = 166.67\ \Omega$$

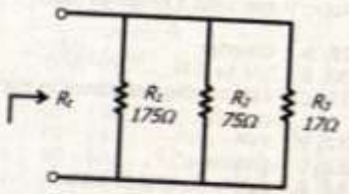
$$R_2 = \frac{100^2}{200} = 50\ \Omega$$

$$I = \frac{E}{R_1 + R_2} = \frac{200}{166.67 + 50}$$

$I = 0.923$ A

6. B. reaming the ends of rigid conduit after it is cut
7. A. two diodes connected back to back
8. B. current flowing through the coil
9. B. Slip rings
10. C. By removing the ends, insulating and bridging the bars
11. A. Linear
12. C. carbon
13. A. in series with the circuit
14. D. LDR
15. C. less than 17 ohms

Solution:



$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_t} = \frac{1}{175} + \frac{1}{75} + \frac{1}{17}$$

$R_t = 12.84\ \Omega$

16. A. Motor control center
17. C. brown, black, brown
18. D. shunt motor
19. C. the temperature coefficient of resistance of the filament is positive
20. D. 9,900 VA

Solution:

Note: The rating shall be increased by 25% for machines used at continuous duty.

Rating = 1.25(7920)

Rating = 9,900 VA

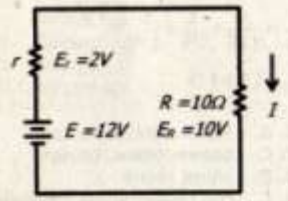
21. D. None of these

22. D. infinite resistance and zero inductance
23. C. sum of the currents leaving that point
24. C. his personal safety before anything else
25. D. 1
26. D. all of these
27. B. Efficacy
28. B. 600 A

Note: It can hold 3 times as much

29. B. Diverter
30. B. 1/4 to 2 W
31. C. varying the resistance in the circuit
32. B. kVA
33. D. Enamel
34. B. sulphuric acid to water
35. B. 2 Ω

Solution:



$$I = \frac{E_R}{R} = \frac{10}{10} = 1\ A$$

$$r = \frac{E_r}{I} = \frac{2}{1} = 2\ \Omega$$

36. A. increase
37. C. rectifier
38. A. transformer reduced voltage method
39. B. Resistance equals volts divided by amps
40. D. cathode
41. C. is more
42. D. All of these
43. B. twice
44. B. 1373 turns

Solution:

$$\frac{E_1}{E_2} = \frac{N_1}{N_2}$$

$$N_1 = N_2\left(\frac{E_1}{E_2}\right) = 52\left(\frac{6600}{250}\right)$$

$$N_1 = 1372.8 \text{ turns}$$

45. A. 53 Hz

Solution:

$$X_C = \frac{1}{2\pi fC}$$

$$f = \frac{1}{2\pi C X_C} = \frac{1}{2\pi(2x10^{-6})(1500)}$$

$$f = 53\ Hz$$

46. C. highest
47. C. voltage
48. D. 77.7%

Solution:

$$P_{in} = EI = (240)(20)$$

$$P_{in} = 4800\ W$$

$$\eta = \frac{P_{out}}{P_{in}} x100\% = \frac{5(746)}{4800} x100\%$$

$$\eta = 77.7\%$$

49. B. a short circuit
50. D. friction
51. B. 1,000 mm
52. B. 2,500 mm
53. B. 125%
54. C. 7,600 mm
55. C. moisture resistant and thermoplastic

56. B. In wet locations
57. B. 1,800 mm
58. C. 1,000,000 ohms per kilovolt rating
59. D. Varying duty
60. A. 600 mm, 2000 mm
61. C. Interlock
62. A. 3,100 mm
63. D. Hollow spaces of walls and ceilings
64. D. certificate of final inspection
65. A. 12 mm
66. A. 110 A

Solution:

$$\text{Load} = \sum \text{load} + 25\% \text{ of largest load}$$

$$\text{Load} = 10+20+30++40$$

$$+(0.25 \times 40)$$

$$\text{Load} = 110\ A$$

67. C. 10 seconds
68. B. 2.0 mm^2
69. A. three
70. B. natural gray
71. D. Armored cable
72. B. 2,400 mm
73. D. all of these
74. C. Service lateral
75. B. 5 percent
76. A. 50,000 ohms
77. B. 150
78. C. fixed wirings
79. A. Individual branch circuits
80. C. 4
81. B. limit the starting current
82. B. 80%
83. A. 175
84. D. Speed
85. B. Stationary appliance
86. B. where they are located in the open and are visible
87. A. Class III, Division 2
88. C. power panelboard
89. A. Peak load
90. C. 460 mm
91. D. Registered Master Electrician
92. D. Isolation transformer
93. C. Electrical insulation
94. D. 300 mm
95. D. 30 °C
96. A. 300 V
97. A. one-third
98. A. 2,500 mm
99. D. Service point
100. A. Ampacity

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Notes

Notes

Question Bank 18

Part 1: Technical Subject

1. On alternators, which of the following tests is used to determine the synchronous impedance of the alternator?

   A. No load test
   B. Short circuit test
   C. Both A and B
   D. Neither A or B

2. Unit of apparent power.

   A. Watts
   B. Volt-amperes
   C. Horsepower
   D. Kilowatt-hours

RME Board Exam

3. The device includes any switch or device used to start and stop the motor.

   A. Rheostat
   B. Thermostat
   C. Controller
   D. Relay

RME Board Exam

4. Ten identical resistors are in parallel. These resistors are connected across a 220-V supply. If the total current drawn is 15 A, calculate the value of each resistor.

   A. 146.67 ohms
   B. 156.50 ohms
   C. 130.25 ohms
   D. 125.43 ohms

5. Which of the following is the proper remedy when the liquid level in a lead acid cell is low?

   A. Empty out the cell and replace the entire solution
   B. Do nothing till plates become fully exposed
   C. Add only distilled water
   D. Add weak acid solution

RME Board Exam

6. Breaking capacity of a circuit breaker is expressed in

   A. MW
   B. Amp
   C. Volts
   D. MVA

7. Unit of electric charge.

   A. Ohm
   B. Volt
   C. Coulomb
   D. Farad

8. If a load is suddenly released from a shunt motor, it would

   A. stop
   B. speed up
   C. slow down
   D. continue to operate at the same speed

9. If the resistance and reactance of a given circuit are equal in magnitude, the circuit power factor is

   A. 1.0
   B. 0.866
   C. 0.707
   D. 0.8

RME Board Exam

10. Voltage is measured in

A. watts
B. amperes
C. ohms
D. volts

11. Another name for a plugging switch.

A. Centrifugal switch
B. Zero-speed switch
C. Break-make switch
D. Rocker switch

12. Which of the following dc motors has the best speed regulation?

A. Series motors
B. Shunt motors
C. Cumulative compound motors
D. Differential compound motors

RME Board Exam

13. A residential house has a lighting load of 1000 W and a small appliance load of 2000 W. If they are used at the same time, what will be the monthly bill at an energy cost of P 0.40 per kilowatt-hour?

A. P 28.00
B. P 0.40
C. P 864.00
D. P 400.00

14. Which of the following NOT one of the senses used by service technicians in troubleshooting faulty component in a circuit?

A. Sight
B. Taste
C. Touch
D. Smell

15. Which of the following causes extreme sparking at the brushes?

A. Worn bearings
B. Loose coupling
C. Dirt on the commutator segments
D. Shaft misalignment

RME Board Exam

16. A 25-hp engine drives a dc generator, if the generator has an efficiency of 84 %, how much does it deliver?

A. 20 hp
B. 24 hp
C. 21 hp
D. 25 hp

17. The value of the voltage that is indicated on an ac voltmeter is called _____.

A. effective value
B. maximum value
C. average value
D. useful value

18. Capacitors are used in electric circuits to _____.

A. store energy
B. introduce a voltage drop
C. produce a low opposition path to high frequencies
D. all of these

RME Board Exam

19. When the energy cost for a motor is P 4.62 at 3 cents per kilowatthour, the energy consumed is

A. 762 kWh
B. 154 kWh
C. 13.86 kWh
D. 1386 kWh

20. A nameplate data that will tell whether or not the motor is allowed to develop more than its rated nameplate horsepower without causing deterioration of its insulation.

A. Service factor
B. Reactive factor
C. Power factor
D. Use factor

21. An active element in a circuit is the one which _____.

A. receives the energy
B. delivers the energy
C. stores the energy
D. facilitates the transmission of energy

22. A synchronous motor is generally used in applications requiring _____.

A. variable speed
B. frequent stopping
C. occasional starting
D. heavy loads at starting

23. The resistance of a human body is _____value.

A. a constant
B. not a constant
C. a fictitious
D. a negative

RME Board Exam

24. Three 30-ohm resistances are connected in delta across a 208 volt, 3-phase circuit. The line current, in amperes is approximately

A. 6.93
B. 12
C. 120
D. 13.86

RME Board Exam

25. Induction type single-phase energy meter is

A. an ampere-hour meter
B. a wattmeter
C. a true watt-hour meter
D. none of these

26. Which of the following machines is commonly used to drive lifting machines?

A. Squirrel cage induction motor
B. dc series motor
C. Repulsion type induction motor
D. dc compound motor

27. Brushes are made from ____.

A. lead
B. carbon
C. silver
D. copper

RME Board Exam

28. Wound rotor motors are usually started by the use of what type of starter?

A. Primary resistance starter
B. Autotransformer type
C. Wye-delta starter
D. Secondary resistance starter

29. A 230-V, 60 Hz motor is connected to a 230-V, 50 Hz electrical system. What happens?

A. The appliance draws more current
B. The appliance will not operate
C. The appliance draws lesser current
D. The appliance draws the same current

30. Rate of flow of electricity.

A. Energy
B. Voltage
C. Power
D. Current

RME Board Exam

31. The approximate power factor of an electric flat iron is approximately equal to

A. unity
B. 0.9
C. 0.8
D. zero

32. Cooling methods used by small transformers rated below 5 kVA.

A. Forced air-cooled
B. Forced water-cooled
C. Oil-cooled
D. Natural air-cooled

RME Board Exam

33. If the commutator is dirty, clean using

A. sandpaper
B. emery
C. cloth
D. oil

34. For two alternators operating in parallel, some of the load of the first alternator is transferred to the second alternator by ___.

A. increasing the power input of the second alternator
B. decreasing the excitation of the second alternator while increasing the excitation of the first alternator
C. decreasing the power input of the second alternator while increasing its excitation
D. none of these

35. The torque of an induction motor

A. increases with a decrease in supply voltage
B. increases with an increase in supply voltage
C. either A or B
D. is constant

RME Board Exam

36. A coulomb is

A. energy
B. static charge
C. unit of power
D. meter movement

37. A combination of the arc discharge characteristics of a fluorescent lamp and the compact focusable shape of an incandescent lamp.

A. Sodium lamp
B. Quartz lamp
C. Mercury lamp
D. Tungsten halogen lamp

38. Which of the following conditions does NOT have to be meet by alternators working in parallel?

A. Terminal voltage of each machine must be the same
B. Machines must have the same phase rotation
C. Alternators must operate at the same frequency
D. The machines must have the equal kVA ratings

RME Board Exam

39. The term"60 watt" is mostly commonly used in identifying a

A. fuse
B. switch
C. cable
D. lamp

40. Equalizer rings are needed when paralleling which type of generators?

A. Series
B. Shunt
C. Synchronous
D. Compound

RME Board Exam

41. Are devices that serve to open or closed the electric circuits.

A. Plugs
B. Receptacles
C. Outlets
D. Switches

42. If the series field of a compound motor is connected in series with the supply terminals, the compound motor is particularly called _____.

A. long shunt compound motor
B. short shunt compound motor
C. cumulative compound motor
D. differential compound motor

RME Board Exam

43. The common use for autotransformers in electrical power work is as

A. current-limiting reactor
B. instrument current transformer
C. starting compensators for motor
D. insulating transformer

44. If the speed of an alternator increases, the frequency of the voltage generated will _____.

A. remain unaffected
B. increase also
C. decrease
D. any of these

45. An ideal current source has _____ resistance.

A. negligible
B. infinite
C. definite
D. any of these

RME Board Exam

46. A single-phase motor is taking 20 A from a 400-V supply at unity pf. What is the power taken?

A. 6,000 W
B. 8,000 W
C. 4,000 W
D. None of these

47. A 12-V car battery is composed of six _____ cells in series.

A. carbon-zinc
B. nickel-iron
C. zinc-chloride
D. lead-acid

48. An electrician may use a multi-tester to

A. measure the amount of voltage and illumination
B. measure the speed of an electric motor
C. measure power, resistance, illumination and current
D. measure resistance, voltage and current

RME Board Exam

49. The smallest whole unit of an element like uranium is

A. molecule
B. atom
C. ion
D. electron

RME Board Exam

50. Which one is a semi-conductor?

A. Phosphorus
B. Diamond
C. Gallium arsenide
D. Arsenic

Part 2: Philippine Electrical Code

51. Down conductors on a heavy duty smoke or vent stacks shall be protected from physical damage or displacement for a distance of NOT less than ___ above finish grade.

A. 2,000 mm
B. 2,300 mm
C. 2,500 mm
D. 2,400 mm

52. The OCPD for arc welders with transformers shall NOT exceed _____ percent of the primary full load current.

A. 200
B. 300
C. 250
D. 400

RME Board Exam

53. The underground service conductors between the street main, including any risers at the pole or other structure or from transformer and the first point of connection to the service entrance conductors in a terminal box. The point of connection is considered to be the point of entrance of the service conductors into the building.

A. Service entry
B. Service raceway
C. Service lateral
D. Service drop

54. A warning sign shall be posted where ___ voltage is available in service equipment.

A. high
B. low
C. both A and B
D. neither A or B

55. The ampacity of conductors in non-metallic sheathed cable shall be used at ___.

A. 75 °C
B. 60 °C
C. 90 °C
D. 80 °C

RME Board Exam

56. A lighting fixture shall be wired with a flexible lighting cord with a cross sectional area of NOT less than a certain minimum area. Which is this?

A. 0.75 mm^2
B. 2.00 mm^2
C. 0.50 mm^2
D. 1.25 mm^2

57. Service conductors shall not be run in such a manner as to block _____ to buildings.

A. openings
B. driveways
C. both A and B
D. neither A or B

58. Conductors supplying a group of motor-generator arc welders are sized at ___ of the third largest welder plus the percentage of the other welders.

A. 65 %
B. 85 %
C. 70 %
D. 75 %

59. Continuous duty loads shall be figured at _____ percent for branch circuits.

A. 100
B. 115
C. 120
D. 125

60. A 3.5 mm^2 TW copper conductor has an ampacity equal to _____.

A. 20 A
B. 15 A
C. 30 A
D. 12 A

61. What is the lowest standard size of disconnect?

A. 20 A
B. 30 A
C. 60 A
D. 15 A

62. Grounding conductor installed over lightning cables for the purpose of interconnecting the system ground electrodes and providing lightning protection for the cables.

A. Anchor
B. Counterpoise
C. Elevation rod
D. Air terminal

RME Board Exam

63. The surge arrester for services less than 1,000 volts connected by copper conductor to grounding electrode conductor or the equivalent grounding terminal shall NOT be smaller than _____.

A. 8.0 mm^2
B. 5.5 mm^2
C. 3.5 mm^2
D. 2.0 mm^2

64. There shall be no more than _____ disconnects per service grouped in any location.

A. four
B. five
C. six
D. three

65. When a circuit breaker handles are operated vertically rather than horizontally, the "up" position of the handle shall be the ___ position.

A. off
B. on
C. neutral
D. any of these

66. Metal clad cable (MC) can be used in systems of 600 V or ___.

A. less
B. more
C. both A and B
D. neither A or B

67. Each lighting and appliance branch circuit panelboard shall be protected individually on the supply side by not more than two main CBs or two sets of fuses having a combined rating not ___ than that of the panelboard.

A. less
B. greater
C. both A and B
D. neither A or B

68. The PEC permits _____ 90° bends in a single conduit run.

A. one
B. two
C. three
D. four

69. For circuits supplying loads consisting of motor operated utilization equipment that is fastened in place and that has a motor larger than 0.125 hp in combination with other loads, the total computed load shall be base on ___ percent of the largest motor load plus the sum of the other loads.

A. 100
B. 125
C. 150
D. 130

70. Conductors used in lightning protection system shall have no bend forming an included angle of less than ___.

A. 60°
B. 75°
C. 50°
D. 90°

RME Board Exam

71. Which of the following statements on wiring in commercial garages and shops is NOT correct?

A. The ground conductor shall be connected to the ground terminal of the utilization equipment
B. Receptacles, attachment plugs and similar devices shall be of the polarized type
C. Lamps and lamp holders for fixed lighting that are located above vehicles shall be installed not lower than 2,500 mm
D. Battery chargers and batteries being charged shall not be located in location classified as hazardous

72. Circuits with a nominal voltage of 600 V or less in rigid metal or non-metallic conduit and placed under a minimum of 100 mm thick concrete exterior slab with no vehicular traffic shall have a minimum cover distance of __.

A. 200 mm
B. 300 mm
C. 400 mm
D. 100 mm

RME Board Exam

73. The electrical drawing of a single family dwelling shall show the following EXCEPT

A. floor plan
B. computation of illumination
C. location plan
D. one-line diagram

74. Enclosures for overcurrent devices in damp or wet locations shall be identified for use in such locations and shall be mounted so there is at least ____ air space between the enclosure and the wall.

A. 10 mm
B. 12 mm
C. 15 mm
D. 20 mm

75. Where buildings exceed three stories or 15 meters in height, overhead lines shall be arranged, where practicable, so that a clear space of at least ___ wide will be left to facilitate title raising of ladders when necessary for fire fighting.

A. 2,000 mm
B. 1,800 mm
C. 1,900 mm
D. 1,500 mm

RME Board Exam

76. AC equipment on board watercraft shall operate satisfactorily at the following voltage limitations. Which one is correct?

A. Minus 5% to plus 10%
B. Minus 6% to plus 10%
C. Minus 10% to plus 6%
D. Minus 10% to plus 10%

77. Emergency power panel conductors supplying a building are tapped on ____.

A. the line side of the service
B. any subfed panel
C. any circuit breaker main
D. any feeder circuit

78. Overcurrent protection devices in emergency systems shall ____.

A. be coordinated
B. clear in steps
C. not trip the main device
D. all of the above

79. MC cable insulation shall have a maximum operating temperature of not less than __.

A. 75 °C
B. 80 °C
C. 90 °C
D. 60 °C

80. For the purpose of lightning protection, a smoke or vent stack is classified as heavy duty if the cross sectional area of the flue is greater than ___ square meter and the height is greater than 23 meters.

A. 0.50
B. 0.32
C. 0.42
D. 0.27

81. The branch circuit load for continuous duty receptacles shall be calculated at ___ VA per receptacle.

A. 150
B. 175
C. 180
D. 200

82. Control conductors used for load management can be routed with the service entrance conductors in the same _____.

A. raceway
B. cable
C. either A or B
D. neither A or B

RME Board Exam

83. Which of the following statements on lighting fixtures NOT correct?

A. Outdoor lighting fixtures and associated equipment shall be permitted to be supported by trees
B. Metal fixtures and enclosures rated at 250 V and installed up in the ceiling shall be grounded
C. Stranded conductors shall be used in wiring a fixture supporting chain and other movable flexible parts
D. Fixtures and lighting equipment operating at over 250 V shall be grounded

84. The long time rating used to select OCPDs to protect circuits to x-ray equipment shall be __.

A. 125 %
B. 150 %
C. 175 %
D. 100 %

85. For installations to supply only limited load of a single branch circuit, the service disconnecting means shall have a rating of NOT less than _____.

A. 20 A
B. 30 A
C. 40 A
D. 15 A

86. What type letter for conductors has a trade name "moisture and heat resistant rubber"?

A. RH
B. RHW
C. XHHW
D. THW

87. Conductors from the service point to the service disconnecting means are considered service _____.

A. subpanels
B. conductors
C. both A and B
D. neither A or B

88. A 5.5 mm^2 TW copper conductor has a conductor ampacity of __.

A. 30 A
B. 40 A
C. 20 A
D. 50 A

89. On circuits of less than 1000 V, the rating of the surge arrester shall be ___ the maximum continuous phase to ground power frequency voltage available at the point of application.

A. equal to or greater than
B. not less than
C. not less than 125 % of
D. none of these

RME Board Exam

90. Open conductors passing over residential driveways and those commercial areas not subject to truck traffic where the voltage exceeds 300 V to ground shall have a vertical clearance of ___.

A. 3,700 mm
B. 4,600 mm
C. 3,100 mm
D. 5,500 mm

RME Board Exam

91. What is the radius of a solid round conductor, which is the nearest equivalent of a stranded conductor whose total area is exactly 8.0 mm^2?

A. 1.597 mm
B. 1.596 mm
C. 3.191 mm
D. 3.192 mm

92. For high impedance grounding, the system _____ conductor shall not be connected to the ground EXCEPT through the grounding impedance.

A. line
B. neutral
C. both A and B
D. neither A or B

RME Board Exam

93. Where galvanized steel conduit is used, the primary purpose of galvanizing in which one of the following?

A. It provides good electrical contact for grounding
B. It increases mechanical strength
C. It provides good surface for painting
D. It retards rusting

94. The OCPD for resistance welders shall NOT exceed _____ of the conductor's ampacity supplying the circuit.

A. 200 %
B. 250 %
C. 300 %
D. 400 %

95. The load for household electric clothes dryer in a dwelling is the larger of the nameplate rating or ___ VA.

A. 4,000
B. 5,000
C. 6,000
D. 8,000

RME Board Exam

96. Equipment to be installed shall be fully specified in the name plate EXCEPT which of the following that is considered optional?

A. Power and speed ratings
B. Name of manufacturer
C. Voltage, current, frequency
D. Date manufactured

97. The long time rating for x-ray equipment is based on an operating time of _____ minutes or longer.

A. five
B. eight
C. six
D. ten

98. Ground rod clamps shall be secured with at least ____ bolt(s) or cap screws.

A. one
B. two
C. three
D. four

RME Board Exam

99. A three-phase general purpose squirrel cage motor draws a full load current of 40 A. What is the maximum size of time delay fuses that may be used for short circuit protection?

A. 120 A
B. 80 A
C. 40 A
D. 100 A

RME Board Exam

100. Busways shall be permitted to be installed behind panels if means of access are provided and if the conditions below are met. One of them is NOT valid. Which one is this?

A. No overcurrent devices are installed on the busway other than for an individual fixture
B. The busway is so installed that the joints between sections and fitting are accessible for maintenance purposes
C. The busway is open and of the ventilator type
D. The space behind the panels is not for air handling purposes

< Exam ends here >

Proceed to the next page for the answer key and solutions!

Question Bank 18

ANSWER KEY

1. C. Both A and B
2. B. Volt-amperes
3. C. Controller
4. A. 146.67 ohms

Solution:

$$R_t = \frac{E}{I} = \frac{220}{15} = 14.667\ \Omega$$

$$R_t = \frac{R}{n}$$

$$R = R_t n = 14.667(10)$$

$$R = 146.67\ \Omega$$

5. C. Add only distilled water
6. D. MVA
7. C. Coulomb
8. D. continue to operate at the same speed
9. C. 0.707

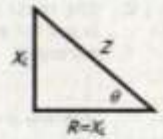
Solution:

$$\tan\theta = \frac{X_L}{R} = \frac{R}{R}$$

$$\tan\theta = 1$$

$$\theta = \tan^{-1}1$$

$$\theta = 45°$$



$$pf = \cos\theta$$

$$pf = \cos 45°$$

$$pf = 0.707$$

10. D. volts
11. B. Zero-speed switch
12. B. Shunt motors

13. C. P 864 A

Solution:

$$P = 1000 + 2000$$

$$P = 3000\ W \text{ or } 3\ kW$$

$$W = Pt$$

$$W = 3\left(30\ \text{days} \times \frac{24\ \text{hours}}{1\ \text{day}}\right)$$

$$W = 2160\ kW\text{-}hr$$

$$\text{Cost} = W \times \text{cost/kW-hr}$$

$$= 2160(P\ 0.40)$$

$$\text{Cost} = P\ 864$$

14. B. Taste
15. C. Dirt on the commutator segments
16. C. 21 hp

Solution:

$$P_{out} = \eta P_{in}$$

$$P_{out} = (0.84)(25)$$

$$P_{out} = 21\ hp$$

17. A. effective value
18. D. all of these
19. B. 154 kWh

Solution:

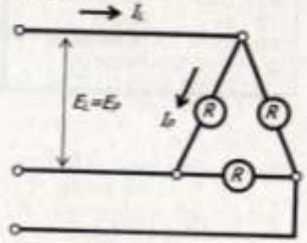
$$\text{Cost} = W \times \text{cost/kW-hr}$$

$$W = \frac{\text{Cost}}{\text{cost/kW-hr}} = \frac{P\ 4.62}{P\ 0.03}$$

$$W = 154\ kW\text{-}hr$$

20. A. Service factor
21. B. delivers the energy
22. C. occasional starting
23. B. not a constant
24. B. 12

Solution:



$$I_p = \frac{E_p}{R} = \frac{208}{30} = 6.93\ A$$

$$I_L = \sqrt{3} I_p = \sqrt{3}(6.93)$$

$$I_L = 12\ A$$

25. C. a true watt-hour meter
26. B. dc series motor
27. B. carbon
28. D. Secondary resistance starter
29. A. The appliance draws more current
30. D. Current
31. A. unity
32. D. Natural air-cooled
33. C. cloth
34. A. increasing the power input of the second alternator
35. B. increases with an increase in supply voltage
36. B. static charge
37. C. Mercury lamp
38. D. The machines must have the equal kVA ratings
39. D. lamp
40. D. Compound
41. D. Switches
42. B. short shunt compound Motor

43. C. starting compensators for motor
44. B. increase also
45. B. infinite
46. B. 8,000 W

Solution:

$$P = EIpf$$

$$P = (400)(20)(1.0)$$

$$P = 8,000\ W$$

47. D. lead-acid
48. D. measure resistance, voltage and current
49. B. atom
50. C. Gallium arsenide
51. D. 2,400 mm
52. A. 200
53. C. Service lateral
54. A. high
55. B. 60 °C
56. A. 0.75 mm^2
57. A. openings
58. B. 85%
59. D. 125
60. A. 20 A
61. B. 30 A
62. B. Counterpoise
63. D. 2.0 mm^2
64. C. six
65. B. on
66. B. more
67. B. greater
68. D. four
69. B. 125
70. D. 90°
71. C. Lamps and lamp holders for fixed lighting that are located above vehicles shall be installed not lower than 2,500 mm
72. D. 100 m
73. B. computation of illumination
74. A. 10 mm
75. C. 1,900 mm
76. A. Minus 5% to plus 10%

77. A. the line side of the service
78. D. all of the above
79. C. 90 °C
80. B. 0.32
81. C. 180
82. C. either A or B
83. A. Fixtures and lighting equipment operating at over 250 V shall be grounded
84. D. 100%
85. D. 15 A
86. B. RHW
87. B. conductors
88. A. 30 A
89. A. equal to or greater than
90. B. 4,600 mm
91. C. 3.192 mm

Solution:

$$A = \frac{\pi d^2}{4}$$

$$d = \sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4(8)}{\pi}}$$

$d = 3.192$ mm

92. B. neutral
93. D. It retards rusting
94. C. 300%
95. B. 5,000
96. D. Date of manufactured
97. A. five
98. B. two
99. B. 80 A

Solution:

For time delay fuse, the rating shall be 175% of the full load current

Rating = 1.75(40)

Rating = 70 A

Note: Since 70 A is not available from the choices, select the nearest, 80 A.

100. C. The busway is open and of the ventilator type

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Question Bank 19

Part 1: Technical Subject

RME Board Exam

1. If a low resistance is connected in parallel with a higher resistance, the combined resistance is

A. always more than the high resistance
B. always less than the low resistance
C. higher or lower than the low resistance depending on the value of the higher resistance
D. always between the values of the high and low resistance

2. The SI unit of specific resistance.

A. Ohm per square meter
B. Ohm-meter
C. Ohm per meter
D. Ohm

RME Board Exam

3. By definition in RA 7920, ___ refers to the installed capacity of an alternating current electric plant or supply equipment, or the connected load of industrial plants, commercial establishments, institutional buildings expressed in kilovolt-amperes.

A. industrial plant
B. utilization equipment
C. kVA
D. kW

4. Largest size of a dry cell.

A. Size A
B. Size AAA
C. Size C
D. Size D

RME Board Exam

5. Very large 3-phase induction motor are started using ___

A. autotransformer starting
B. direct on line
C. star-delta
D. none of these

6. The centrifugal switch of a capacitor start single-phase induction motor is connected in series with the _____.

A. main windings
B. field terminals
C. supply terminals
D. auxiliary windings

RME Board Exam

7. An ac ammeter or voltmeter is calibrated to read rms values, this means the meter is reading the _____ value.

A. maximum
B. peak
C. average
D. effective

8. Type of cell commonly used in hearing aids, electric watches, missiles and space applications.

A. Mercury cell
B. Alkaline cell
C. Silver-zinc cell
D. Carbon-zinc cell

9. Which of the following is an advantage of dc motors over ac motors?

A. They have higher allowable speeds
B. They can lift heavier loads
C. They have better speed control over a wide range
D. They have a longer life

RME Board Exam

10. To transmit power economically over considerable distances, it is necessary that the voltage be high. High voltages are readily obtainable with

A. rectifier currents
B. dc currents
C. carrier currents
D. ac currents

11. A passive element in a circuit is the one that ____ the energy.

A. supplies
B. receives
C. relays
D. transmit

12. Separators in a storage battery are used to prevent the plates from ___.

A. touching the container
B. touching the electrolyte
C. shorting together
D. none of these

13. Which type of ac motors are used for high starting torque and low starting current applications?

A. Squirrel cage motor
B. Wound rotor motor
C. Compound wound motor
D. Synchronous motor

RME Board Exam

14. The members of the Board shall hold office for a term of ____ years from the date of appointment or until their successors shall have been appointed and qualified.

A. 5
B. 3
C. 6
D. 4

RME Board Exam

15. The main contributing factor to motor starter's starter failures usually is

A. overloading
B. dirt
C. bearing trouble
D. moisture

16. The load in an electrical circuit is use to ____.

A. transmit the electrical energy
B. generate the electrical energy
C. cause a voltage drop
D. utilize the electrical energy

RME Board Exam

17. An RME may install electrical system in excess of 500 kVA or in excess of 600 volts provided
I. he is a holder of a BSEE degree
II. he is more than 5 years of electrical installation experience
III. he shall be under the supervision of a PEE or REE

A. I and II
B. II
C. III
D. I, II and III

18. Machine which converts ac to dc or dc to ac.

A. Tube rectifiers
B. Inverters
C. Synchronous converters
D. Turbo alternators

RME Board Exam

19. The primary and secondary coils of a transformer always have

A. a common magnetic circuit
B. separate magnetic circuits
C. the same size of wire
D. a different number of turns

20. A lead acid battery unlike other batteries should not be short circuited due to ____

A. its internal resistance is very low
B. its electrolyte will evaporate
C. its charges will discharge very fast
D. all of these

21. Two resistors 8 Ω and 12 Ω are connected in series across a 100-V source. What is the power absorbed in the 12 Ω resistor?

A. 200 W
B. 150 W
C. 100 W
D. 300 W

RME Board Exam

22. A shunt generator has an armature current of 400 A and a shunt field current of 5 A. What is its output in kW if the terminal voltage is 220 volts?

A. 89.1 kW
B. 80.5 kW
C. 86.9 kW
D. 84.6 kW

23. The speed of a synchronous motor ____.

A. is constant
B. decreases with load
C. increases with load
D. any of these

24. A fuse wire should be made from a material with a ____ melting point.

A. low
B. high
C. either A or B
D. neither A or B

RME Board Exam

25. Members of the Board of Electrical Engineering are appointed by ___.
I. the President of the Philippines
II. the Professional Regulations Commission
III. the Institute of Integrated Electrical Engineers of the Phils.

A. III
B. II
C. I
D. I and II

26. The speed of a universal motor is commonly reduced by using which of the following?

A. Brakes
B. Gearing
C. Chains
D. Belts

27. At dc steady state condition, a capacitor acts like _____.

A. a short circuit
B. an open circuit
C. an inductor
D. a conductor

28. If the secondary voltage of the transformer is step-down, the primary will have _____.

A. as many turns as the secondary
B. half as many turns as the secondary
C. fewer turns as the secondary
D. more turns as the secondary

RME Board Exam

29. A resistor of 6 ohms is connected in series with a 5-ohm resistor. What resistance must be placed across the 6-ohm resistor so that the total resistance shall be 7 ohms?

A. 3 ohms
B. 11 ohms
C. 1 ohm
D. 4 ohms

30. A megger is always used on a

A. grounded circuit
B. live circuit
C. short circuit
D. de-energized circuit

31. Transformer with only one winding.

A. Single-phase transformer
B. Current transformer
C. Unity transformer
D. Autotransformer

RME Board Exam

32. The rated frequency of the output voltage of an AC generator depends upon

A. power factor
B. excitation current
C. load
D. number of poles

33. Unit of magnetomotive force.

A. Volt
B. Coulomb
C. Newton
D. Ampere-turn

34. How much current is needed by a 24-ohm resistance in order to dissipate 600 watts?

A. 5 A
B. 25 A
C. 15 A
D. 10 A

RME Board Exam

35. If a test lamp lights when placed in series with a condenser and a suitable source of dc, it is a good indication that the condenser is

A. fully discharged
B. fully charged
C. open circuited
D. short circuited

36. Which of the following parts of an ac motor corresponds to the field of a dc motor?

A. Stator
B. Rotor
C. Field coils
D. Armature

RME Board Exam

37. An applicant for the registered master electricians' examination must have at least completed _____ of a five year Bachelor of Science in Electrical Engineering program and has a specific record of _____practice in electrical wiring and installation.

A. 3 years, 1 year
B. 2 years, 2 years
C. 2 years, 1 year
D. 3 years, 2 years

38. What type of electrolyte solution is used in a lead-acid cell?

A. Hydrochloric acid
B. Sulphuric acid
C. Phosphoric acid
D. Lead-acid

RME Board Exam

39. The purpose of having a rheostat in the field of a dc shunt generator is to

A. limit the field current to a safe value
B. minimize starting current
C. control motor speed
D. reduce sparking at the brushes

40. Before using a megger it should be tested by placing the test leads together and turning the crank. What will be the reading to indicate that the leads and megger are in good condition?

A. Between 100 to 1,000
B. Above 1,000
C. Below 100
D. 0

RME Board Exam

41. Which of the following is a primary cell?

A. Nickel-cadmium-alkaline
B. Mercury-oxide
C. Nickel-iron-alkaline
D. Lead-acid

42. If an additional resistance is added to a series RL circuit, the overall power factor of the circuit will ____.

A. decrease
B. increase
C. remain the same
D. any of these

43. In a series circuit with different values of resistances, the current is _____.

A. the same in each resistor
B. different in each resistor
C. largest in the smallest resistance
D. largest in the largest resistance

44. Which of the following electrical equipment is occasionally connected across the relay contacts to minimize arcing?

A. Resistor
B. Inductor
C. Diode
D. Capacitor

RME Board Exam

45. Electric current in a wire is a flow of

A. atoms
B. valence electrons
C. free electrons
D. bound electrons

46. If a fuse of higher than the required current rating is employed in a circuit, what will happen?

A. It will blow more frequently since it carries more current
B. It will lead to larger maintenance cost
C. afford better protection to the circuit
D. seriously overload the circuit

47. Which of the following is NOT a good conductor of electricity?

A. Copper
B. Silver
C. Mica
D. Aluminum

RME Board Exam

48. A 10-hp, 230-V dc motor of 84 % full load efficiency is located 500 ft. from the supply mains. What is the motor current?

A. 38.6 A
B. 29.3 A
C. 24.4 A
D. 40.5 A

49. Which of the following electrical machines has the highest operating efficiency?

A. Motors
B. Generators
C. Transformers
D. Converters

50. A power factor meter will show relationship between _____.

A. true power and reactive power
B. ohms and volts
C. volts and amperes
D. watts and volt-amperes

Part 2: Philippine Electrical Code

RME Board Exam

51. When alternating current flows through a conductor, there is an inductive action that causes the current in the conductor to be forced toward the outer surface. The current is greater at the surface that at the center of the conductor, this, ___ will cause the resistance in the conductor to increase due to the increased heating of the conductor.

A. superconductive effect
B. capacitive effect
C. outer effect
D. skin effect

52. Intermediate metal conduit shall be permitted to be installed in or under cinder fill where subject to permanent moisture when protected on all sides by a layer of non-cinder concrete not less than _____ thick.

A. 50 mm
B. 100 mm
C. 75 mm
D. 25 mm

53. A disruptive discharge through insulation.

A. Breakdown
B. Surge
C. Overload
D. Fault

RME Board Exam

54. The _____ shall not be less than the continuous load plus 125% of the continuous load.

A. conductor size
B. branch circuit rating
C. non continuous load
D. continuous load

55. Electrical non-metallic tubing smaller than _____ (outside diameter) electrical trade size shall NOT be used.

A. 15 mm
B. 12mm
C. 20 mm
D. 10 mm

56. For churches, the general lighting load shall be computed at _____.

A. 8 VA/m^2
B. 12 VA/m^2
C. 16 VA/m^2
D. 24 VA/m^2

57. Outlet boxes are not required to have blank covers to prevent the escape of ___

A. odor and heat
B. dust and moist
C. arcs and sparks
D. none of these

RME Board Exam

58. What is the maximum rating of a molded case circuit breaker to protect a 10 hp squirrel cage induction motor rated at 230 volts, 3-phase, 60 Hz with a full load rating of 28 A?

A. 30 A
B. 50 A
C. 70 A
D. 100 A

59. A single or multi-conductor solid dielectric insulated cable rated 2,000 volts or higher.

A. type MI
B. type MV
C. type TC
D. type IGS

60. Conductors used only for grounding shall be _____.

A. green, green with yellow stripes, or green and yellow
B. green, yellow with green stripes, or yellow
C. green, green with yellow stripes, or bare
D. green, yellow, or bare

61. Screw type lampholders shall have the _____ conductor connected to the screw shell.

A. hot
B. grounded
C. either A or B
D. neither A or B

RME Board Exam

62. Any motor applications shall be considered as ___ duty unless the nature of the apparatus it drives is such that the motor will not operate continuously with load under any condition of use.

A. short time
B. periodic
C. continuous
D. varying

63. The grounded conductor shall be equal to the largest _____ conductor.

A. bonding
B. phase
C. ungrounded service
D. equipment

64. Ratio of the maximum demand of a system or part of a system to the total connected load of a system or the part of the system under consideration.

A. Power factor
B. Utilization factor
C. Capacity factor
D. Demand factor

RME Board Exam

65. What is the metric size equivalent of 1,000 MCM?

A. 250 mm^2
B. 750 mm^2
C. 500 mm^2
D. 1,000 mm^2

66. Lighting fixtures approved for damp locations shall be installed only in ___ locations.

A. damp
B. wet
C. flooded
D. all of these

67. Fixture studs in octagonal boxes used to mount lighting fixtures are computed on the _____ conductor entering the box.

A. smallest
B. longest
C. shortest
D. biggest

RME Board Exam

68. Non-metallic sheathed cable shall not be permitted for installation in the following locations EXCEPT

A. storage battery room
B. corrosive locations
C. moist locations
D. dry locations

RME Board Exam

69. Instrument pilot lights and potential current transformers shall be protected by OCP of __ amps or less.

A. 50
B. 15
C. 30
D. 20

RME Board Exam

70. Insulators used to support wires under cross arms are

A. pin
B. spool
C. suspension
D. strain

71. Bonding provides electrical continuity and safely conducts any _____.

A. load of the system
B. voltage on the system
C. unbalanced current
D. fault current that may occur

72. A ___ branch circuit shall be permitted to supply lighting units, other than utilization equipment or a combination of both.

A. 15 A
B. 20 A
C. either A or B
D. neither A or B

RME Board Exam

73. The unit lighting for a dwelling unit expressed in watts per square meter shall be

A. 8 watts
B. 40 watts
C. 24 watts
D. 16 watts

RME Board Exam

74. Where the conduits enter a switchboard at the bottom, a sufficient space shall be provided to permit installation of the conductors in the enclosure. The minimum spacing between the bottom of the enclosure and the non-insulated bus bar shall be _.

A. 155 mm
B. 300 mm
C. 255 mm
D. 200 mm

RME Board Exam

75. To make sure that the high voltage switchboard is not energized, what final step should you take for assurance?

A. Ground all bus bars inside the switch board
B. Assign a person to guard the disconnect switch
C. Open the disconnect switch
D. Put a sign board that the switch should not be turned on

76. Transformers rated over 600 V and installed in supervised locations are protected by circuit breakers on the primary side and cannot exceed _____ of the primary full load current.

A. 600 %
B. 500 %
C. 300 %
D. 700 %

RME Board Exam

77. Type FCC (flat conductor cable) cables are permitted for the following installations, EXCEPT

A. on wall surfaces in surface metal raceways
B. on hard, sound and smooth continuous surface
C. in residential buildings
D. for general purpose branch circuit wiring

78. The scope of the PEC covers all electrical conductors including optical fiber cable and equipment installed within or to or from any of the following premises, which one is NOT included?

A. aircraft
B. motor vehicles
C. railway rolling stocks
D. all of these

79. A factory assembly of one or more conductors, each individually insulated and enclosed in a metallic sheath of interlocking tape or a smooth or corrugated tube.

A. type MC cable
B. type AC cable
C. type MI cable
D. type MV cable

RME Board Exam

80. Which of the following listed materials is considered among the best insulation material for motor rewinding?

A. Nomex
B. Red fiber
C. Mylar
D. Fish paper

81. Type FCC cable shall be clearly and durably marked on both sides at intervals of not more than _____.

A. 760 mm
B. 1,000 mm
C. 500 mm
D. 600 mm

82. The first choice for the grounding electrode of a separately derived system is a

A. ground ring
B. water pipe
C. building steel
D. driven rod

83. Individual open conductors and cables other than service entrance cables shall NOT be installed within _____ of grade level or where exposed to physical damage.

A. 3,100 mm
B. 3,700 mm
C. 4,600 mm
D. 5,500 mm

84. Heavy duty lighting tracks shall be identified to exceed _____ in rating.

A. 15 A
B. 20 A
C. 30 A
D. 40 A

85. A pliable corrugated raceway of circular cross-section with integral or associated couplings, connectors and fittings for the installation of electric conductors?

A. Electrical metallic tubing
B. Rigid non-metallic conduit
C. Electrical non-metallic tubing
D. Rigid metal conduit

RME Board Exam

86. In a switchboard there shall be an air space of at least _____ between the energized metal part and the door of the cabinet.

A. 30 mm
B. 20 mm
C. 15 mm
D. 25 mm

87. Surface metal raceway shall NOT be used where the voltage is ___ volts or more between conductors unless the metal has a thickness of not less than one mm.

A. 300 mm
B. 250 mm
C. 150 mm
D. 400 mm

88. What type of cable consists of three or more flat copper conductors placed edge to edge, separated and enclosed within an insulating assembly?

A. type AC
B. type FC
C. type FCC
D. type TC

RME Board Exam

89. The maximum size of liquid tight flexible metal conduit shall be ___ trade size.

A. 50 mm
B. 125 mm
C. 150 mm
D. 100 mm

90. Each length of non-metallic conduit shall be clearly and durably marked at least every _____ as required.

A. 3,000 mm
B. 2,000 mm
C. 4,000 mm
D. 5,000 mm

91. Non-metallic extensions shall NOT be used _____.

A. from an existing outlet
B. exposed in dry location
C. non-metallic surface extension
D. as an aerial cable

RME Board Exam

92. Feeders should be of such size that the voltage drop up to the final distribution panel should NOT exceed

A. 2 ½ %
B. 4 ½ %
C. 3%
D. 6%

93. Connection or fittings shall not connect grounding electrode conductors to equipment by means of _____.

A. solder
B. lugs
C. pressure connectors
D. clamps

RME Board Exam

94. Resistors and reactors shall not be installed in close proximity to combustible materials such that it constitutes a fire hazard. What minimum clearance is required by the Code?

A. 250 mm
B. 300 mm
C. 400 mm
D. 100 mm

95. Transformers that are installed in unsupervised locations and rated over 600 V are protected by fuses on the primary side and cannot exceed _____ percent of the primary full load current.

A. 150
B. 300
C. 200
D. 250

RME Board Exam

96. All circuit conductors between the service equipment or the generator switchboard of an isolate plant, and the final branch circuit overcurrent device.

A. Service
B. Feeder
C. Branch circuit
D. All of these

97. Electrical metallic tubing shall be securely fastened in place within ___ of each outlet box, junction box, cabinet or fitting.

A. 300 mm
B. 600 mm
C. 900 mm
D. 800 mm

98. Electric discharge lighting shall be connected by flexible cord if the cord is visible for ____ percent of its entire length.

A. 50
B. 80
C. 90
D. 100

99. Completely enclosed, ventilated transformers equipped with an 80 °C rise insulation may be installed in a room _____.

A. built with tile blocks
B. with concrete walls
C. designed as a vault
D. of fire resistant construction

100. Each length of intermediate metal conduit shall be clearly and durably identified at _____ intervals with the letters "IMC".

A. 760 mm
B. 600 mm
C. 900 mm
D. 1,000 mm

< Exam ends here >

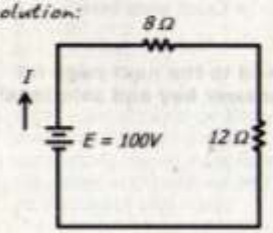
Proceed to the next page for the answer key and solutions!

Question Bank 19

ANSWER KEY

1. B. always less than the low resistance
2. B. Ohm-meter
3. C. kVA
4. D. Size D
5. A. autotransformer starting
6. D. auxiliary windings
7. D. effective
8. C. Silver-zinc cell
9. C. They have better speed control over a wide range
10. D. ac currents
11. B. receives
12. C. shorting together
13. B. Wound rotor motor
14. B. 3
15. A. overloading
16. D. utilize the electrical energy
17. C. III
18. C. Synchronous converters
19. A. a common magnetic circuit
20. A. its internal resistance is very low
21. D. 300 W

Solution:



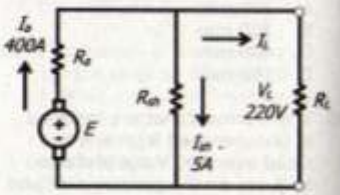
$$I = \frac{E}{R_t} = \frac{100}{8+12} = 5\ A$$

$$P = I^2R = (5)^2(12)$$

$$P = 300\ W$$

22. A. 86.9 kW

Solution:



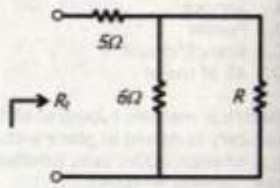
$$I_L = I_a - I_{sh} = 400 - 5 = 395\ A$$

$$P_L = V_L I_L = (220)(395)$$

$$P_L = 86{,}900\ W \text{ or } 86.9\ kW$$

23. A. is constant
24. A. low
25. C. I
26. B. Gearing
27. B. an open circuit
28. D. more turns as the secondary
29. A. 3 ohms

Solution:



$$R_t = \frac{6(R)}{6+R} + 5$$

$$7 = \frac{6R}{6+R} + 5$$

$$R = 3\ \Omega$$

30. D. de-energized circuit
31. D. Autotransformer
32. D. number of poles
33. D. Ampere-turn
34. A. 5 A

Solution:

$$P = I^2R$$

$$I = \sqrt{\frac{P}{R}} = \sqrt{\frac{600}{24}}$$

$$I = 5A$$

35. D. short circuited
36. B. Rotor
37. A. 3 years, 1 year
38. B. Sulphuric acid
39. C. control motor speed
40. D. 0
41. B. Mercury-oxide
42. B. increase
43. A. the same in each resistor
44. D. Capacitor
45. C. free electrons
46. D. seriously overload the circuit
47. C. Mica
48. A. 38.6 A

Solution:

$$P_{in} = \frac{P_{out}}{\eta} = \frac{10(746)}{0.84}$$

$$P_{in} = 8{,}880.95\ W$$

$$I = \frac{P}{E} = \frac{8{,}880.95}{230}$$

$$I = 38.6\ A$$

49. C. Transformers
50. D. watts and volt-amperes
51. D. skin effect
52. A. 50 mm
53. A. Breakdown
54. B. branch circuit rating
55. C. 20 mm
56. A. 8 VA/m²
57. C. arcs and sparks
58. C. 70 A

Solution:

For circuit breaker, the rating shall be 250% of the full load current

Rating = 2.5(28)

Rating = 70 A

59. B. type MV
60. C. green, green with yellow stripes, or bare
61. B. grounded
62. C. continuous
63. B. phase
64. D. Demand factor
65. C. 500 mm²

Solution:

1,000 MCM = 1,000,000 CM

$$A = d^2$$

$$d = \sqrt{A} = \sqrt{(1{,}000{,}000)}$$

$$d = 1000\ \text{mils} \times \frac{1\ \text{in}}{1000\ \text{mils}}$$

$$\times \frac{25.4\ \text{mm}}{1\ \text{in}}$$

$$d = 25.4\ mm$$

$$A = \frac{\pi d^2}{4}$$

$$A = \frac{\pi(25.4)^2}{4}$$

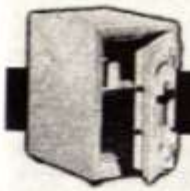
$$A = 506.7\ mm^2$$

66. A. damp
67. D. biggest

68. D. dry locations
69. B. 15
70. C. suspension
71. D. fault current that may occur
72. C. either A or B
73. C. 24 watts
74. C. 255 mm
75. C. Open the disconnect switch
76. A. 600%
77. C. in residential buildings
78. D. all of these
79. A. type MC cable
80. D. Fish paper
81. D. 600 mm
82. C. building steel
83. A. 3,100 mm
84. B. 20 A
85. C. Electrical non-metallic tubing
86. D. 25 mm
87. A. 300 mm
88. C. type FCC
89. D. 100 mm
90. A. 3,000 mm
91. D. as an aerial cable
92. C. 3%
93. A. solder
94. B. 300 mm
95. B. 300
96. B. Feeder
97. C. 900 mm
98. D. 100
99. D. of fire resistant construction
100. A. 760 mm

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed



Question Bank 20

Part I: Technical Subject

1. A tool specifically used to drive hexagonally shaped screws.

A. Allen wrench
B. Box wrench
C. Vise grip
D. Philip's screw driver

RME Board Exam

2. Motor fuses are usually used to

A. provide inexpensive protection
B. protect motors from overcurrent
C. protect the feeder lines from short circuit currents
D. have a safety factor of 10

3. Batteries used to start the engine of automobiles are examples of what type of cell?

A. Zinc-chloride
B. Silver-oxide
C. Manganese-dioxide
D. Lead-acid

4. Power measurement is to be done on a balanced delta connected load whose terminals cannot be simply open-circuited. What is the minimum number of wattmeters needed?

A. Only one
B. Two
C. Three
D. Four

RME Board Exam

5. What is the magnitude of the starting current in an induction motor compared to its full load current?

A. 9 to 12 times
B. 4 to 9 times
C. 2 to 3 times
D. 3 to 4 times

6. Power transformers are usually rated in _____.

A. ampere-turn
B. kWh
C. kVA
D. kW

RME Board Exam

7. Which of the following is NOT a qualification of the BEE board members?

I. Be at least 36 years of age
II. Be a resident of the Phils for at least 10 consecutive years
III. Be a registered electrical engineer
IV. Have practiced electrical engineering for a period not less than 5 years

A. II, III and IV
B. I, II and III
C. I, II, III and IV
D. III and IV

8. Instrument use to check the motor shaft alignment.

A. Growler
B. Hydrometer
C. Dial indicator
D. Dynamometer

RME Board Exam

9. Each member of the Board of Electrical engineering must be at the time of his appointment

A. must have practice electrical engineering for a period of not less than 5 years
B. must be at least a registered electrical engineer
C. must be at least 40 years of age
D. none of these

10. An alternator running in parallel with other alternators all having an automatic voltage regulator is to be taken off the bus. The first thing to do before opening the switch is to _____.

A. reduce the power fed to the prime mover
B. reduce alternator excitation
C. increase alternator excitation
D. do nothing

11. What is the electrolyte in a lead-acid storage battery?

A. H_2O_2
B. HCl
C. H_2SO_4
D. $MgSO_4$

RME Board Exam

12. A staircase lamp is to be controlled at three different locations. What switches would an electrician install?

A. two SPST and one 3-way switches
B. two 3-way and one 4-way switches
C. two 3-way and one SPST switches
D. two 4-way and one SPST switches

13. The three special types of gears used in gearmotors are helical, spur and worm. Which of the types mentioned above is best in power high power applications?

A. Helical
B. Spur
C. Worm
D. All of these

14. The electric device which blocks dc but allows ac.

A. Rectifier
B. Inverter
C. Capacitor
D. Inductor

RME Board Exam

15. The resistance of a circuit containing 1 ohm, 2 ohms and 3 ohms in parallel is _____.

A. 6 ohms
B. 5.45 ohms
C. 0.545 ohm
D. 4.5 ohms

16. A parallel circuit is one that has

A. all elements connected end to end
B. same current flowing through all elements
C. all elements connected across the power supply so that removing one element does not stop the others from working
D. all elements placed side by side

17. The rotating part of a single phase motor is called

A. rotor
B. stator
C. running winding
D. starting winding

18. The operating speed of a dc series motor is basically evaluated by

A. field excitation
B. equivalent motor resistance
C. size of load
D. types of armature winding

RME Board Exam

19. Accurate resistances, the value which are not materially affected by changes in room temperature, are usually made of an alloy commonly called ___.

A. exellin
B. paganin
C. siemens martin
D. manganin

20. Which of the following is NOT a hand tool?

A. Pipe threader
B. Electrician's knife
C. Electric drill
D. None of these

21. A magnet that is heated will ___.

A. increase in magnetism
B. become demagnetized
C. decrease in magnetism
D. not change its magnetism

RME Board Exam

22. A resistance of 6 ohms is connected in parallel with a 3-ohm resistance. Both resistances are then connected in series with an 8-ohm resistance. If the supply is a 220-V source, what is the current through the 6-ohm resistance?

A. 7.12 A
B. 7.5 A
C. 7.42 A
D. 7.33 A

RME Board Exam

23. A dc generator supplies a load of resistance 1.4 ohms through a pair of wires having a total resistance of 0.10 ohm. The voltage at the DC generator terminals is 120 V, what is the voltage across the load?

A. 110 V
B. 105 V
C. 112 V
D. 115 V

24. Which one of the following types capacitor is a polarized type?

A. Electrolytic
B. Ceramic
C. Paper
D. Mylar

25. For maximum power transfer, the internal resistance of the source must be _____ the resistance of the load

A. equal to
B. greater than
C. less than
D. any of these

RME Board Exam

26. For efficient operation, induction motors are always designed with a small _____.

A. air gap
B. voltage drop
C. inductive reactance
D. impedance

27. In an ac circuit, a low value of kVAR compared to kW indicates which of the following?

A. Low efficiency
B. Unity power factor
C. High power factor
D. Maximum load current

28. Any members of the Board shall be at least _____ years of age at the time of his appointment.

A. 30
B. 40
C. 45
D. 35

RME Board Exam

29. An electric range takes 8 kW and an air conditioning unit draws 10 A. The lighting load is 500 W and a water pump draws 8 A. The main supply is 220 volts. Find the total current taken from the supply.

A. 60.12 A
B. 56.63 A
C. 54.21 A
D. 58.63 A

RME Board Exam

30. What should you do to reverse operation of a split-phase single phase motor?

A. Reverse the supply lines
B. Reverse polarity of both winding
C. Reverse polarity of the auxiliary winding
D. Do nothing as it can not be done

31. The impedance of a series resonant circuit is _____.

A. minimum
B. maximum
C. either A or B
D. approximately zero

32. Which of the following is one the cause of overheating in motors?

A. dirty lubrication
B. worn bearings
C. overloads
D. loose parts

RME Board Exam

33. A single-phase motor commonly used for small air compressor.

A. Reluctive motor
B. Universal motor
C. Shaded pole motor
D. Capacitor start, capacitor run

34. This term means that the motor will stop when there is a supply voltage failure and the motor will restart automatically when the supply voltage is restored.

A. No voltage release
B. No voltage protection
C. No voltage control
D. None of these

RME Board Exam

35. If a single phase induction motor runs slower than normal, the more likely defect is

A. improper fuses
B. shorted running winding
C. open starting winding
D. worn bearings

36. The safety factor in using a double-pole switch is the fact that _____.

A. it cab be used on any voltage
B. both line wires are dead when the switch is turned off
C. it can be replaced easily
D. it will stand greater loads

37. Most single-phase induction motors has how many poles?

A. 2 poles
B. 4 poles
C. 6 poles
D. 8 poles

38. Coils placed at the neutral point midway between the main poles of a dc machine.

A. Interpole windings
B. Compensating windings
C. Equalizer windings
D. Damper windings

39. An open coil can be detected by _____ reading.

A. high current
B. high resistance
C. high voltage reading
D. all of these

40. Manually operated three-position three-pole rotaries switch, which carries a hp rating and is used for manually reversing electric motors.

A. Knife switch
B. Break-make switch
C. Drum switch
D. Rocker switch

RME Board Exam

41. Any waterborne unit, which is designed and built to have an electric plant.

A. Water vessel
B. Watercraft
C. Motor vessel
D. None of these

42. The action of the acid in a chemical cell is to _____.

A. removes electrons from both plates
B. removes electrons from one plate and accumulate them on the other plate
C. provide additional free electrons
D. provide insulation between the two plates

43. Cells are connected in ___ when high voltage, as well as high current is desired.

A. series
B. parallel
C. series-parallel
D. none of these

RME Board Exam

44. This is the greatest effective difference of potential that exists between any two conductors of a circuit.

A. Current
B. Resistor
C. Power
D. Voltage

45. The terminal voltage of this dc generator varies widely when a change in load occurs. Which one is this?

A. Series
B. Shunt
C. Long shunt compound
D. Short shunt compound

RME Board Exam

46. An electric heater works at 220 V and takes a current of 9.1 A, what is its rating?

A. 1,800 W
B. 2,500 W
C. 2,000 W
D. 2,002 W

RME Board Exam

47. Which of the following protection features, a motor starter is not readily needed?

A. No-voltage protection
B. Ground fault protection
C. Single phasing protection
D. Overload protection

48. Which of the following is not important with transformers?

A. Casing
B. Primary windings
C. Contacts
D. Core

49. Pipe bending tool.

A. Pipe vise
B. Pipe reamer
C. Hickey
D. Gimlet

RME Board Exam

50. Two incandescent lamps of 100 W, 200 V are connected in parallel across a 200-V supply. The total resistance will be

A. 800 ohms
B. 200 ohms
C. 400 ohms
D. 600 ohms

Part 2: Philippine Electrical Code

51. Storage batteries in solar photovoltaic systems for dwellings shall have cells operating at less than ___.

A. 50 V
B. 30 V
C. 24 V
D. 12 V

RME Board Exam

52. The Code requires that all energized part of electrical equipment operating at ____ or more shall be guarded against accidental contacts by approved enclosures. What is this voltage?

A. 24 volts
B. 110 volts
C. 230 volts
D. 50 volts

RME Board Exam

53. In order to protect a personnel and prevent shock, the equipment should be connected good earth ground through the

A. conduit pipe
B. hot water pipe
C. cold water pipe
D. rigid conduit pipe

54. The minimum spacing between the bottom of enclosure and the insulated busbars, their supports and other obstructions shall be

A. 200 mm
B. 210 mm
C. 215 mm
D. 205 mm

55. Service drop conductors passing through sidewalk accessible only to pedestrians where the voltage is limited to 300 V to ground shall maintain a vertical clearance of NOT less than ____ at the electric service entrance to buildings.

A. 3,700 mm
B. 3,100 mm
C. 4,600 mm
D. 5,500 mm

RME Board Exam

56. If the interrupting rating of a circuit breaker is lower than required, what will happen to the breaker if there is a dead short between two down stream breaker terminals?

A. Only the conductors will burn out
B. Nothing
C. The entire breaker will be completely damaged
D. The breaker may trip but may reset

57. Secondaries of transformers supplying voltage for impedance heating of vessels are computed at NOT less than ___ percent of the heating load.

A. 150
B. 100
C. 125
D. 130

58. Where nails or screws are likely to penetrate non-metallic sheathed cable or electrical non-metal tubing, a steel sleeve or steel clip NOT less than ____ in thickness shall be used to protect the cable or tubing.

A. 1.6 mm
B. 1.5 mm
C. 2.0 mm
D. 1.8 mm

59. Rosettes for exposed wiring shall be provided with bases that shall be high enough to keep the wires and terminals at least ___ from the surface wired over.

A. 10 mm
B. 12 mm
C. 13 mm
D. 15 mm

RME Board Exam

60. The ____, or other descriptive marking by which the organization responsible for the product maybe identified, shall be placed on all electric equipment.

I. trademark
II. cost
III. manufacturer's name

A. I, II and III
B. I and II only
C. I and III only
D. I only

61. Metal faceplates for flush mounted snap switches shall be of ferrous metal NOT less than ___ in thickness.

A. 0.6 mm
B. 0.7 mm
C. 0.8 mm
D. 0.9 mm

RME Board Exam

62. Conductors of ac and dc rated up to 600 V nominal shall be permitted to occupy the same equipment wiring enclosure, cable tray or raceway. Is this being allowed under Sec 5.1.1.3 (c) (1) Art 5.1?

A. Installation is correct
B. False
C. True
D. Acceptable

63. The ampacity of supply branch circuit conductors supplying diagnostic equipment and the current rating of the overcurrent protective devices shall NOT be less than ___ percent of the momentary rating or ____ percent of the long time rating whichever is larger.

A. 50, 100
B. 60. 125
C. 60, 100
D. 50, 125

64. Solar photovoltaic systems in a one-family dwelling units with circuits rated over ____ to ground while energized shall NOT be accessible to other than qualified persons.

A. 50 V
B. 150 V
C. 100 V
D. 75 V

RME Board Exam

65. Consist of a group of wire twisted to form a metallic string.

A. Duplex wire
B. Loomex wire
C. Solid wire
D. Stranded wire

66. Hazardous locations in which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures.

A. Class II, Division 1
B. Class II, Division 2
C. Class III, Division 1
D. Class III, Division 2

RME Board Exam

67. If an electrician does not understand the instruction that were given by the supervisor, which of the following is best for him to do?

A. He works out the solution himself
B. He asks to repeat and clarify the instruction
C. He gets one of the electrician to do the job
D. He does the job the way he thinks best

68. In dwelling units and guestrooms of hotels, motels and similar occupancies, the voltage shall NOT exceed ___ volts nominal between conductors that supply the terminals of medium base screw shell lampholders.

A. 250
B. 230
C. 300
D. 150

RME Board Exam

69. The inner strand of ACSR is made of

A. brass
B. steel
C. copper
D. lead

70. Border lights shall be installed around stages in theaters on circuits rated at ___ or less.

A. 20 A
B. 15 A
C. 30 A
D. 10 A

RME Board Exam

71. The grounding electrode for grounding communications systems may be connected to the nearest accessible location on any of the following EXCEPT one. Which one is this?

A. Buried interior PVC water piping system
B. Grounding electrode conductor
C. Building structure of a concrete building
D. Grounding terminal of service equipment if provided by the utility company

72. Direct burial cables or conductors with a nominal voltage of 600 V or less and passes under airport runways including adjacent areas where trespassing is prohibited, shall have a minimum cover distance of ____.

A. 460 mm
B. 500 mm
C. 600 mm
D. 300 mm

73. Flexible metallic tubing smaller than ___ electrical trade size shall NOT be used.

A. 20 mm
B. 15 mm
C. 12 mm
D. 32 mm

RME Board Exam

74. In rigid metal wiring conduit, conduits shall be supported at least every

A. 2,000 mm
B. 2,500 mm
C. 3,500 mm
D. 3,000 mm

75. Lighting track conductors shall be a minimum of ____ and shall be copper.

A. 2.0 mm^2
B. 1.25 mm^2
C. 5.5 mm^2
D. 3.5 mm^2

76. A cable provided with a wrapping or metal usually steel wires or tapes, primarily for the purpose of mechanical protection.

A. Metal clad cable
B. Metallic sheathed cable
C. Armored cable
D. Flat conductor cable

RME Board Exam

77. Employees shall familiarize themselves with approved methods of ___ rescue techniques and fire extinguishment.

A. playing
B. first aid
C. wiring
D. heating

78. The continuous load supplied by a branch circuit shall NOT exceed the branch circuit rating by more than _____ percent.

A. 50
B. 60
C. 80
D. 90

79. Masts separate from the structure to be protected shall be a minimum of ___ from the protected structure.

A. 1,800 mm
B. 2,000 mm
C. 1,900 mm
D. 1,500 mm

RME Board Exam

80. Branch lighting circuits shall be protected by overcurrent devices not rated more than

A. 40 A
B. 20 A
C. 30 A
D. 50 A

81. Where liquidtight flexible metal conduit is installed as a fixed raceway, it shall be secured at intervals NOT exceeding ____ .

A. 1,500 mm
B. 1,250 mm
C. 1,400 mm
D. 1,300 mm

82. For a portable motor rated at ____ horsepower or less, the controller shall be permitted to be an attachment plug and receptacle.

A. 0.25
B. 0.33
C. 0.125
D. 0.50

RME Board Exam

83. In all cases where there are energized parts on the front of the switchboards or motor control centers, the working space in front of such equipment shall NOT be less than a minimum distance. What is this distance?

A. 2,000 mm
B. 500 mm
C. 1,500 mm
D. 1,000 mm

84. A fixture requiring supply wire rated higher than 90 °C shall be so marked in letters ___ high prominently displayed on the fixture.

A. 6.0 mm
B. 10 mm
C. 6.4 mm
D. 8.4 mm

RME Board Exam

85. A protective device for assembly as an integral part of a motor or motor compressor and which when properly applied protects the motor against dangerous overheating due to overload and failure to start.

A. Fault current
B. Ground fault
C. Thermal heat
D. Thermal protector

86. When computing the service load with the standard method, a 20 kW electric space heating unit is computed at _____ percent.

A. 80
B. 100
C. 90
D. 125

RME Board Exam

87. Wirings allowed to be installed outside buildings are enumerated below EXCEPT one. Which one is this?

A. Type MC cable
B. Flat conductor cable
C. Rigid metal conduit
D. Open wires on insulators

88. The walls and roofs of transformer vaults shall be constructed of materials that have adequate structural strength for the condition with a minimum fire resistance of ___ hours.

A. 1.5
B. 2.0
C. 2.5
D. 3.0

89. Where knobs are used, conductors shall be securely tied thereto by _____ wires having insulation equivalent to that of the conductor.

A. tie
B. bonding
C. guy
D. splicing

RME Board Exam

90. Employees shall read _____ and warn others who are in danger near energized equipment or lines

A. first aid equipment and materials
B. manhole and vaults
C. warning signs and signals
D. body belts and safety straps

91. The use of electrical metallic tubing shall be permitted for ___.

A. exposed works
B. concealed works
C. both A and B
D. neither A or B

92. The sum of all contained conductors of an auxiliary gutter at any cross section shall NOT exceed ___ of the interior cross sectional area of the said gutter.

A. 10 %
B. 15 %
C. 20 %
D. 25 %

RME Board Exam

93. A 20-ampere rated branch circuit with 3.5 mm^2 wire supplying a duplex receptacle can be loaded to a maximum of ___ amperes.

A. 16
B. 20
C. 30
D. 12

RME Board Exam

94. For better illumination you would provide _____.

A. joint lights
B. even spacing numerous lights
C. random spacing lights
D. evenly space high ceiling

95. An auxiliary gutter shall NOT extend a greater distance than _____ beyond the equipment, which it supplements.

A. 8,500 mm
B. 8,900 mm
C. 9,100 mm
D. 8,000 mm

96. Size 0.75 mm^2 fixture wire has an ampacity of _____.

A. 6 A
B. 10 A
C. 4 A
D. 8 A

97. A clearance of NOT less than ___ shall be provided from recessed fixtures and their trims, ventilating openings and other such openings in room surfaces.

A. 100 mm
B. 70 mm
C. 50 mm
D. 30 mm

98. An approved assembly of insulated conductors with fittings and conductor terminations in a completely enclosed ventilated protective metal housing.

A. Cable tray
B. Cablebus
C. Gutter
D. Busway

99. A metal underground gas piping system ___ used as a grounding system.

A. shall be
B. shall not be
C. both A and B
D. not specified in the PEC

100. If the voltage level is from 250 to 600 V, the air space between the wall, door or gutter partition of any cabinet shall be at least

A. 24 mm
B. 22 mm
C. 28 mm
D. 26 mm

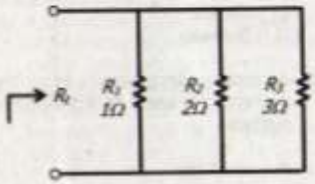
< Exam ends here >

Question Bank 20

ANSWER KEY

1. A. Allen wrench
2. B. protect motors from overcurrent
3. D. Lead-acid
4. B. Two
5. B. 4 to 9 times
6. C. kVA
7. C. I, II, III and IV
8. C. Dial indicator
9. D. none of these
10. A. reduce the power fed to the prime mover
11. C. H_2SO_4
12. B. two 3-way and one 4-way switches
13. B. Spur
14. C. Capacitor
15. C. 0.545 ohm

Solution:



$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

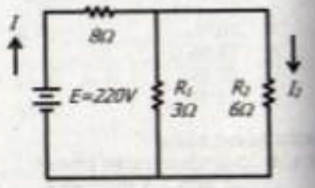
$$\frac{1}{R_t} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3}$$

$$R_t = 0.545\,\Omega$$

16. C. all elements connected across the power supply so that removing one element does not stop the others from working

17. A. rotor
18. C. size of load
19. D. manganin
20. C. Electric drill
21. B. become demagnetized
22. D. 7.33 A

Solution:



$$R_t = \frac{3(6)}{3+6} + 8 = 10\,\Omega$$

$$I = \frac{E}{R_t} = \frac{220}{10} = 22\text{A}$$

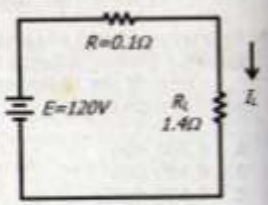
Using current division theorem:

$$I_2 = \frac{I(R_1)}{R_1 + R_2} = \frac{22(3)}{3+6}$$

$$I_2 = 7.33\text{ A}$$

23. C. 112 V

Solution:



$$I_L = \frac{E}{R + R_L}$$

$$I_L = \frac{120}{0.1 + 1.4} = 80\text{ A}$$

$$E_L = I_L R_L = 80(1.4)$$

$$E_L = 112\text{ V}$$

24. A. Electrolytic
25. A. equal to
26. A. air gap
27. C. High power factor
28. D. 35
29. B. 56.63 A

Solution:

$$I_1 = \frac{P_1}{E} = \frac{8000}{220} = 36.36\text{ A}$$

$$I_2 = \frac{P_2}{E} = \frac{500}{220} = 2.27\text{ A}$$

$$I_t = I_1 + I_2 + I_3 + I_4$$

$$I_t = 36.36 + 10 + 2.27 + 8$$

$$I_t = 56.63\text{ A}$$

30. C. Reverse polarity of the auxiliary winding
31. A. minimum
32. C. overloads
33. D. Capacitor start, capacitor run
34. A. No voltage release
35. D. worn bearings
36. B. both line wires are dead when the switch is turned off
37. B. 4 poles
38. A. Interpole windings
39. B. high resistance
40. C. Drum switch
41. B. Watercraft
42. B. removes electrons from one plate and accumulate them on the other plate

43. C. series-parallel
44. D. Voltage
45. A. Series
46. D. 2,002 W

Solution:

$$P = EI$$

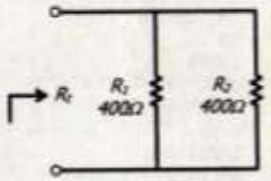
$$P = 220(9.1)$$

$$P = 2{,}002\text{ W}$$

47. B. Ground fault protection
48. C. Contacts
49. C. Hickey
50. B. 200 ohms

Solution:

$$R = \frac{E^2}{R} = \frac{200^2}{100} = 400\,\Omega$$



$$R_t = \frac{R}{n} = \frac{400}{2}$$

$$R_t = 200\,\Omega$$

51. A. 50 V
52. D. 50 volts
53. C. cold water pipe
54. D. 205 mm
55. B. 3,100 mm

56. C. The entire breaker will be completely damaged
57. B. 100
58. A. 1.6 mm
59. C. 13 mm
60. C. I and III only
61. C. 0.8 mm
62. C. True
63. A. 50, 100
64. B. 150 V
65. D. Stranded wire
66. A. Class II, Division 1
67. B. He asks to repeat and clarify the instruction
68. A. 250
69. B. steel
70. A. 20 A
71. A. Buried interior PVC water piping system
72. A. 460 mm
73. B. 15 mm
74. D. 3,000 mm
75. D. 3.5 mm^2
76. C. Armored cable
77. B. first aid
78. C. 80
79. A. 1,800 mm
80. B. 20 A
81. D. 1,300 mm
82. B. 0.33
83. D. 1,000 mm
84. C. 6.4 mm
85. D. Thermal protector
86. B. 100
87. B. Flat conductor cable
88. D. 3.0
89. A. tie
90. C. warning signs and signals
91. C. both A and B
92. C. 20%
93. A. 16

Note: As a rule, branch circuits supplying continuous duty load shall be loaded only to 80% of their rating.

Load = 0.8(20)

Load = 16 A

94. B. even spacing numerous lights
95. C. 9,100 mm
96. A. 6 A
97. C. 50 mm
98. B. Cablebus
99. B. shall not be
100. D. 26 mm

Rating:

85 - 100	- Topnotcher
70 - 84	- Passer
50 - 69	- Conditional
0 - 49	- Failed

Theories & Formulas

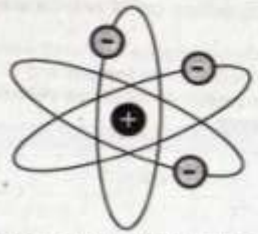
❑ **Structure of matter**

- **Matter** – anything that occupies space and has weight
- **Element** – a substance that cannot be decomposed any further by chemical action
- **Compound** – a combination of two or more elements
- **Molecule** – smallest particle that a compound can be reduced to before it breaks down into its elements.

❑ **The atomic structure of an atom:**

Atom - smallest part that an element can be reduced to and still keeping the properties of the element.

Name	Charge	Mass (kg)
Proton	+	1.672×10^{-27}
Electron	-	9.107×10^{-31}
Neutron	None	1.672×10^{-27}

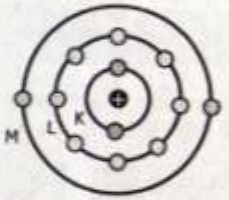


The center of the atom is called **nucleus**. Protons and neutrons are found in the nucleus of an atom.

Electrons are revolving around the nucleus in a specified path called **orbital shells**. The number of shells is dependent upon the total number of electrons of the atom.

Orbital shells of an atom:

K-shell - first orbit (innermost)
L-shell – second orbit
M-shell – third orbit
N-shell – fourth orbit
O-shell – fifth orbit



- **Valence electrons** – electrons found in the outermost shell or orbit of an atom.
- **Atomic Number** – represents the number of electrons or protons of an atom.
- **Atomic Mass** – represents the sum of protons and neutrons of an atom.

Name of Element	Electrons	Protons	Neutrons
Copper	29	29	34
Aluminum	13	13	14

❑ Classification of materials according to conductivity:

- **Conductor** – has 3 or less valence electrons

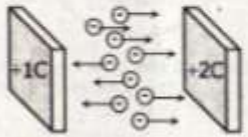
- **Semi-conductor** – has exactly 4 valence electrons
- **Insulator** – has 5 or more valence electrons

❑ A body is said to be **charge**, if it has either an **excess or deficit** of electrons from its normal values due to sharing.

Coulomb (C) is the unit of electric charge which is equivalent to **6.25 x 10^{18}** electrons or protons.

❑ Any charge has the capability of doing work of moving another charge either by attraction or repulsion.

Example, assume 1 C of charge can moved 3 electrons.



6 electrons will be attracted by the +2 C plate and 3 electrons will be attracted by the +1 C plate, making a resultant motion of 3 electrons going towards the +2 C plate

The net number of electrons moved in the direction of the positive charge plate depends upon the **potential difference** between the two charges.

- **Volt (V)**– unit of potential difference which is equal to **one joule of work** done per **one coulomb of charge.**

$$E = \frac{W}{Q}$$

where:
E = potential difference (volt)
W = work done (joule)
Q = charge (coulomb)

❑ When a potential difference between two charges forces a third charge to move, the charge in motion is called an **electric current**.

- **Ampere (A)** – unit of charge flow equal to one coulomb of charge past a given point in one second.

$$I = \frac{Q}{t}$$

where:
I = current (ampere)
Q =charge (coulomb)
t = time (second)

❑ The fact that a wire carrying a current can become hot, it is evident that the work done by the applied force in producing the current must be accomplished against some opposition called **resistance**.

- The resistance of a wire varies directly as its **length** and inversely to its **cross sectional area.**

$$R = \rho\left(\frac{L}{A}\right)$$

where:
R = resistance (ohm)
ρ = resistivity (ohm-CM/ft)
L = length (ft)
A = cross sectional area (CM)

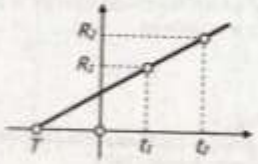
❑ **Circular mils (CM)** - area of a circle having a diameter of **one mil**.

$$A = (d)^2$$

where:
A = cross sectional area (CM)
d = diameter (mils)

Note:
1 inch = 1,000 mils
1 MCM = 1,000 CM

❑ Experiments have shown that the resistance of all wires generally used in practice in electrical systems, increases as the temperature increases.



$$\frac{R_2}{R_1} = \frac{T + t_1}{T + t_2}$$

where:
R_1 = resistance at temperature 1
R_2 = resistance at temperature 2
t_1 = temperature 1
t_2 = temperature 2
T = inferred absolute temperature = temperature when resistance of a given material is zero.

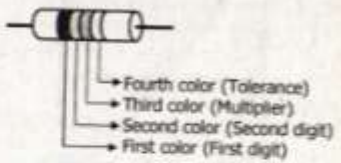
Material	Ω-CM/ft	T (°C)
Silver	9.9	243
Copper	10.37	234.5
Aluminum	17	236
Tungsten	33	202
Zinc	36	250
Nickel	47	147

❑ Common types of resistors:

- **Wire wound resistor** – a special type of wire called resistance wire is wrapped around an insulating core. Its wattage ratings are available from 5 watts or more.
- **Carbon composition resistor** – this resistor is made from finely divided carbon mixed with a powdered insulating material as a binder. Its wattage ratings are available are 1/8 to 2 watts.

❑ Resistor color code

Color	Digit	Multi -plier	Tole-rance
Black	0	1	
Brown	1	10^1	
Red	2	10^2	
Orange	3	10^3	
Yellow	4	10^4	
Green	5	10^5	
Blue	6	10^6	
Violet	7	10^7	
Gray	8	10^8	
White	9	10^9	
Gold		10^{-1}	±5%
Silver		10^{-2}	±10%
No color			±20%



- **Tolerance** – the amount in percent by which the actual resistance can be different from the color coded value.

Example:

What is the resistance of a carbon resistor with the following color bands, **brown, black, orange** and **gold**?

Fist digit = 1 (brown)
Second digit = 0 (black)
Multiplier = 10^3 (orange)
Tolerance = ±5%

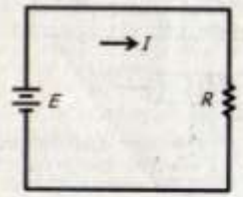
Thus, its ohmic value is **10 x 10^3** or **10,000 ohms** ±5%

- **Conductance (G)** is a measure of the material's ability to conduct electric current.

$$G = \frac{1}{R}$$

where:
G = conductance (mho or siemens)
C = resistance (ohm)

- **Ohm's Law** states that the current flowing in an electric circuit is directly proportional to the impressed emf applied to the circuit and inversely to the equivalent resistance of the said circuit.



$$I = \frac{E}{R} \Leftrightarrow R = \frac{E}{I} \Leftrightarrow E = IR$$

where:
E = impressed voltage (volt)
I = current drawn (ampere)
R = resistance (ohm)

- **Electrical power** – rate of using the electrical energy

$$P = EI \Leftrightarrow P = I^2R \Leftrightarrow P = \frac{E^2}{R}$$

where:
P = electrical power (watt)
E = voltage (volt)
I = current (ampere)
R = resistance (ohm)

Other practical units of power:

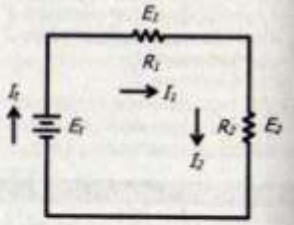
1 horsepower (Hp)=746 watts
1 kilowatt (kW)=1,000 watts
1 megawatt (MW) =1,000,000 watts

- **Kilowatt-hour (kW-hr)** – unit in which electrical energy is sold to a customer.

$$W = Pt$$

where:
W = energy consumption (kW-hr)
P =power drawn (kW)
t = time of usage (hour)

- **Series circuit** – the load resistances are connected end to end.



- Total resistance is equal to the sum of the individual resistance connected in the circuit.

$$R_t = R_1 + R_2 + \ldots + R_n$$

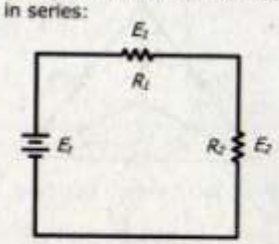
- Total voltage is equal to the sum of the voltage drop across each resistance in the circuit.

$$E_t = E_1 + E_2 + \ldots + E_n$$

- Total current is equal to the current in each resistance in the circuit.

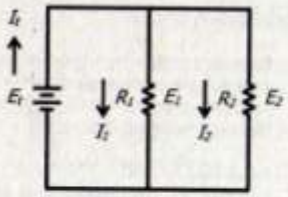
$$I_t = I_1 = I_2 = I_n$$

- **Voltage Division Theorem** (VDT) in two resistors connected in series:



$$E_1 = \frac{E_t R_1}{R_1 + R_2} \Leftrightarrow E_2 = \frac{E_t R_2}{R_1 + R_2}$$

- **Parallel circuit** – the load resistances are connected across each other.



- Total resistance is equal to the reciprocal of the sum of the reciprocals of the individual resistance connected in the circuit.

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots + \frac{1}{R_n}$$

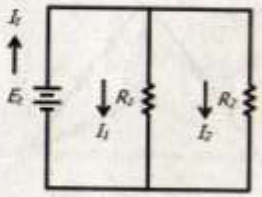
- Total voltage is equal to the voltage drop across each resistance in the circuit.

$$E_t = E_1 = E_2 = E_n$$

- Total current is equal to the sum of the currents in each resistance in the circuit.

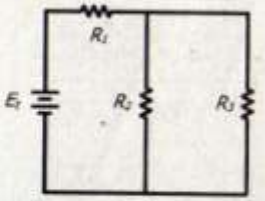
$$I_t = I_1 + I_2 + \ldots + I_n$$

- **Current Division Theorem** (CDT) in two resistors connected in parallel:



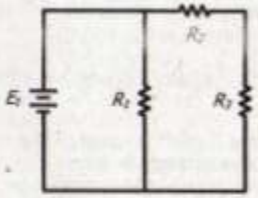
$$I_1 = \frac{I_t R_2}{R_1 + R_2} \Leftrightarrow I_2 = \frac{I_t R_1}{R_1 + R_2}$$

- **Series-parallel circuit** – a combinational circuit which when simplified will result into a series circuit.



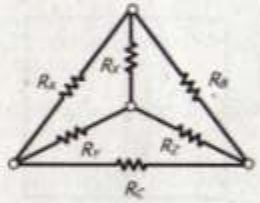
$$R_t = R_1 + \frac{R_2 R_3}{R_2 + R_3}$$

❑ **Parallel-series circuit** – a combinational circuit which when simplified will result into a parallel circuit.



$$R_t = \frac{R_1(R_2+R_3)}{R_1+(R_2+R_3)}$$

❑ **Delta and wye** connected resistances



where:
R_X, R_Y, R_Z = wye-connected resistors
R_A, R_B, R_C = delta-connected resistors

- Conversion from **delta** connected to **wye** connected:

$$R_X = \frac{R_A R_B}{R_A+R_B+R_C}$$

$$R_Y = \frac{R_A R_C}{R_A+R_B+R_C}$$

$$R_Z = \frac{R_B R_C}{R_A+R_B+R_C}$$

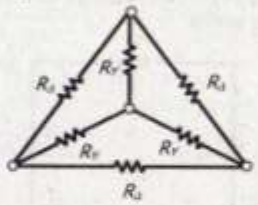
- Conversion from **wye** connected to **delta** connected:

$$R_A = \frac{R_X R_Y + R_Y R_Z + R_Z R_X}{R_Z}$$

$$R_B = \frac{R_X R_Y + R_Y R_Z + R_Z R_X}{R_Y}$$

$$R_C = \frac{R_X R_Y + R_Y R_Z + R_Z R_X}{R_X}$$

- Conversion for identical resistances connected delta or wye:



$$R_Y = \frac{R_\Delta}{3}$$

$$R_\Delta = 3R_Y$$

❑ **Cell** is a single unit for electrolysis (process of converting chemical energy to electrical energy).

Classification of cells:

- **Primary cell** –This type of cell **cannot be recharged**. After it has delivered its rated capacity, the cell must be discarded.
- **Secondary cell** – This type of cell **can be recharged** due to its chemical action can be reversed.

Cell	Volt	Type
Carbon Zinc	1.5	Primary
Zinc-chloride	1.5	Primary
Manganese -zinc	1.5	Primary or Secondary
Mercury-oxide	1.35	Primary
Silver-oxide	1.5	Primary
Lithium	3.0	Primary
Lead-acid	2.0	Secondary
Nickel cadmium	1.25	Secondary
Nickel-iron	1.2	Secondary
Silver-zinc	1.5	Secondary
Silver-cadmium	1.1	Secondary

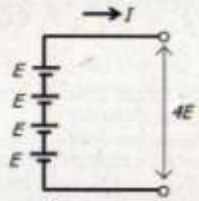
Classification of cells according to type of chemicals used:

- **Wet cell** – uses liquid chemicals
- **Dry cell** – contains a chemical paste

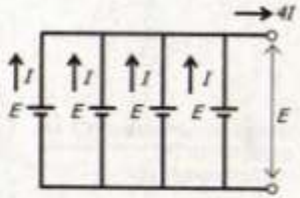
Sizes for popular types of dry cells:

Size	Height	Diameter
D	2 ¼ in	1 ¼ in
C	1 ⅜ in	1 in
AA	1 7/8 in	9/16 in
AAA	1 ¾ in	3/8 in

❑ Cells are connected in **series** in order to have a **high voltage** output.



❑ Cells are connected in **parallel** in order to have a **high current** output

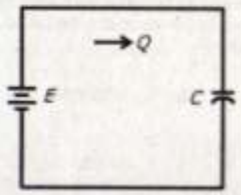


❑ **Capacitor or condenser** - a device on which electric charges can be stored so as to posses electrical potential. It consists of **two conducting plates** separated by a layer of an insulating medium called **dielectric**.

$$C = \frac{\Sigma_o \Sigma_r A}{d}$$

where:
C = capacitance (farad)
A = area (size) of the plate (m^2)
d = distance between plates (m)
Σ_o = permittivity of free space
*= **8.854×10^{-12} F/m***
Σ_r = dielectric constant

Material	Σ_r
Air	1
Glass	4.2
Mica	5 to 9
Paper	3.5
Porcelain	5.5
Oil	2 to 5



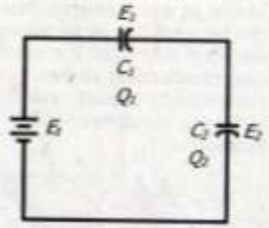
$$Q = CE$$

$$C = \frac{Q}{E}$$

$$E = \frac{Q}{C}$$

where:
Q = charge accumulated (C)
C = capacitance (F)
E = voltage across (E)

❑ Series connected capacitors.



- Total capacitance is equal to the reciprocal of the sum of the reciprocals of the individual capacitance connected in the circuit.

$$\frac{1}{C_t} = \frac{1}{C_1} + \frac{1}{C_2} + \ldots + \frac{1}{C_n}$$

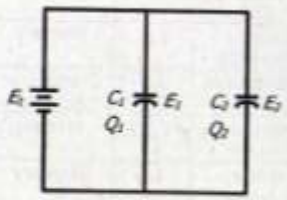
- Total voltage is equal to the sum of the voltage drops across each capacitance in the circuit.

$$E_t = E_1 + E_2 + \ldots + E_n$$

- The charges accumulated in each capacitor are equal to each other.

$$Q_t = Q_1 = Q_2 = Q_n$$

❑ Parallel connected capacitors



- Total capacitance is equal to the sum of the individual capacitance connected in the circuit.

$$C_t = C_1 + C_2 + \ldots + C_n$$

- Total voltage is equal to voltage drops across each capacitance in the circuit.

$$E_t = E_1 = E_2 = E_n$$

- Total charges accumulated is equal to the sum of the charges stored in each capacitor in the circuit.

$$Q_t = Q_1 + Q_2 + \ldots + Q_n$$

❑ Energy stored in a charge capacitor

$$W = \frac{1}{2}CE^2 = \frac{1}{2}QE = \frac{1}{2}\left(\frac{Q^2}{C}\right)$$

where:
W = energy stored (joule)
C = capacitance (farad)
E = voltage across (volt)
Q = charge accumulated (coulomb)

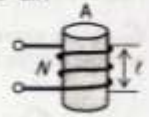
❑ **Elastance (S)** is the reciprocal of capacitance.

$$S = \frac{1}{C}$$

where:
S = elastance (daraf)
C = capacitance (farad)

❑ **Inductor or choke coil** - a two terminal device that consist of a coiled wire wound in common core or in free air.

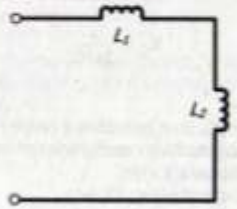
$$L = \frac{\mu_o \mu_r A N^2}{\ell}$$



where:
L = inductance in henry
μ_o = permeability of free space
= $4\pi \times 10^{-7}$ henry per meter
μ_r = relative permeability of core
A = cross sectional area per turn
N = number of turns
ℓ = mean length of magnetic path

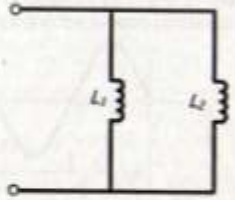
Material	μ_R
Air	1
Magnetic iron	200
Nickel	100
Permalloy	8,000
Mumetal	20,000
Copper-zinc ferrite	1,500

❑ Series connected inductors



$$L_t = L_1 + L_2 + \ldots + L_n$$

❑ Parallel connected inductors



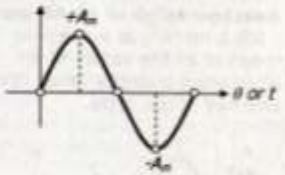
$$\frac{1}{L_t} = \frac{1}{L_1} + \frac{1}{L_2} + \ldots + \frac{1}{L_n}$$

❑ Energy stored in an inductor carrying a current:

$$W = \frac{1}{2}LI^2$$

where:
W = energy (joule)
L = inductance (henry)
I = current (ampere)

❑ The fundamental **sinusoidal AC wave** equation.



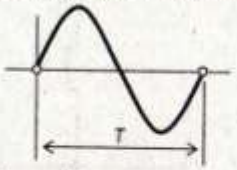
$$y(\theta) = A_m \sin\theta$$

$$y(t) = A_m \sin wt$$

$$w = 2\pi f$$

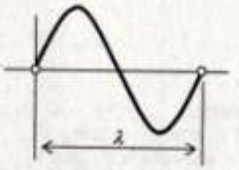
where:
y = instantaneous value of the wave
A_m = maximum or peak value
θ = angle of rotation (degree)
t = time (second)
w = angular velocity of the wave (radian/second)
f = frequency (hertz)

- **Period (T)** of an alternating wave is the time needed in seconds to produced one cycle



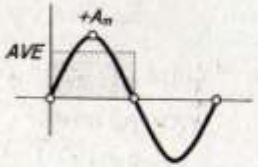
where:
T = period (second)
f = frequency (Hz)

- **Wavelength** (λ) is the length of the alternating wave for one complete cycle.



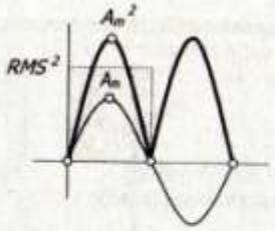
where:
λ = wavelength (m)
Vc = velocity of light (3 x 10⁸ m/s)
f = frequency (Hz)

- **Average value of an AC wave** - the arithmetical average or mean of all the values of an alternating quantity taken over one half of the cycle.



$AVE = 0.636A_m$

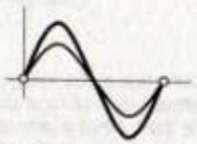
- **RMS (root-mean square) value of an AC wave** is defined as the square root of the average of the squares of the given quantity taken over a complete period.



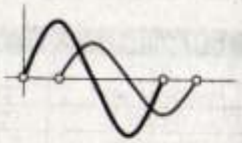
$RMS = 0.707A_m$

- Phase relation among waves:

- **In-phase waves** – waves that occur at the same time



- **Out-of phase waves** - waves that do not occur at the same time



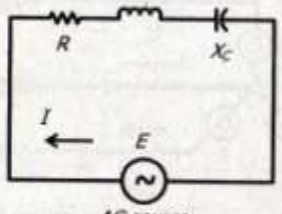
- **Reactance** – property of an inductor or a capacitor to oppose current flow in a given circuit

$$X_L = 2\pi fL$$

$$X_C = \frac{1}{2\pi fC}$$

where:
X_L = inductive reactance (ohm)
X_C = capacitive reactance (ohm)
f = frequency (Hz)
C = capacitance (farad)
L = inductance (henry)

- **Impedance (Z)** – the joint effect of combining resistance and reactance in an AC circuit.



$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$I = \frac{E}{Z}$$

where:
Z = impedance (ohm)
E = supply voltage (volt)
I = current drawn (ampere)

- Active, Reactive and Apparent powers drawn by an AC circuit.

$$P = EI\cos\theta$$

$$Q = EI\sin\theta$$

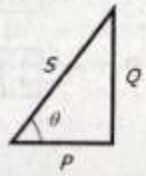
$$S = EI$$

where:
P = active or real power (watt)
Q = reactive power (var)
S = apparent power (volt-ampere)
cos θ = power factor

- Triangular relationship between the active, reactive and apparent powers

$$S = \sqrt{P^2 + Q^2}$$

$$\cos\theta = pf = \frac{P}{S}$$



- Types of power factor:

- **Unity pf** – the voltage and current are in phase.

  Examples of unity pf loads: resistive loads such as incandescent lamps, electric flat irons, water heaters, etc

- **Lagging pf** - the current lags the voltage by an acute angle θ.

  Examples of lagging pf loads: inductive loads such as electric motors, fluorescent lamps, door bells, electric fans, television set, air-conditioning unit, etc (loads with a winding or a coil on it).

- **Leading pf** - the current leads the voltage by an acute angle θ.

  Examples of leading pf loads: capacitve lods such as synchronous motors

- **Admittance (Y)** is the reciprocal of impedance

$$Y = \frac{1}{Z}$$

where:
Y = admittance (mho or siemens)
Z = impedance (ohm)

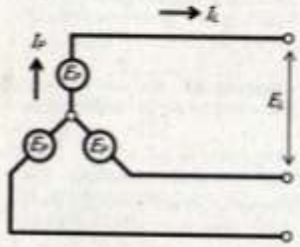
- **Resonance** – a circuit phenomenon wherein the circuit power factor is unity.

$$f = \frac{1}{2\pi\sqrt{LC}}$$

where:
fr = resonant frequency(hertz)
L = inductance (henry)
C = capacitance (farad)

❑ Voltage and current relationship in a three-phase balanced system.

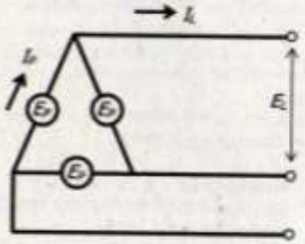
- **Wye-connected system**



$$E_L = \sqrt{3}\, E_p \Leftrightarrow I_L = I_p$$

where:
V_L = *line to line voltage*
V_P = *line to ground voltage or phase voltage*
I_L = *line current*
I_P = *phase current*

- **Delta-connected system**



$$E_L = E_p \Leftrightarrow I_L = \sqrt{3}\, I_p$$

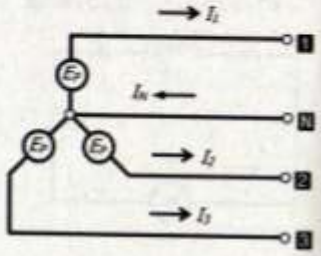
❑ Three-phase power formulas

$$P = 3E_pI_p \cos\theta = \sqrt{3}E_L I_L \cos\theta$$

$$Q = 3E_pI_p \sin\theta = \sqrt{3}E_L I_L \sin\theta$$

$$S = 3E_pI_p = \sqrt{3}E_L I_L$$

❑ Approximate neutral current in a three 4-wire system



$$I_N = \sqrt{\frac{(I_1)^2 + (I_2)^2 + (I_3)^2}{-(I_1I_2) - (I_2I_3) - (I_3I_1)}}$$

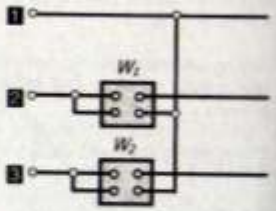
where:
I_N = *neutral current*
I_1, I_2 *and* I_3 = *currents in the three lines conductors*

❑ **Two-wattmeter method** of measuring three-phase power.

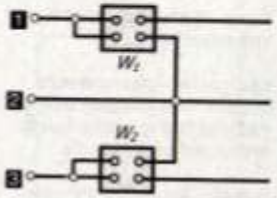
Procedure:

Connect the current coils of the two wattmeters in each of the two lines while the potential coils are connected to these two lines and to the third line (common point).

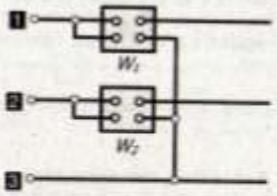
- using line 1 as the common potential terminal



- using line 2 as the common potential terminal



- using line 3 as the common potential terminal



$$P_{total} = W_1 + W_2$$

where:
W_1, W_2 = *wattmeter readings*

❑ Classification of tools

a. **Hand tools** are tools operated by our hands without the need of electricity to operate it.

Examples: Screw drivers, Electrician's pliers, Hacksaw, etc.

b. **Machine tool are tools operated by our hands with electricity to operate it.**

Examples: Electric drill, Soldering gun, Electric pipe cutter, etc.

- **C-clamp** – used in holding objects together while they are being assembled
- **Center punch** – used for marking metal parts
- **Electrician's knife** – used by electricians to removed insulation of large wires or big cables.
- **File** – used to remove rough edges
- **Gimlet** – used to make an initial hole for wood screws
- **Hacksaw** – used for cutting metals
- **Hammer** – used for striking hard objects like nails, etc.
  a. **Claw hammer** – used for pulling out nails
  b. **Ball pen hammer** – used to flatten metal surfaces
  c. **Soft-faced hammer** – used in rewinding jobs
- **Handrill and bit** – used for boring holes
- **Hickey** – used in bending small size pipes
- **Micrometer** – used to measure the diameter of small wires in mils.
- **Pipe-cutter** – use cut small size of pipes
- **Pipe-threader** –used in threading pipes
- **Pipe-vise** – used to hold down the pipe while it is being cut

- **Pliers** – used for cutting, twisting or gripping electrical components.
  a. **Lineman's pliers** (Side-cutting pliers)
  b. **Long nose pliers**
  c. **Diagonal pliers** (simply called "cutter" in the practice)
  d. **Mechanical pliers**
- **Puller** – used for pulling out gears, bearings or bushings
- **Push-pull tape rule** – a length measuring tool
- **Reamer** – used to cut away the rough edges inside the pipe after being cut
- **Screw drivers** –used to turn or drive screws with slotted heads.
  a. Standard screw driver
  b. Phillips screw driver
  c. Stubb screw driver (short in length)
- **Wire stripper** – used in removing the insulation of small size wires.
- **Wrenches** – used to tightened or loosened objects
  a. **Adjustable wrench** –size is adjustable
  b. **Open-end wrench** – used to grip the nut only in two sides
  c. **Box wrench** – used to grip the nut in all sides
  d. **Allen wrench** – used for hexagonally shaped nuts
  e. **Vise-grip wrench** – used to locked on the objects and grip it
  f. **Pipe wrench** – used for gripping pipes only

❑ Types of electrical measuring instruments:

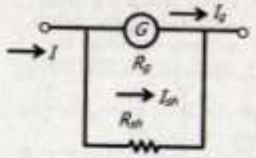
- **Indicating instruments** – devices that indicate directly the value of the quantity being measured on the scale.

  Examples: Voltmeters, ammeters, ohmmeters, etc.
- **Integrating instruments** – device that combines two or more electrical quantities and registers it as a single equivalent unit.

  Examples: kW-hr meters, power factor meters, etc.
- **Recording instruments** – devices that give a record of the variations of the electrical quantity being measured over a period of time.

  Examples: Load-graph, seismograph, chronograph, etc.

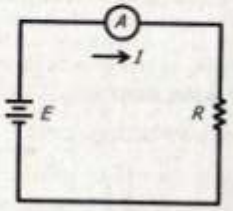
❑ **Ammeter shunts** – used to extend the range of an ammeter



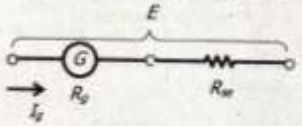
$$I = I_g + I_{sh} \Leftrightarrow I_g R_g = I_{sh} R_{sh}$$

where:
R_g = *galvanometer coil resistance*
R_{sh} = *shunt resistance*
I_{sh} = *current in the shunt resistance*
I = *current to be measured*

Note:
An ammeter is always connected in **series** with the load.



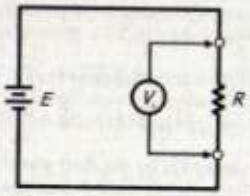
❑ **Potential divider** – used to extend the range of a voltmeter



$$E = I_g(R_g + R_{se})$$

where:
E = *voltage to be measured*
I_g = *galvanometer current*
R_g = *galvanometer coil resistance*
R_{se} = *potential divider resistance*

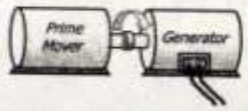
Note:
A voltmeter is always connected **in parallel** to the load whose voltage across is to be determined.



Instrument	Quantity measured
Ammeter	Current
Caloriemeter	Heat generated
Clamp ammeter	Current
Dynamometer	Mechanical output of a motor
Frequency meter	Frequency
Galvanometer	Small voltage or current
Hydrometer	Specific gravity of the liquid in a battery
Inductometer	Inductance
Kilowatt-hour meter	Electrical energy consumption
Megger	Insulation resistance
Ohmmeter	Resistance
Oscilloscope	Waveform characteristics
Photometer	Luminous intensity of light
Power factor meter	Power factor
Pyrometer	High temperatures
Synchroscope	Alternator's synchronization
Tachometer	Speed of shaft
Thermometer	Temperature
Voltmeter	Voltage
Wattmeter	Active power

❑ **Generator** is a machine used to converts mechanical energy to electrical energy.

Prime mover is a machine that drives the generator



❑ Main parts of a dc generator:

- **Yoke or Frame** – it is cylindrical in form to which an even number of poles are bolted. It is either made from cast iron or cast steel.
- **Armature core and winding** - the core is cylindrical in form made from sheet steel laminations with slots that carry the armature windings.
- **Poles and Field windings** – it is used to generate magnetic lines of flux.
- **Commutator** - it is cylindrical in shape and consists of hard drawn copper conductors insulated from each other. It is also called a mechanical rectifier.
- **Brushes** - used to connect the external load circuit load to the armature. It is made from carbon particles and are held in position by spring pressures.

❑ Types of armature windings:

- **Lap winding** – a winding that forms a loop as it expands around the armature core. It is suitable for **high current** dc generators.
- **Wave winding** – a winding that forms a wave as it expands around the armature core. It is suitable for **high voltage** dc generators.

❑ Number of armature current paths:

- for **lap** winding

$$a = mP$$

- for **wave** winding

$$a = 2m$$

where:
a = number of current paths
P = number of poles
m = multiplicity factor
= 1, if simplex (one coil)
= 2, if duplex (two coils)

❑ Generated emf equation of a dc generator

$$E = \frac{PNZ\Phi}{60a}$$

where:
E = generated emf (volt)
P = number of poles
N = speed of prime mover (rpm)
Z = number of armature conductors
ϕ = flux per pole (weber)
a = number of current paths

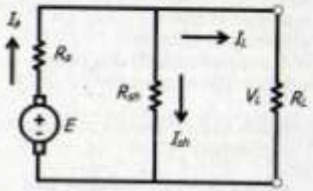
Note: 1 weber = 1 x 10^8 maxwells

❑ **Exciter** - an external equipment used to supply voltage to the field windings of a generator.

- **Self-excited generator** – the field winding is excited from its own generated in the armature.
- **Separately-excited generator** – the field winding is excited from a separate source such as a battery.

❑ Types of self-excited dc generators according to connection:

- **Shunt generator** – the field and armature windings are connected across each other.



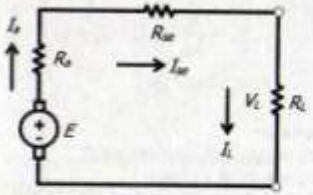
$$I_{sh} = \frac{V_L}{R_{sh}}$$

$$I_a = I_L + I_{sh}$$

$$E = V_L + I_a R_a$$

where:
E = generated emf
V_L = load voltage
R_a = armature winding resistance
R_{sh} = shunt field winding resistance
I_a = armature current
I_{sh} = shunt field current
I_L = load current

- **Series generator** – the field and the armature windings are connected in series.

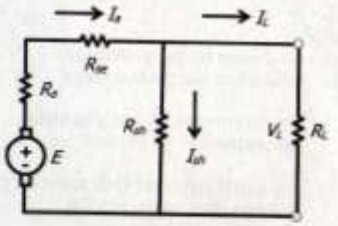


$$I_L = I_a = I_{se}$$

$$E = V_L + I_a(R_a + R_{se})$$

where:
R_{se} = series field winding resistance
I_{se} = series field current

- **Long shunt compound generator** – the series field winding is connected in series with the armature winding while the shunt field winding is connected across the series combination.

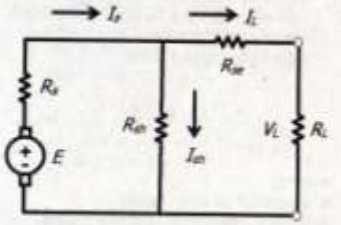


$$I_{sh} = \frac{V_L}{R_{sh}}$$

$$I_a = I_L + I_{sh}$$

$$E = V_L + I_a(R_a + R_{se})$$

- **Short shunt compound generator** – the series field winding is connected in series with the load while the shunt field winding is connected across the armature winding.



$$I_{sh} = \frac{V_L + I_L R_{se}}{R_{sh}}$$

$$I_a = I_L + I_{sh}$$

$$E = V_L + I_a R_a + I_L R_{se}$$

❑ **Voltage regulation (%VR)** – percentage rise in voltage at the terminals of a generator when the load is removed.

$$\%VR = \left(\frac{V_{NL} - V_{FL}}{V_{FL}}\right) x\ 100\%$$

where:
V_{NL} = *no-load terminal voltage*
V_{FL} = *full-load terminal voltage*

❑ Requirements for the **parallel operation** of dc generators:

- the same external characteristics or behaviors when loaded
- terminal voltage of each machine must be numerically equal
- terminal polarity must be the same

❑ **Motor** is a machine that converts electrical energy to mechanical energy. It is the opposite of a generator.

❑ **Speed-torque characteristics** of a dc motor:

- The speed of a dc motor is directly proportional to the back emf and inversely as the flux generated per pole.

$$N = k\left(\frac{E_b}{\Phi}\right)$$

where:
N = *speed of the motor*
Φ = *flux generated on the poles*
E_b = *back emf or counter emf*
k = *proportional constant*

- The torque exerted by a dc motor is directly proportional to both the armature current drawn and the flux generated per pole.

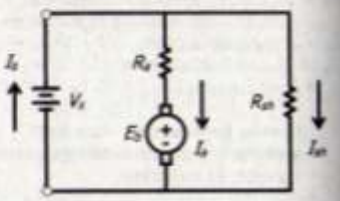
$$T = k\, I_a \Phi$$

where:
T = *torque exerted*
I_a = *armature current*
Φ = *flux generated on the poles*
k = *proportional constant*

❑ Types of dc motors according to connection:

- **Shunt motor** – the field and armature windings are connected in parallel across the supply voltage. This machine is used where almost a constant speed is required.

Examples, in lathe machines, wood working machines and other machine tools.



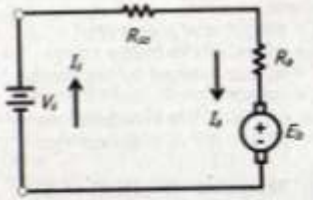
$$I_{sh} = \frac{V_s}{R_{sh}} \Leftrightarrow I_s = I_a + I_{sh}$$

$$E_b = V_s - I_a R_a$$

where:
E_b = *back or counter emf*
V_S = *supply voltage*
R_a = *armature winding resistance*
R_{sh} = *shunt field winding resistance*
I_a = *armature current*
I_{sh} = *shunt field current*
I_S = *current drawn from supply*

- **Series motor** – the field and the armature windings are connected in series across the supply voltage. This machine is used where (a) the load suddenly comes and goes after some time (b) where constant speed is not essential.

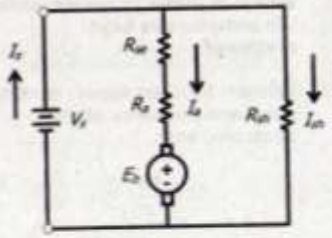
Examples, in punching machines, presses, power hammers, lifting machines, etc.



$$I_a = I_s$$

$$E_b = V_s - I_a(R_a + R_{se})$$

- **Long shunt compound motor** – the series field winding is connected in series with the armature winding and connected in parallel with the shunt field winding.

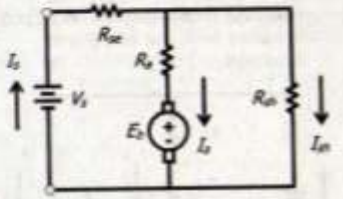


$$I_{sh} = \frac{V_s}{R_{sh}}$$

$$I_s = I_a + I_{sh}$$

$$E_b = V_s - I_a(R_a + R_{se})$$

- **Short shunt compound motor** – the series field winding is connected in series with the supply voltage while the shunt field winding is connected across the armature winding.



$$I_{sh} = \frac{V_s - I_a R_{se}}{R_{sh}}$$

$$I_s = I_a + I_{sh}$$

$$E_b = V_s - I_a R_{se} - I_a R_a$$

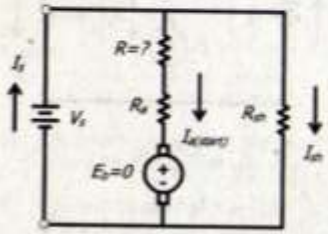
❑ Types of compound motors according to methods of compounding used:

- **Differential compound motor** – the series field winding is so connected so that the flux produced by it **opposes** that of the flux produced by the shunt field winding
- **Cumulative compound motor** – the series field winding is so connected so that the flux produced by it **aids or assists** the flux produced by the shunt field winding.

❑ **Speed regulation (%NR)** – percentage rise in speed when load is removed

$$\%NR = \left(\frac{N_{no\text{-}load} - N_{full\text{-}load}}{N_{full\text{-}load}}\right) x\ 100\%$$

❑ **DC motor starting** - at starting, the motor draws a high armature current. The reason of this high starting current is the back emf, since at starting its value is **zero**. To reduce the starting current, a **starting resistor** (rheostat) is connected in series with the armature windings.



$$R = \frac{V_t}{I_{a(start)}} - R_a$$

where:
R = resistance of starting resistor
R_a = armature winding resistance
$I_{a(start)}$ = armature current at starting
V_t = supply voltage

❑ **Motor reversion** – the direction of rotation of a DC motor is reversed by any of the following methods

- interchange the terminals of the armature windings
- interchange the terminals of the field windings

❑ **Speed control** - the speed of a dc motor can be controlled by varying the resistance of a rheostat connected in series to any of the following:

- a rheostat in series with the armature windings
- a rheostat in series with the field windings (common method)
- a rheostat in series with the supply terminals

❑ **Power rating of a dc motor** is the maximum safest mechanical power it can deliver to the load.

$$P = \frac{2\pi NT}{k}$$

where:
P = mechanical power (hp)
N = speed of the motor (rpm)
T = torque exerted by the motor
k = constant
= 44,760 if T is in newton-meter
= 33,000 if T is in pound-foot

❑ **Standard HP rating of dc motors**:

1/4, 1/3, 1/2, 3/4, 1, 1 ½, 2, 3, 5, 7 ½ , 10, 15, 20, 25, 30, 40, 50, 60, 75, 100, 125, 150, 200

❑ **Alternator** – an alternating current generator. The working principle is exactly the same as that of a dc generator. However in alternators it is the **field which is made to rotate** while the **armature is kept stationary**.

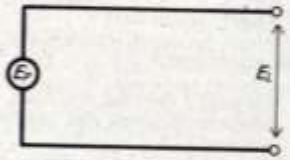
❑ Relation between speed, number poles and frequency of the generated emf:

$$f = \frac{PN}{120}$$

where:
N = speed (rpm)
P = number of poles
f = frequency (Hz)

❑ Types of alternator as to **number of phases**:

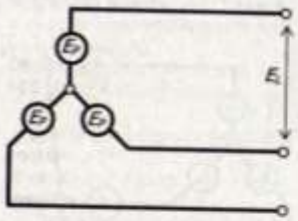
- **Single-phase alternator** – there is only one winding used.



$$E_L = E_P$$

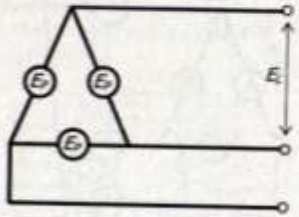
- **Three phase alternator** – there are three separate windings used.

Wye-connected windings:



$$E_L = \sqrt{3}\, E_P$$

Delta-connected windings:



$$E_L = E_P$$

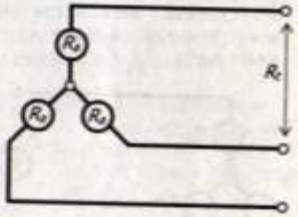
where:
E_P = generated voltage per winding or per phase voltage
E_L = line to line voltage or voltage measured between any two line conductors of the alternator

❑ Tests on alternators:

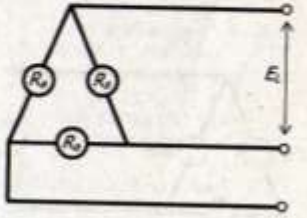
- **Resistance test** – use to evaluate the resistance of the windings per phase

Test procedures:

1. Stop the machine from running and disconnect all loads
2. Using an ohmmeter, measure the resistance between any two lines.



$$R_a = \frac{R_t}{2}$$



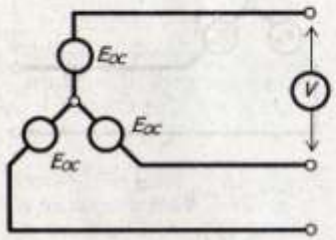
$$R_a = \frac{3}{2} R_t$$

where:
R_a = dc armature resistance per phase
R_t = measured resistance in any two terminals of the alternator

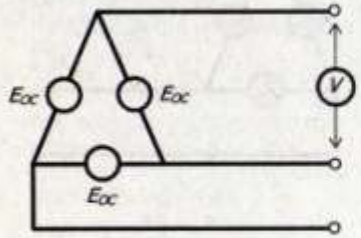
- **No load test or Open circuit test**

Test procedures:

1. Connect a rheostat and a DC ammeter in series with the field winding.
2. Run the machine at synchronous speed.
3. Measure the voltage across any two lines of the generator using an AC voltmeter.
4. djust the rheostat resistance so that the AC voltmeter will read approximately equal to the rated line to line voltage of the alternator.



$E_{oc} = \sqrt{3}\ V$



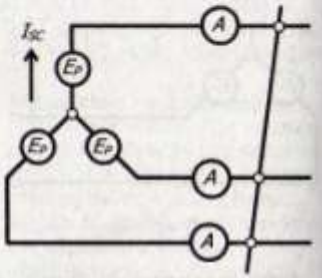
$E_{oc} = V$

where:
E_{oc} = voltage generated per phase during the test
V = line to line voltage as measured by the voltmeter

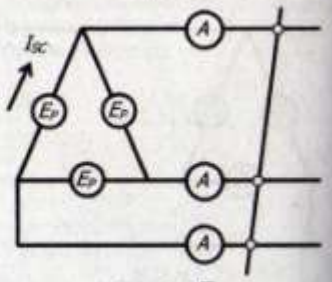
- **Short circuit test**

Test procedures:

1. Connect a rheostat and a DC ammeter in series with the field winding.
2. Connect three AC ammeters in wye connection to the armature terminals.
3. Run the alternator at synchronous speed and slowly adjust the rheostat so that the DC ammeter will read the field current used in the open circuit test.
4. Record the average reading of the three ammeters.



$I_{sc} = I$



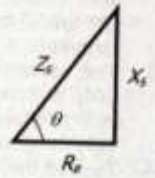
$I_{sc} = I / \sqrt{3}$

where:
I_{sc} = short circuit current carried by each winding
I = average line current as measured by the three ammeters

- The purpose of the open and short circuit tests is to evaluate the synchronous impedance and synchronous reactance of the alternator per phase.

$$Z_s = \frac{E_{oc}}{I_{sc}}$$

$$X_s = \sqrt{(Z_s)^2 - (R_a)^2}$$

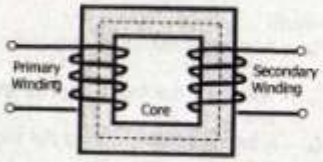


where:
Z_s = synchronous impedance per phase
X_s = reactance per phase

- Requirements for parallel operation of alternators:

- operating frequency must be equal
- line to line voltage must be equal
- phase sequence must be the same

- **Transformer** - a static device by which electrical energy is being transferred from one alternating current circuit to another without a change in frequency.



- Main parts of a transformer:

  a. **Primary winding** – the winding which is receiving power from the source.

  b. **Secondary winding** – the winding which is supplying power to the load.

  c. **Core** – part which serves as the medium for magnetic flux

- Classifications of transformers:

- **According to the core used**

  1. Core type transformer
  2. Shell type transformer, etc

- **According to method of cooling the windings**

  1. Self-cooled transformer
  2. Oil-self cooled transform
  3. Force-oil cooled transformer
  4. Force-air cooled transformer , etc

- **According to purpose or applications**

  1. Distribution type transformer
  2. Instrument type transformer
  3. Power transformer
  4. Welding transformer
  5. Rectifier transformer
  6. Regulating transformer
  7. Lighting transformer, etc

- **According to voltage transformation**

  1. Step-up transformer (low to high)
  2. Step-down transformer (high to low)

❑ Ideal transformation ratios:

$$\frac{E_1}{E_2}=\frac{N_1}{N_2}\Leftrightarrow\frac{I_1}{I_2}=\frac{N_2}{N_1}$$

$$\frac{Z_1}{Z_2}=\left(\frac{N_1}{N_2}\right)^2$$

where:
E_1 = voltage induced in the primary windings
E_2 = voltage induced in the secondary windings
I_1 = primary winding current
I_2 = secondary winding current
Z_1 = ohmic impedance of the primary Windings
Z_2 = ohmic impedance of the secondary windings
N_1 = number of turns in the primary windings
N_2 = number of turns in the secondary windings

❑ Tests on transformers:

- **No load test or Open circuit test** – use to determine the iron loss or core loss of the transformer.

Test procedures:

1. Connect a voltmeter and a wattmeter at the low voltage side of the transformer.
2. Supply the low voltage side with its rated voltage. Use the reading of the voltmeter to check the magnitude of this voltage
3. Record the reading of the wattmeter.

Note: The reading of the wattmeter during the test is equal to the **core losses**.

- **Short circuit test** – use to determine the copper loss, equivalent resistance and impedance of the transformer.

Test procedures:

1. Connect an ammeter, a voltmeter and a wattmeter in the high voltage side of the transformer.
2. Supply the high voltage side with a variable ac source while the low voltage side is short-circuited.
3. The variable ac source is varied until the ammeter will read approximately the rated high side current.
4. Record the readings of the ammeter, voltmeter and the wattmeter.

Note: The reading of the wattmeter during the test is equal to the **copper losses of the transformer at rated load**.

❑ The purpose of the open and short circuit tests is to evaluate the synchronous impedance and synchronous reactance of the alternator per phase.

$$R_e=\frac{P_{sc}}{(I_{sc})^2}$$

$$Z_e=\frac{E_{sc}}{I_{sc}}$$

$$X_e=\sqrt{Z_e^{\,2}-R_e^{\,2}}$$

where:
P_{sc} = wattmeter reading during the short circuit test
E_{sc} = voltmeter reading during the short test
I_{sc} = ammeter reading during the short test

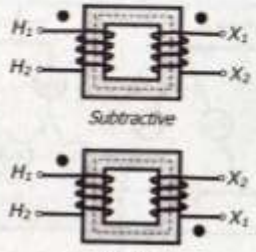
R_e = equivalent resistance referred to the high side
Z_e = equivalent impedance referred to the high side
X_e = equivalent reactance referred to the high side

- **Polarity test**

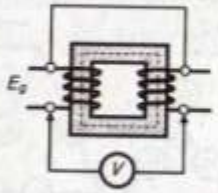
Note: The correct polarity of the terminals of a transformer is needed during parallel operation of transformers and when several transformers are to be banked for three phase applications.

The polarity can be determined using any of the following ways:

- Noting the manner in which the terminals are marked.



- Perform a simple voltmeter test by impressing the high voltage side with a voltage smaller than its rating.

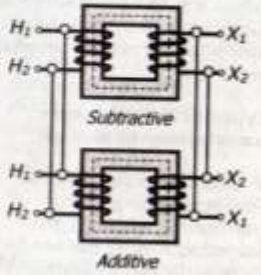


Indications:
If the voltmeter reading (V) is greater than the supply voltage (E_s), polarity is additive while if its reading is smaller than the supply voltage, the polarity is subtractive.

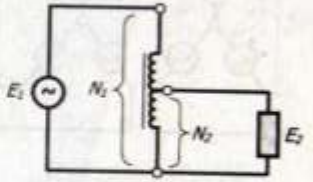
❑ **Parallel operation of transformers**

Requirements:

1. voltage ratio must be the same
2. transformers must be properly connected as to polarity
3. the ratio of the equivalent resistance to reactance of all transformers should be the same.



- **Autotransformer** – a transformer with only one winding common to both primary and secondary windings.



$$\frac{E_1}{E_2}=\frac{N_1}{N_2}$$

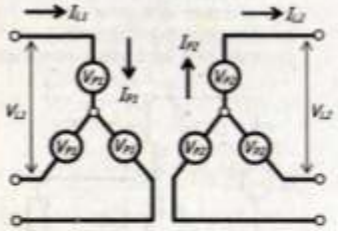
- **Instrument transformers** – used in conjunction with an ammeter or a voltmeter to measure relatively large values of current or voltage.

- **Current transformer (CT)** – the primary terminals is connected in series to the line in which the current flowing through it is to be measured while an ammeter of suitable range is connected across the secondary terminals.

- **Potential transformer (PT)** – the primary terminals is connected across the high voltage line in which the voltage across it is to be measured while a voltmeter of suitable range is connected across the secondary terminals.

- **Types of three-phase transformer bankings:**

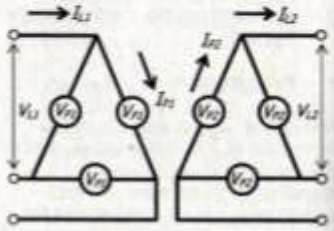
- **Y-Y connection** - has the advantage being all the transformer windings are subjected only to the line to line voltage divided by square root of 3.



$$V_{L1} = \sqrt{3}V_{P1} \Leftrightarrow V_{L2} = \sqrt{3}V_{P2}$$

$$I_{L1} = I_{P1} \Leftrightarrow I_{L2} = I_{P2}$$

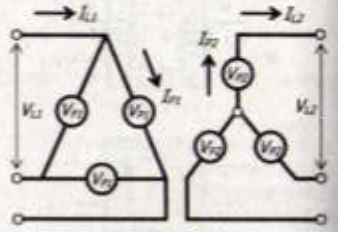
- **Δ-Δ connection** - used for moderate voltages, large current operations.



$$V_{L1} = V_{P1} \Leftrightarrow V_{L2} = V_{P2}$$

$$I_{L1} = \sqrt{3}I_{P1} \Leftrightarrow I_{L2} = \sqrt{3}I_{P2}$$

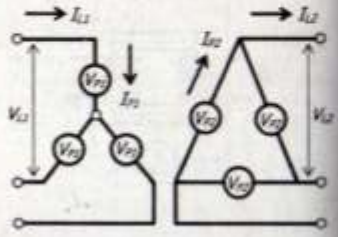
- **Δ-Y connection** - used for stepping up voltages



$$V_{L1} = V_{P1} \Leftrightarrow V_{L2} = \sqrt{3}V_{P2}$$

$$I_{L1} = \sqrt{3}I_{P1} \Leftrightarrow I_{L2} = I_{P2}$$

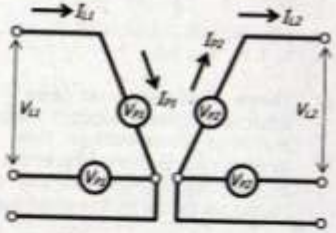
- **Y-Δ connection** - used for stepping down voltages



$$V_{L1} = \sqrt{3}V_{P1} \Leftrightarrow V_{L2} = V_{P2}$$

$$I_{L1} = I_{P1} \Leftrightarrow I_{L2} = \sqrt{3}I_{P2}$$

- **V-V (open delta) connection** - used in applications where load is small and the use of a closed Δ bank is unwarranted. Also used if one of the transformers in a Δ-Δ bank fails or under maintenance procedures.



$$V_{L1} = V_{P1} \Leftrightarrow V_{L2} = V_{P2}$$

$$I_{L1} = I_{P1} \Leftrightarrow I_{L2} = I_{P2}$$

where:
V_L = line to line voltage
V_P = phase voltage
I_L = line current
I_P = phase current

- **Comparison between an open delta bank to a closed delta bank**

$$S_{V\text{-bank}} = \sqrt{3}S_{transformer}$$

$$S_{\Delta\text{-bank}} = 3S_{transformer}$$

$$S_{V\text{-bank}} = 57.73\% \text{ of } S_{\Delta\text{-bank}}$$

where:
$S_{transformer}$ = *kVA rating of each transformers*

- **Standard kVA rating of single-phase transformers**:

1, 1 ½, 2, 3, 5, 7 ½, 10, 15, 20, 25, 30, 37 ½, 50, 75, 100, 150, 167, 200, 250, 333 and 500

- **Standard kVA rating of three-phase transformers**:

3, 6, 9, 15, 20, 25, 30, 37 ½, 45, 50, 60, 75, 100, 112 ½, 150, 200, 225, 300, 400, 500, 750, 1000, 1500 and 2000

- **AC motors**

Types of rotor as to construction:

- **Squirrel cage type** – the rotor consist of aluminum bars located in slots in the iron core and connected to one another by means of heavy cast aluminum rings located on both ends of the core.

- **Wound rotor type** – the rotor has windings that are connected to a commutator.

- **Capacitor motors** – a single-phase induction motor that uses a squirrel cage rotor and a stator that has two windings called the main or run windings and the start or auxiliary windings. The direction of rotation is reversed by interchanging the connection to the start or to the run windings.

Basic parts:
1. rotor
2. stator
3. end plays or brackets
4. centrifugal device
5. stationary switch
6. one or more capacitors

- **Capacitor-start motor** – an electrolytic capacitor is inserted in the start windings. The motor is equipped with a centrifugal switch that disconnects the start winding after the rotor has accelerated to about 75% of its rated speed.

- **Permanent-split capacitor motor** – a capacitor motor having no centrifugal switch. It uses an oiled filled type capacitor instead of an electrolytic type.

- **Two-value capacitor motor** – a capacitor motor using different values of capacitance for the start and run windings.

- **Repulsion-start induction motor** – one of the oldest forms of single-phase induction motor and were widely used from 1930's through 1950's. The rotor has a standard dc armature winding, a commutator of special design and a centrifugal mechanism for short circuiting all the commutator bars when the motor approaches its rated speed.

Features:
a. high starting torque
b. low strating current
c. it is capable of doing well on low voltage
d. most expensive of all single phase motors

- **Universal motor** – it is basically a series dc motor which is specially designed to operate on single-phase ac as well as dc supplies. The direction of rotation is reversed by interchanging the connection to the armature or to the field.

This motor is commonly used in portable tools such as electric drills, saws, etc and in home appliances such as blenders, mixers, vacuum cleaners, etc.

Features:
a. high speed
b. small in size

- **Standard HP rating of single-phase AC motors**:

  1/6, ¼, 1/3, ½, ¾, 1, 1 ½, 2, 3, 5, 7 ½, and 10

- **Three-phase squirrel cage** induction motor – supply voltage is a three-phase voltage. The direction of rotation is reversed by interchanging any two line terminals to the motor windings.

Features:
a. more powerful compared to a single-phase
b. no starting windings
c. not noisy, unlike single-phase motors which vibrate at a rate of twice the frequency of the AC voltage supplied
d. rotor speed is slower than its synchronous speed

- **Wound rotor induction motor** – it consists of a rotor core with three windings in place at the conducting bars of the squirrel cage rotor. The advantage of having windings in the rotor is that the wires can brought out through the slip rings so that resistance can be added and therefore current through the windings can be controlled.

Features:
a. variable speed capability
b. high starting torque

- **Standard HP rating of three-phase induction type squirrel-cage and wound-rotor type AC motors**

  ½, 3/4, 1, 1 ½, 2, 3, 5, 7 ½, 10, 15, 20, 15, 20, 25, 30, 40, 50, 60, 75, 100, 125, 150, and 200

- **Synchronous motor** – the basic parts are similar to a three-phase synchronous generator. The motor is needs a dc voltage to excite the rotor windings.

Features:
a. under normal condition, it runs at a constant speed
b. it can be used to improved system power factor

- **Standard HP rating of three-phase synchronous motors**:

  25, 30, 40, 50, 60, 75, 100, 125, 150, and 200

- **Overcurrent** – any current in excess of the rated capacity of the equipment or the rated ampacity of the conductor.

Causes of overcurrent:

- overload of the equipment or conductors
- short circuit or ground fault

Types of overcurrent devices:

- fuse
- circuit breaker (CB)

- **Fuse** – an overcurrent protective device with a circuit opening fusible element which opens (break) when there is an overcurrent in the circuit.

General classification:

- **Cartridge fuse** – it is enclosed in insulating tube.
- **Plug fuse** – it is enclosed in porcelain or rubber commonly used in various electrical appliances.
- **Fuse wire** – opened wire of low melting point commonly used in the safety power switch.

Rule of thumb:

Fuses will hold five (5) times their rating for different periods of time based on the type of fuse used.

Non-time delay fuse will hold five times its rating for 1/4 to 2 seconds (not ideal to loads which requires more than 2 seconds to accelerate).

Dual-element time delay fuse will hold five times its rating for 10 seconds.

- Important ratings when choosing replacement fuses:

- **Voltage rating** – the rating must match or exceed the voltage rating of the circuit
- **Amperage rating** – the rating should match the full load current rating of the equipment or ampacity of conductor as closely as possible.
- **Interrupt capacity** – the total current in which the fuse can interrupt without being damage.

- **Circuit breaker** – a mechanical switching device capable of making, carrying and breaking currents under normal or abnormal circuit conditions.

Note: The name of the circuit breaker is taken from the **medium or the manner of extinguishing the arc** produced when the circuit breaker's contacts opened.

- **Air blast type CB** – uses dry and compressed air to extinguish the arc
- **Air type CB** – interruption occurs in free air
- **Oil type CB** – uses a special oil to extinguish the arc
- **Gas type CB –** uses SF6 (sulphur hexaflouride) gas to extinguish the arc
- **Vacuum type CB** – uses a vacuum container

- Important ratings when choosing replacement CB's:

- **Rated voltage, Rated normal current** – values used to designate it and which is related to the operating conditions of the CB
- **Rated breaking capacity** – expressed in MVA as the product of the rated breaking current in kilo-amperes and the corresponding rated voltage in kV.
- **Rated frequency** – frequency of the electrical system in which the CB is to be connected.
- **Rated short time current** – effective value of current in which the CB must carry for a stated time. This requirement is needed since the fault current which has to be cleared by another CB, may have to flow through it.

- Advantages of a fuse over a CB:

- it is reliable (it can stay in position for a long period and can act when needed)
- first cost is cheaper
- it does not require periodic maintenance

- Advantages of a CB over a fuse:

- it can be used again after the fault has been corrected
- its position (open or close) can easily be detected or viewed
- it can act as a switch

- **Standard Ampere ratings of fuses and circuit breakers:**

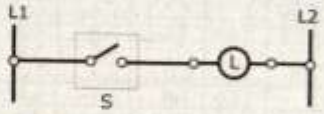
15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000 and 6000

- **Switch** – used to control (switch-on or switch-off) the current path in a circuit.

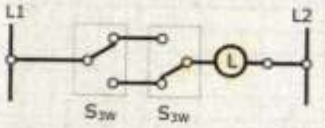
Switch	Symbol
Single pole	S
Duplex (two single pole on one switch plate)	S_2
Triplex (three single pole on one switch plate)	S_3
Double pole	S_{2P}
Three pole	S_{3P}
Automatic door	S_{AD}
Key operated	S_K
Master selector	S_M
Remote control	S_{RM}

- Switches for lamp controls:

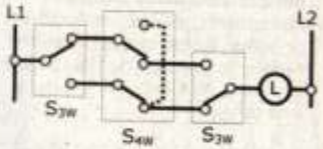
- **SPST (single pole single throw) switch** – used to control a single or group of lamps from one location. This switch has only two terminals.



- **SPDT (single pole double throw) or Three-way switch** – used to control the lamp from two different locations. This switch has three terminals.



- **Four-way switch** – a special type of switch used in conjunction with three-way switches to control a lamp from three or more different locations. This switch has four terminals.



Note: For lamp's control from three or more locations, there should always be two 3-way switches needed and the rest, are 4-way switches.

- for four locations, needs **two 3-way switches** and **two 4-way switches**
- for five locations, needs **two 3-way switches** and **three 4-way switches**

- **Disconnect (safety power switch)** – a mechanical switching device use to isolate a circuit or an equipment from the supply side. It could either be fused or non-fused type.

- **Standard ratings of disconnects in amperes:**

30, 60, 100, 200, 400, 600, 800, 1200, 1400, 1600 and 1800

- **Motor control system** – controls the electrical energy used to run a motor and majority of the devices used to control that energy are in the motor controller.

Devices under motor control system:

- **Power circuit group** – these components carry the rated voltage and current needed to operate or run the motor. These devices commonly includes disconnects, power conductors or wires, fuses, circuit breakers, magnetic contactors, rigid metal conduits, and overload heaters, and others
- **Control circuit group** – these components are necessary in switching power to the motor (on and off) under certain conditions. These devices commonly includes start and stop buttons, relays, limit switches and other sensors, indicating devices (pilot lamps), alarms and others.

❑ **Disconnect switch** – used to isolate the motor from the power source.

Size = 115% of FLA

where:
FLA = Full Load Amperes

Example:

What size of disconnect shall be used in 1 ½ HP, 230 V single-phase motor?

Refer to the table for standard motor's FLA: For 1 ½ HP, 230 V, the FLA is **10 A**.

Size = 115% of FLA
= 1.15 x 10 = 11.5 A

Refer to the table for standard sizes of disconnect, **use 30 A** (minimum standard size of disconnect)

❑ Standard full load amperes (FLA) of **single phase AC motors**

HP	115 V	200 V	208 V	230 V
0.166	4.4	2.5	2.4	2.2
0.25	5.8	3.3	3.2	2.9
0.33	7.2	4.1	4.0	3.6
0.5	9.8	5.6	5.4	4.9
0.75	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8
1.5	20	11.5	11	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7.5	80	46	44	40
10	100	57.5	55	50

Source: Philippine Electrical Code, Part 1

❑ Standard full load amperes (FLA) a of **three-phase induction type squirrel-cage and wound-rotor type AC motors**

HP	115 V	200 V	208 V	230 V
0.50	4	2.3	2.2	2
0.75	5.6	3.2	3.1	2.8
1	7.2	4.1	4.0	3.6
1.5	10.4	6.0	5.7	5.2
2	13.6	7.8	7.5	6.8
3		11.0	10.6	9.6
5		17.5	16.7	15.2
7.5		25.3	24.2	22
10		32.2	30.8	28
15		48.3	46.2	42
20		62.1	59.4	54
25		78.2	74.8	68
30		92	88	80
40		119.6	114.4	104
50		149.5	143	130
60		177.1	169.4	154
75		220.8	211.2	192
100		285.2	272.8	248
125		358.8	343.2	312
150		414	396	360
200		552	528	480

❑ Standard full load amperes (FLA) a of **three-phase induction type squirrel-cage and wound-rotor type AC motors**

HP	460 V	575 V	2300 V	
0.50	1	0.8		
0.75	1.4	1.1		
1	1.8	1.4		
1.5	2.6	2.1		
2	3.4	2.7		
3	4.8	3.9		
5	7.6	6.1		
7.5	11	9		
10	14	11		
15	21	17		
20	27	22		
25	34	27		
30	40	32		
40	52	41		
50	65	52		
60	77	62	16	
75	96	77	20	
100	124	99	26	
125	156	125	31	
150	180	144	37	
200	240	192	49	

Source: Philippine Electrical Code, Part 1

❑ Standard full load amperes (FLA) of a **three-phase synchronous type AC motors**

HP	230 V	460 V	575 V	2300 V
25	53	26	21	
30	63	32	26	
40	83	41	33	
50	104	52	42	
60	123	61	49	12
75	155	78	62	15
100	202	101	81	20
125	253	126	101	25
150	302	151	121	30
200	400	201	161	40

Source: Philippine Electrical Code, Part 1

❑ Standard full load amperes (FLA) of **DC motors**

HP	90 V	120 V	180 V	240 V
0.25	4.0	3.1	2.0	1.6
0.33	5.2	4.1	2.6	2.0
0.50	6.8	5.4	3.4	2.7
0.75	9.6	7.6	4.8	3.8
1	12.2	9.5	6.1	4.7
1.50		13.2	8.3	6.6
2		17	10.8	8.5
3		25	16	12.2
5		40	27	20
7.5		58		29
10		76		38
15				55
20				72
25				89
30				106
40				140
50				173
60				206
75				255
100				341
125				425
150				506
200				675

Source: Philippine Electrical Code, Part 1

- Standard full load amperes (FLA) of **DC motors**

HP	500 V	550 V		
0.25				
0.33				
0.50				
0.75				
1				
1.50				
2				
3				
5				
7.5	13.6	12.2		
10	18	16		
15	27	24		
20	34	31		
25	43	38		
30	51	46		
40	67	61		
50	83	75		
60	99	90		
75	123	111		
100	164	148		
125	205	185		
150	246	222		
200	330	294		

Source: Philippine Electrical Code, Part 1

- **Power circuit conductors** – these conductors carry the full load current to the motor terminals.

Size = 125% of FLA

Example:

Refer to previous example, what size of type THW copper conductors shall be used?

Size = 125% of FLA
= 1.25 x 10
= 12.5 A

Refer to the table for standard ampacity of conductors, use **size 2.0 mm² THW copper** whose ampacity is 15 A.

- Allowable **ampacities** of insulated copper conductors rated 0 – 2000 V, 60°C to 90°C

Size mm²	Temperature rating of conductors			
	60°	75°	85°	90°
	Type TW UF	Types FEPW,RH, RHW, THHW THW, THWN, XHHW, USE, ZW	Type V	Types TBS, SIS, FEP, FEPB, RHH, THHN, THHW, XHHW
2.0	15	15	25	25
3.5	20	20	30	30
5.5	30	30	40	40
8.0	40	45	50	50
14	55	65	70	70
22	70	85	90	90
30	90	110	115	115
38	100	125	130	130
50	120	145	150	150
60	135	160	170	170
80	160	195	205	205
100	185	220	225	225
125	210	225	265	265
150	240	280	295	295
200	280	330	355	355
250	315	375	400	400
325	370	435	470	470
400	405	485	515	515
500	445	540	580	580

Source: Philippine Electrical Code, Part 1

- **Fuse or CB** – used to protect the motor for overcurrent due to faults.

Size = Percentage factor of FLA

Types of Motor	Percentage factor of FLA	
	Non-time delay fuse	Time delay fuse
All AC single phase squirrel cage and synchronous motors with full voltage, resistor or reactor starting:		
No code letter..	300%	175%
Code letter F to V..	300%	175%
Code letter B to E..	250%	175%
Code letter A..	150%	150%
All AC squirrel cage and synchronous motors with autotrans-former strating		
Not more than 30A		
No code letter..	250%	175%
More than 30 A		
No code letter..	200%	175%
Code letter F to V..	250%	175%
Code letter B to E..	200%	175%
Code letter A..	150%	150%
High reactance squirrel cage		
Not more than 30 A		
No code letter...	250%	175%
More than 30 A		
No code letter...	200%	175%
Wound rotor	150%	150%
Direct current		
Not more than 50hp		
No code letter.....	150%	150%
More than 50 hp		
No code letter.....	150%	150%

Source: Philippine Electrical Code, Part 1

Types of Motor	Percentage factor of FLA	
	Instan-taneous trip CB	Inverse time CB
All AC single phase squirrel cage and synchronous motors with full voltage, resistor or reactor starting:		
No code letter..	700%	250%
Code letter F to V..	700%	250%
Code letter B to E..	700%	200%
Code letter A..	700%	150%
All AC squirrel cage and synchronous motors with autotrans-former strating		
Not more than 30A		
No code letter..	700%	200%
More than 30 A		
No code letter..	700%	200%
Code letter F to V..	700%	200%
Code letter B to E..	700%	200%
Code letter A..	700%	150%
High reactance squirrel cage		
Not more than 30 A		
No code letter...	700%	250%
More than 30 A		
No code letter...	700%	200%
Wound rotor	700%	150%
Direct current		
Not more than 50hp		
No code letter.....	250%	150%
More than 50 hp		
No code letter.....	175%	150%

Source: Philippine Electrical Code, Part 1

Note: The size should be selected to the closest lower standard size. However as a rule, if there is no available standard size, the next higher standard size shall be used.

Example:

Refer to previous example, what size of a time delay fuse shall be used to protect the motor from overcurrent?

Referring to the table for the percentage factor to be used for a time delay fuse, use 175%.

Size = 1.75 x 10 = 17.5 A

Therefore **use 15 A** (the closest lower standard size available)

- **Magnetic contactor** – it is basically a large switching relay designed to open or closed the path of current to the motor terminals.

Note: Contactors are manufactured and sized using some **international standards**.

Factors to consider in selecting sizes of contactors:

- voltage rating
- current rating
- horsepower rating
- duty cycle

- **Thermal overload relay** – used to protect the motor during critical overloading periods.

- **Service factor (SF)** – a nameplate data used to determine whether the motor is allowed to carry overloads for a certain period of time.

Size = 125% of FLA (if SF = 1.15)

Size = 115% of FLA

(if SF = 1.0 or not written)

Example:

If the motor of the previous example has a service factor of 1.15, what will be the trip setting of the overload relay to be used?

Setting = 125% of FLA
= 1.25 x 10
= 12.5 A

Note: The number of overload heaters to be used is dependent on types of motor and type of supply system available.

Kind of motor	Type of supply system	Number & location of overload units
single phase AC or DC	2-wire, single phase AC or DC, ungrounded	1 in either conductor
single phase AC or DC	2-wire, single phase AC or DC, one conductor grounded	1 in the ungrounded conductor
Single phase AC or DC	3-wire, single phase AC or DC, grounded neutral	1 in either ungrounded conductor
two phase AC	3-wire, two phase AC, ungrounded	2, one in each phase
two phase AC	3-wire, two phase AC, one conductor grounded	2, in the ungrounded conductors
two phase AC	4-wire, two phase AC, grounded or ungrounded	2, one per phase in ungrounded conductors
three phase	any thee phase	3, one in each phase

Source: Philippine Electrical Code, Part 1

- Sizing the **feeder conductors** and the **feeder protective device** supplying more than one motors:

Conductor size = sum of the motors FLA + 25% of the largest motor FLA

Feeder protection = largest motor protective device + sum of FLA of the remaining motors

Example:

Given the FLA of the three motors as shown below, what is the size of the feeder conductors and the size of the feeder protection to be used?

Motor A = 10 A
Motor B = 12 A
Motor C = 8 A

Conductor size = 10 + 12 + 8
+ 0.25(12)
= 33 A

Refer to the table for standard conductor ampacity, use **8.0 mm²** THW copper conductor whose ampacity is **40 A**.

For the largest motor protection (motor B):
= 250% of FLA
= 2.5 x 12
= 30 A

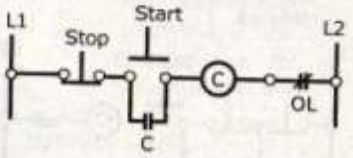
Therefore, use a 30 A CB

Feeder protection = largest protective device + summation of the other motor currents
= 30 + 10 + 8
= 48 A

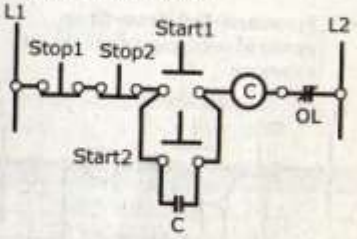
Therefore, use a **50 A CB**

- **Basic motor control circuit diagrams:**

- **Start-Stop** push button control with a sealing path

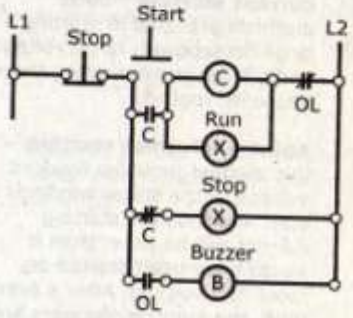


- **Start-Stop** control from two different locations



Note: The stop buttons are connected **in series** while the start buttons are connected **in parallel**.

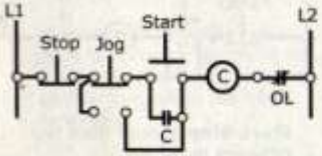
- Control methods with **pilot lights** and **alarm**.



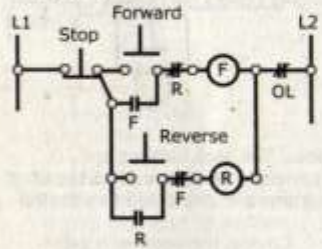
Note: The **buzzer** is used to give an alarm in cases where the motor is experiencing an overload.

- **Jog-Start-Stop** push button control

  Jogging – is an operation in which the motor will run when a pushbutton is pressed and will stop when the said pushbutton is released.



- **Forward-Reverse-Stop control** with electrical circuit interlock



❑ **Reduced voltage or reduced current starting** - these methods are used in starting a large horsepower, large voltage and a large current rating three phase AC motors.

- **Autotransformer starting** – this method provides reduced voltage to the stator windings at start and thus the starting current will be lower than it would have been started on rated line voltage. After a preset time, the autotransformers are removed and the motor then continues to run at rated line voltage.

- **Star-delta starting** – this method applies only to a three-phase delta connected motor with all six leads, extended to the motor's terminal box. At starting, the motor is connected wye, which means that each winding carries only 58% of the supply voltage and this makes a lower current at starting instant. After a preset time, the motor is reconnected in delta and continuous to run.

- **Part winding starting** – this method provides lower starting current by first connecting one part of the windings across the supply voltage and after a preset time, the second part is to be connected across the first part.

- **Primary resistance starting** – this method uses a resistance of suitable current capacity. These resistors are to be connected in series with each line conductors to the motor. Due to the resistance, the voltage supplied to the stator will reduced because of the voltage drop in the resistances.

- **Secondary resistance starting** – this method is used to start a wound rotor induction motor. At starting a wound rotor induction motor, the stator or primary circuit is supplied with the line voltage while resistances are connected in series to the rotor or secondary circuit to limit the current.

❑ **Illumination (E)** – the intensity of light per unit area

Terms, quantities, units and conversion factors:

- **Light** – the energy radiated in the form of luminous flux that produces a sensation to the eyes.

- **Lumen (lm)** – unit of luminous flux

- **Brightness** – the intensity of sensation resulting from viewing light sources and backgrounds.

- **Color** – defined as the quality of visual sensation which is associated with the spectral distribution of light.

- **Glare** – a strong steady dazzling light

- **Candlepower (I)**– the light radiating capability of a light source

$$I = \frac{\Phi}{4\pi}$$

where:
Φ = total lumen output of lamp

- **Candle or candela** – unit of candle power

- **Coefficient of utilization (C.u.)** – ratio of the lumens actually received by a particular surface to the total lumens emitted by the luminous source. This is dependent on type of lamp, type of lighting system and color of the room.

$$C.u. = \frac{\text{lumens received}}{\text{lumens emitted}}$$

- **Depreciation factor (Df)** – it is the factor related cleanliness of the lamp including the room, replacement of lamp after recommended life, etc.

$$D.f. = \frac{\text{Illumination when everything is new}}{\text{Illumination under actual condition}}$$

- **Efficacy** – ratio of luminous output to the input power in watts.

$$\text{Efficacy} = \frac{\text{lumen output}}{\text{wattage consumed}}$$

Average efficacy of various types of lamps:

Lamp name	Lumen/watt
Fluorescent	50 - 80
Incandescent	14 - 20
Mercury	40 - 70
Metal halide	60 - 80
Sodium lamp	90 - 100
Tungsten halogen	16 - 20

- **Footcandle (fc)** – unit of illumination when foot is taken as the unit of length.

$$\text{footcandle} = \frac{\text{lumens}}{ft^2}$$

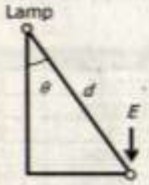
- **Lux (Lx)** – unit of illumination when meter is taken as the unit of length.

$$\text{footcandle} = \frac{\text{lumens}}{m^2}$$

Note: 1 footcandle = 10.76 lux

❑ **Laws on illumination**

- The illumination on a surface is directly proportional to the luminous intensity of the illuminating source.
- The illumination on a surface is inversely proportional to the square of the distance between the illuminating source and the surface.
- The illumination on a surface is directly proportional to the cosine of the angle made by the normal to the illuminated surface with the direction of the incident flux.



$$E = \frac{I}{d^2} \cos \theta$$

where:
E = illumination at a point
I = luminous intensity of the light source
d = distance of the light source to the point concerned.
θ = called the angle of incidence

❑ **Lighting systems** are classified in terms of the percentage of light that falls downward towards the work plane and the percentage of light towards the walls and ceilings.

Lighting system name	% of light downward	% of light upward
Direct	90	10
Semi-direct	60	40
General diffuse	50	50
Semi-indirect	40	60
Indirect	10	90

❑ **Electrical lighting materials:**

- **Incandescent lamp** – the most commonly used lamp

Characteristics:

a. cost is cheaper
b. fast starting and small in size
c. only about 10% of the input power is converted to light
d. sensitive to voltage fluctuations
e. life span is short

- **Fluorescent lamp** – one of the most commonly used lamp, second only to the incandescent lamp.

Characteristics:

a. for the same light output, it consumes lesser energy than an incandescent lamp
b. pleasant light output (high efficacy)
c. life span is longer
d. not sensitive to voltage fluctuations
e. limited to indoor usage
f. noisy due to ballast hum

- **Mercury lamp** – a combination of the arc discharge characteristics of the fluorescent lamp and the shape of an incandescent lamp.

Characteristics:

a. higher lighting efficiency compared to incandescent lamp
b. available in many different sizes and shapes
c. requires a ballast and a certain warm-up period before discharging full intensity
d. like the fluorescent lamp, it is also noisy

- **Sodium lamp** – high intensity discharge lamp

Characteristics:

a. small in size
b. life span is longer
c. high lumen output
d. does not start instantly but warm-up period is shorter than that of the mercury lamp

- **Tungsten halogen lamp** – a special type of incandescent lamp also known as quartz lamp.

Advantages over an ordinary incandescent lamp:

a. lighting ability (level of light output) is constant
b. longer life
c. efficacy is higher

- **Metal halide lamp** – it is basically a mercury lamp with a certain innovation of its arc tube.

Characteristics:

a. better coloring effect compared to a mercury lamp
b. efficacy is higher compared to a mercury lamp
c. life span is shorter compared to a mercury lamp

Notes

Notes

Republic Act No.7920

Republic of the Philippines
Congress of the Philippines
Metro Manila

Third Regular Session

Begun and held in Metro Manila, on Monday the twenty-fifth day of July, nineteen hundred and ninety-four

Republic Act No. 7920

AN ACT PROVIDING FOR A MORE RESPONSIVE AND COMPREHENSIVE REGULATION FOR THE PRACTICE, LICENCING AND REGISTRATION OF ELECTRICAL ENGINEERS AND ELECTRICIANS.

Be it enacted by the Senate and House of Representatives of the Philippines in Congress assembled.

Article I
Title and Definition of Terms

SECTION 1: *Title* –This act shall be known as the "New Electrical Engineering Law"

SECTION 2: *Definition of Terms* – As used in this Act, the following terms shall mean:

(a) Practice of electrical engineering – A person is deemed to be in the practice of electrical engineering when he renders or offers to render professional electrical engineering service in the form of:

- Consultation, investigation, valuation and management of services requiring electrical engineering knowledge;
- Design and preparation of plans, specifications and estimates for electric power systems, power plants, power systems, power plants, power distribution systems including power transformers, transmission lines and network protection, switchgear, building wiring, electrical machines, equipment and others.
- Supervision of erection, installation, testing and commissioning of power plants, substations, transmission lines, industrial plants and others.
- Supervision of operation and maintenance of electrical equipment in power plants, industrial plants, watercrafts, electric locomotives and others.
- Supervision of the manufacture and repair of electrical equipment including switchboards, transformers, generators, motors, apparatus and others.
- Teaching electrical engineering professional subjects and
- Taking charge of the sale and distribution of electrical equipment and systems requiring engineering calculation or applications of engineering data.

(b) Electric supply equipment is any equipment, which produces, modifies, regulates, or controls the supply of electric energy.

(c) Electric plant is an establishment or a system for the production and modification of electric energy.

(d) Power plant design refers to planning, specifying, coordinating and layouting of electrical equipment in power plants, substation and the like.

(e) Substation is any building, room, or separate place that houses or encloses electric supply equipment connected to transmission or distribution lines and the interior of which is accessible, as a rule only to properly qualified

(f) Electrical system design refers to the choice of electrical systems, including planning and detailing of requirements for protection, control, monitoring, coordination and interlocking of electrical systems among others.

(g) Voltage is the highest effective potential difference between any two conductors of the circuit concerned expressed in volts.

(h) kVA refers to the installed capacity of an alternating current (ac) electric plant supply equipment, or the connected load of industrial plants, commercial establishments, institutional buildings expressed in kilovolt-amperes.

(i) kW refers to the installed capacity of a direct current (dc) electric plant on board watercraft expressed in kilowatts.

(j) Utilization equipment refers to energy consuming equipment including motors, heaters, furnaces, light sources and other devices which utilize electric energy for any purpose.

(k) Industrial plant or factory refers to manufacturing assembly plants including engineering shops, shipyards or other business endeavors where electrical machineries and equipments are installed.

(l) Commercial establishments are department stores, supermarkets, shopping malls, office buildings, hotels, theaters, stadiums, condominiums, convention centers, restaurants and the like used for business or profit.

(m) Institutional buildings are school buildings, hospitals, museums, display centers, government buildings and the like.

(n) Watercraft is any waterborne unit, which is designed and built to have an electrical plant.

(o) Electrical locomotive refers to the power plant mounted on wheels as used in the railroad transportation industry.

Article II
Board of Electrical Engineering

SECTION 3: *Composition of the Board* –The Board of Electrical Engineering, hereafter referred to as the Board, shall be created as a collegial body under the general supervision and administrative control of the Professional Regulations Commission, herein after called as the Commission, composed of a chairman and two (2) members to be appointed by the President of the Philippines from among the recommendees of the Commissioner, who were chosen from the nominees of the integrated and accredited association of electrical engineers and of other registered associations of electrical engineers and allied fields.

SECTION 4: *Powers and Duties of the Board* –The Board shall exercise executive/administrative or quasi-legislative (rule making) or quasi-judicial (investigate) powers in carrying out the provisions of this Act. It shall be vested with the following specific powers, functions, and duties and responsibilities:

(a) Supervise and regulate the practice of electrical engineering in the Philippines.

(b) Determine and evaluate the qualifications of the applicants for registration with or without licensure examinations and for special permits.

(c) Prepare the examination questions in accordance with Section 19 hereof or modifications thereof; prescribe the syllabi of the subjects and their relative weights for the licensure examinations; formulate or adopt test questions and deposit them in a test question bank; draw the test questions at random through process of computerization; conduct the examination; correct and rate the examination papers manually or through process of computerization; and submit the examination results to the Professional Regulations Commission (PRC) within the period provided for the rules of the Commission.

(d) Prescribe, amend or revise the requirements for professional electrical engineers and subjects in the licensure examination for registered electrical engineers and registered master electricians and their relative weights, subject to the approval of the Commission

(e) Register successful applicants for professional electrical engineers and applicants who have passed the licensure examinations for registered electrical engineers or registered master electricians and issue the corresponding certificates of registration and professional licenses.

(f) Issue special permits to individual foreign electrical engineers and electricians for specific projects and for a specific duration of time.

(g) Look into the conditions affecting the practice of the electrical engineering profession, adopt measures for the enhancement of the profession and the maintenance of high professional, technical, and ethical standards and conduct ocular inspection of places where registrants practice their profession, such as, but not limited to; electric plants, substations, industrial plants or factories, commercial establishments, institutional buildings, watercrafts, electric locomotives, engineering offices, repair shops and similar places to determine and enforce compliance with this Act. The Board shall authorize the duly integrated and accredited electrical engineering association and other registered electrical engineering association to render assistance in this function.

(h) Promulgate rules and regulations, code of ethics, administrative policies, orders and issuances promulgated by the Board. The rules on administrative investigation promulgated by the Commission shall govern in such investigation.

(i) Investigate violations of the Act and rules and regulations, code of ethics, administrative policies, orders and issuances promulgated by the Board. The rules on administrative investigation promulgated by the Commission shall govern in such investigation.

(j) Issue subpoena or subpoena duces tecum, to secure the attendance of respondents or witnesses or the production of documents at and relative to the investigation conducted by the Board

(k) Delegate the investigation of the case to the chairman, member of the Board or a Professional Regulations Commission attorney (PRC attorney). If the case concerns strictly the practice of the profession, the investigation shall be presided by the chairman or member of the Board with the assistance of a PRC attorney.

(l) Render decision, order or resolution on preliminary or inquiry on undocketed cases and on docketed administrative cases against examinees or registrants which shall become final and executory unless appealed with the Commission within fifteen (15) days from receipt of the copy thereof. The decision of the Commission maybe appealed to the Court of Appeals in accordance with the procedure provided in the Rules of court.

(m) After due notice and hearing, cancel examination papers and or ban examinee from future examinations; refuse or defer his registration; reprimand the registrant with stern warning; suspend him from the practice of his profession; revoke his certificate of registration; delist his name from the roll of professional payment annual registration fees and non compliance with the Continuing Professional Education (CPE) requirements; reinstate or reenroll his name in the said roll; reissue or return his certificate of registration. A decision of suspension, revocation of the certificate of registration or delisting from the roll by the Board as decision of the Commission maybe appealed to the Court of Appeals in accordance with the procedure provided in the Rules of Court.

(n) Administer oaths in connection with the administration, implementation or enforcement of this Act

(o) Submit an annual report on proceedings and accomplishments during the year and on recommendations of the Board to the Commission after the close of each fiscal year.

(p) Prosecute or institute criminal against any violator of the Act and or the rules and regulations of the Board

(q) Adopt an official seal

(r) Coordinate with the Commission and the Department of Education, Culture and Sports (DECS) in prescribing, amending and or revising the courses.

(s) Prescribe guidelines and criteria on the CPE program for professional electrical engineers, registered electrical engineers and registered master electricians and renew their professional licenses after compliance with the CPE requirements.

(t) Perform such functions and duties as may be necessary to implement effectively this Act. The policies, resolutions, rules and regulations, orders or decisions issued or promulgated by the Board shall be subject to the review and approval by the Commission; however, the Board's decision, resolutions or orders which are not interlocury, rendered in an administrative case, shall be subject to review only if appealed.

SECTION 5: *Qualifications of Board Members*–Each Board member must, at the time of his appointment.

(a) Be a natural born Filipino citizen and a resident in the Philippines for at least five (5) consecutive years

(b) Be at least thirty-five (35) years of age, of proven integrity, with high moral values in his personal as well as his professional conduct

(c) Be a person with no final conviction by the court of an offense involving moral turpitude

(d) Be a holder of the degree of Bachelor of Science in Electrical Engineering (BSEE) from a university school, college, academy or institute duly constituted, recognized and accredited by the Philippine government

(e) Be a professional electrical engineer with a valid certificate and a valid professional license duly qualified to practice electrical engineering in the Philippines

(f) Have practiced electrical engineering for a period of not less than ten (10) years prior to his appointment, with a sworn statement as such and

(g) Not be an official member nor a member of the faculty of, nor have a pecuniary interest in, any university, college, school or institution conferring a bachelor's degree in electrical engineering for at least three (3) years prior to his appointment and is not connected with a review center or any with any group or association where review classes or lectures in preparation for the licensure examination are offered or conducted at the time of his appointment.

SECTION 6: *Term of Office* – The members of the Board shall hold office for a term of three (3) years from the date of appointment or until their successor shall have appointed and qualified. They may, however be reappointed for a second term. Each member shall qualify by taking an oath of office before entering upon performances of his duties.

Vacancies in the Board shall be filled by the President from a list of recommendees selected by the Commissioner who were chosen from the list of nominees submitted by the integrated and accredited association for the unexpired term only.

SECTION 7: *Removal of Board Members* – Any members of the Board may be removed by the President of the Philippines upon the recommendation of the Commissioner for the neglect of duty, incompetence, malpractice, commission or tolerance or irregularities in the examination, or for unprofessional, unethical, or dishonorable conduct, after having been given the opportunity to defend himself in a proper administrative investigation.

SECTION 8: *Compensation of Chairman and the Board Members* – The chairman and the members of the Board shall receive a monthly compensation of no less than twelve thousand pesos (P 12,000.00); Provided that the chairman shall receive a monthly compensation of ten percent (10%) more; Provided further, that such compensation shall be increased or modified pursuant to the General Appropriation Act of the year; Provided further more, that they shall receive other benefits that may be provided for by the law.

SECTION 9: *Executive Officer of the Board* – The Commissioner shall be the executive officer of the Board and shall conduct the examination given by the Board and shall designate any subordinate officer of the commission to act as secretary and custodian of all records including all examination papers and minutes of the deliberations of the Board.

Article III
Examination and Registration

SECTION 10: *Examination Required* – All applicants for registration for the practice of electrical engineering in the Philippines shall be required to pass technical examination as hereafter provided except as otherwise specifically allowed under this Act.

SECTION 11: *Registration and License Required* – A valid certificate of registration and a valid professional license from the Commission are required before any person is allowed to practice electrical engineering in the Philippines except as otherwise allowed under this Act.

SECTION 12: *Examination Fees* – All applications for oral examinations for professional electrical engineer and written examinations for registered electrical engineer and registered master electricians shall be subject to payment of fees prescribed by the Commission; Provided that ninety percent (90%) of the fees is to be treated as a special fund for the programs, projects and activities of the Commission and the remaining ten percent (10%) shall be set aside as a trust fund for the establishment and maintenance of the center for continuing education and research.

SECTION 13: *Registration Fees, License Fees and Fines* – All applicants for registration and license to practice as professional electrical engineer, registered electrical engineer and registered master electricians shall be subject to the payment of registration fees, license fees and fines in case of violation of the pertinent rules and regulations for the amounts prescribes by the Board and approved by the Commission; Provided that fifty percent (50%) from these collections are to be treated as a special fund for programs, projects and activities of the Commission and the other fifty

percent (50%) shall be set up in a separate special fund for programs, projects and activities of the regulatory functions of the Board.

SECTION 14: *Exemption from Examination and Registration* –

(a) Examination and registration shall not be required for foreign electrical engineers, erection/commissioning guarantee engineers employed as technical consultants by the Philippine government or by private firms, for which the pertinent professional society certifies that no qualified Filipino professional is available or of foreign electrical installers for the erection and installation of a special project or for any other specialized work subject to the following conditions:

(i) That the above mentioned foreign professional are legally qualified to practice their profession in their own country in which the requirements and qualifications for obtaining a license or certificate of registration

(ii) That the scope of work to be performed by said foreign professional shall secure a special permit from the Commission

(iii) That prior to commencing the work, the foreign professional shall secure a special permit from the Commission

(iv) That said foreign professional shall not engage in private practice on their own accounts

(v) That for every foreign professional contracted pursuant to this section, one Filipino understudy who is registered under the provisions of this Act shall be employed by the private firm utilizing the services of such foreign professional for at least the duration the alien expert's tenure with said firm; and

(vi) That the exemption herein granted shall be good only for six (6) months, renewable for another six (6) months at the discretion of the Board; Provided that incase the foreign professional ceases to be employed in accordance with this section engages in an occupation requiring registration as electrical engineer, such professional must be registered under the provision of this Act.

(b) No registration with the Board shall be required of the following:

(i) Engineering students, apprentices and other persons employed or acting as subordinates of, or undergoing training under a person holding a valid certificate of registration and a valid professional license under this Act

(ii) Persons in charge of supervising the operation, tending and maintenance of an electric generating set for private use employing voltages not exceeding two hundred fifty volts (250 V) and capacity not exceeding fifty kilovolt-amperes (50 kVA); Provided, chat the owner or operator shall be required to have electric generating set periodically inspected at intervals of not more than one (1) year by a professional electrical engineer, a registered electrical engineer on a national, city, provincial or municipal government authority exercising legal jurisdiction over electrical installations.

SECTION 15: *Holding of Examination* – Examinations for the practice of electrical engineering in the Philippines should be given twice a year in the City of Manila and other places on dates that the Board may recommend for determination of scheduling. The Board shall schedule interviews/oral examination of every applicant for registration as professional electrical engineer only at the office of the Commission.

To qualified applicants for examination, notice of administration shall be issued not later than ten (10) days prior to the first day of examination.

SECTION 16: *Qualifications of Applicants for Registration as Professional Electrical Engineer* – Any person applying for registration as professional electrical engineer shall establish to the satisfaction of the Board that on or before the date of registration, he possesses the following qualifications:

(a) He is a citizen of the Philippines

(b) He is of good reputation with high moral values

(c) He has not been finally convicted by the court of an offense involving moral turpitude

(d) He is a holder of the degree of Bachelor of Science in Electrical Engineering (BSEE) from a university, school, college, academy or institute duly constituted, recognized and accredited by the Philippine government; and

(e) He is a registered engineer with valid certificate of registration and professional license and with four (4) years or more of active practice reckoned from the date of his registration as registered electrical engineer.

SECTION 17: *Qualifications of Applicants for Registered Electrical Engineer Examination* – Any person applying for admission to the registered electrical engineering examinations, as herein provided, shall establish to the satisfaction of the Board that on or before the date of registration, he possesses the following qualifications:

(a) He is a citizen of the Philippines

(b) He is at least twenty-one (21) years of age

(c) He is of good reputation with high moral values

(d) He has not been finally convicted by the court of an offense involving moral turpitude; and

(e) He is a holder of the degree of Bachelor of Science in Electrical Engineering (BSEE) from a university, school, college, academy or institute duly constituted, recognized and accredited by the Philippine government and

SECTION 18: *Qualifications of Applicants for Registered Master Electrician Examination* – Any person applying for admission to the registered master electrician examinations, as herein provided, shall establish to the satisfaction of the Board that on or before the date of registration, he possesses the following qualifications:

(a) He is a citizen of the Philippines

(b) He is at least eighteen (18) years of age

(c) He is of good reputation with high moral values

(d) He has not been finally convicted by the court of an offense involving moral turpitude; and

(e) He has any of the following technical backgrounds;

(1) Has completed at least three (3) years of a five-year Bachelor of Science in Electrical Engineering (BSEE) program or a three year course in electrical engineering technology from an engineering school recognized by the Philippine government and in addition, has a subsequent specific record of one (1) year practice in electrical wiring and installation, operation and maintenance of utilization devices and equipment, or

(2) Has graduated from a two-year electrician's course of instruction from a vocational or trade school recognized by the Philippine government and in addition, has at least two (2) years of apprenticeship after completion of the course of instruction on electrical wiring and installation, operation and maintenance of utilization devices and equipment, or

(3) Has completed from a one-year electrician's course of instruction from a vocational or trade school recognized by the Philippine government and in addition, has at least three years of apprenticeship after completion of the course of instruction on electrical wiring and installation, operation and maintenance of utilization devices and equipment, or

(4) Has completed a four year high school education or its equivalent and in addition, has a subsequent specific record of at least five (5) years of apprenticeship in electrical wiring and installation, operation and maintenance of utilization devices and equipment.

SECTION 19: *Scope of Examination* – As a prerequisite for registration as professional electrical engineer, registered electrical engineer and registered master electrician, the applicants shall comply with the following requirements;

(a) Professional electrical engineer:

For the purpose of confirming the services record and clarifying the technical report submitted by the applicant for registration as a professional electrical engineer, an oral examination or interview shall be conducted on the following documents to be submitted to the Board:

(1) Certified experience record from the date the applicant took oath as a registered electrical engineer indicating the inclusive dates, companies worked for, description of specific responsibilities, significant accomplishment as well as the name and position of immediate supervisors.

(2) Technical papers covering an evaluation, an analysis, a study or a critical discussion of an electrical engineering projects or subject on one or several technical aspects such as: design, construction, installation, commissioning, testing, operation, maintenance, repair, research and the like. The technical paper shall be supported by engineering principles and data. Published or unpublished scientific paper or treatise on electrical engineering theories and applications maybe considered as complying with the requirements;

(3) Three (3) certifications signed by three (3) professional electrical engineers to the effect that the experience record submitted by the applicant is factual and that the technical paper submitted was actually prepared by the applicant.

The applicant must obtain passing grades on the experience record and on the technical in order to qualify for registration as professional electrical engineer.

(b) Registered electrical engineer:

The applicant shall pass a written examination on different subjects or group of subjects as follows:

(1) Mathematics such as: algebra, trigonometry, analytic geometry, differential calculus, integral calculus, differential equations, complex numbers, probability and statistics, advanced engineering mathematics including matrices, power series, Fourier analysis, Laplace transforms and others. The weight is twenty-five percent (25%).

(2) Engineering sciences and allied subjects such as general chemistry, college physics, computer fundamentals and programming, engineering materials, engineering mechanics, fluid mechanics, strength of materials, thermodynamics, electrical engineering law, engineering economics, engineering management, contracts and specifications, code of professional ethics, Philippine Electrical Code Parts 1 and 2 and others. The weight is thirty percent (30%).

(3) Electrical engineering professional subjects such as: electric circuits, electronic theory and circuits, energy conversion, power transmission and distribution, instrumentation and measurement, circuit and line protection, control systems, principles of communication, electrical machines, electrical equipment, components and devices, electric systems, power plant, electronic power equipment, illumination, building wiring and others. The weight is forty-five percent (45%).

The passing general weighted average rating shall be seventy percent (70%) with no grade below fifty percent (50%) in any group of subjects listed above.

The examination questions on the foregoing subjects shall cover only basic theories and principles and shall not include questions based on experience and trade practices. The number of questions shall be such that the examinations can be finished in three (3) consecutive eight-hour days.

(c) Registered master electrician:

The applicant shall pass a written examination on the different subjects or group of subjects as follows:

(1) Technical subjects:

- Ohm' s Law: Calculations for resistance, current, voltage and power for direct current and alternating current circuits
- Electrical machines: Description and operating principles of motors, generators and transformers.
- Control equipment: Description and functions of fuses, overload relays, safety switches, circuit breakers, star-delta motor starters, transformer type motor-starters, DC motor starters.
- Electrical components: Description of resistors, capacitors, inductors and semi-conductors
- Maintenance and repair: Description of the procedures in the maintenance of electrical machinery
- Test equipment: Types and uses of measuring instruments
- Electrical engineering law provisions pertaining to registered master electricians.
- Other related subjects as maybe prescribed by the Board.

(2) Philippine Electrical Code Parts 1 and 2:

- General requirements for installation of electric wiring and equipment
- Approved wiring method
- Types of wiring materials and wiring devices
- Installation of switchboard and panelboards
- Installation in hazardous locations
- Wiring diagrams of different types of motor starters with motor protection;
- Drawing symbols and wiring plans
- Other related subjects as may be prescribed by the Board

The number of test questions shall be that the examinations can be finished in one (1) eight-hour day

The relative weight shall be fifty percent (50%) for technical subjects and fifty percent (50%) for Philippine Electrical Code.

The passing general average rating shall be seventy percent (70%) with no grade below fifty percent (50%) in any subjects.

SECTION 20: *Report of Ratings* – The board of Electrical Engineering shall within one hundred fifty (150) days after the completion of the examinations report the ratings obtained by each candidate to the Commission.

SECTION 21: *Re-examination of Failed Subjects* – An applicant shall be allowed to retake, any number of times, only on the subject/s in which he has obtained a grade below fifty percent (50%) When he shall obtained an average grade of seventy percent (70%) in the subject/s repeated, he shall be considered to have passed his licensure examination.

SECTION 22: *Oath* – All successful candidates in the examinations shall be required to take a professional oath before the Board or any government official authorized to administer oaths prior to entering upon the practice of professional electrical engineer, registered electrical engineer and registered master electrician.

SECTION 23: *Issuance of Certificates of Registration and Professional Licenses* – The registration of professional electrical engineer, registered electrical engineer or registered master electrician commences from the date his name is entered in the roll of registrants or licensees for his profession. Every registrants who has satisfactorily met all the requirements specified in this Act, upon payment of the registration fee, shall be issued a certificate of registration as a professional electrical engineer, a registered electrical engineer or a registered master electrician that shows the full name of the registrant and with several number signed by the Commissioner and by the chairman and members of the Board, stamped with the official seal, as evidence that the person named therein is entitled to practice the profession with all the rights and privileges appurtenant thereto.

The certificate shall remain in full force and effect until withdrawn, suspended, or revoked in accordance with law.

A professional license signed by the Commissioner and bearing the registration number and date of issuance thereof and the month of expiry or renewability shall likewise be issued to every registrant who has paid the annual registration fees for three (3) consecutive years and has complied with the requirements of the Continuing Professional Education (CPE) unless exempted there from. This license will serve as evidence that the license can lawfully practice his profession until the expiration of its validity.

SECTION 24: *Continuing Professional Education Program* – The CPE guidelines shall be prescribed and promulgated by the Board subject to the approval of the Commission, after consultation with the integrated and accredited electrical engineering associations, other associations of the electrical engineering profession and other concerned sectors. The Board shall incorporate in the said guidelines the creation of a CPE council that shall be composed of officers coming from the Board, the Commission, the integrated and accredited electrical associations and other concerned sectors. It shall be vested with the functions, duties and responsibilities to implement the guidelines and shall have the juridical personality that is distinct and separate from and independent of the Board, the Commission, the integrated and associated electrical engineering association and other associations of the electrical engineering profession.

SECTION 25: *Integration of the Electrical Engineering Profession* – The electrical engineering professions shall be integrated into one national organization, which will be recognized by the Board as the one and only integrated and accredited association of professional electrical engineers, registered electrical engineers and registered master electricians. Every professional electrical engineer, registered electrical engineer and registered master electrician upon registration with the Board as such, shall ipso facto, become member of the integrated national organization. Those who have been registered with the Board as such but are not members of the said organization at the time of the effectivity of this Act, shall be allowed to register as members of the said integrated organization within three (3) years after the effectivity of this Act. Membership in the integrated organization shall not be a bar to membership in other associations of the electrical engineering profession. The professional electrical engineer, registered electrical engineer and registered master electrician shall receive the benefits and privileges appurtenant to this listed membership in the duly integrated and accredited electrical engineering association only upon payment of the required membership fees and dues.

SECTION 26: *Seal of Professional Electrical Engineer* – All licensed professional electrical engineers may obtain a seal of a design prescribed by the Board bearing the registrant's name, the certificate number and the legend "Professional Electrical Engineer". Plans, specifications, reports and other professional documents prepared or executed under the immediate supervision of, and issued by a licensee, shall be stamped on every sheet with said seal when filed with government authorities of when submitted or used professionally. Provided, however that it is unlawful for anyone to stamp or seal any document with said seal after the registrants name has been delisted from the roster of professional electrical engineers or after the validity of his professional license has expired. The registrant shall be allowed to again use his seal or stamp in the documentation he prepares, signs or issues only after he is reinstated to the practice of his profession and reissued a new professional license.

SECTION 27: *Indication of Registration/Professional License Number* – The professional electrical engineer, registered electrical engineer or registered master electrician shall be required to indicate his registration/professional license number, the date registered and the date of its expiry in the documents he signs, uses or issues in connection with the practice of his profession.

SECTION 28: *Refusal to Issue Certificates* – The Board of electrical engineering shall not issue a certificate of registration to any person convicted by the court of any criminal offense involving moral turpitude or to any person guilty of immoral or dishonorable conduct or to any person of unsound mind. In the event of refusal to issue certificates for any reason, the Board shall give the applicant a written statement setting forth the reasons for such action, which statement shall be incorporated in the records of the Board.

After no less than a year from the finality of the Board's decision, the Board, out of equity and justice, may recommend to the Commission the issuance of the certificate of registration to the applicant.

SECTION 29: *Revocation of Certificates of Registration and Suspension from the Practice of the Profession* – The Board shall have the power, upon proper notice and hearing, to revoke any certificate of registration of any registrant, to suspend him from the practice of his profession or reprimand him for any cause specified in the preceding section, or for the use of , perpetration of any fraud or deceit in obtaining a certificate of registration, or for gross negligence or incompetence or for unprofessional or dishonorable conduct; for violation of this Act, the rules and regulations and other policies of the Board and the Code of Professional Ethics.

It shall be sufficient ground for the revocation of a certificate issued to a person under this Act, and his suspension from the practice of his profession for unprofessional or dishonorable conduct, if;

(a) Being a professional electrical engineer, he has signed and affixed his seal on any plan, design, technical reports, valuation, estimate, specification or other similar or work not prepared by him or not executed under his immediate;

(b) He has represented himself as having taken charge of or supervised; any electrical construction or installation; operation, tending and maintenance of any electric plant; manufacture or repair of electrical equipment, teaching of electrical engineering subjects; sale or distribution of any electric supply or utilization equipment requiring engineering calculations or application of engineering principles and data, without actually having done so.

The decision of the Board shall be final and executory unless it is appealed by the respondent to the Commission within fifteen (15) days from the receipt of that decision. The Board's or the Commission's decision is appealable by the respondent to the Court of Appeals in accordance with the procedure provided under the Rules of Court.

Any person, firm, association or corporation may file charges in accordance with the provisions of this section against any licensee, or the Board may, on its own initiative (motu propio) investigate and/or take cognizance of acts and practices constituting cause for suspension or revocation of the certificate of registration by proper resolution or order, such charges shall be in writing and shall be sworn to by the person making them and shall be filed with the Board.

The rules and regulations of the Commission on administrative investigation shall govern the procedure and conduct of administrative investigation before the Board.

The respondent shall have the right to a speedy and public hearing and to confront and cross examine witnesses against him.

SECTION 30: *Re-issuance of Revoke Certificates and Replacement of Lost Certificates* – Subject to the approval of the Commission, the Board may, after the expiration of one (1) year from the date of revocation of a certificate, for reasons it may be deem sufficient, entertain an application for a new certificate in the same manner as applications for an original one. It may exempt the applicant from the necessity of undergoing an examination.

A new certificate of registration to replace any certificate that has been lost, destroyed or mutilated may be issued, subject to the rules of the Board.

Article IV
Sundry Provisions Relative to the Practice of Electrical Engineering

SECTION 31: *Field of Practice* – The field of practice for professional electrical engineers, registered electrical engineer and registered master electricians shall be as follows;

(a) A professional electrical engineer's field of practice includes the sole authority to seal electrical plans, etc and to practice electrical engineering in its full scope as defined in this Act.

(b) A registered electrical engineer's field of practice includes the charge or supervision of; operation and maintenance of electrical equipment in power plants, industrial plants, watercraft, electric locomotives and others; manufacture and repair of electrical supply and utilization equipment including switchboards power transformers, generators, motors, apparatus, and others; teaching of electrical subjects; and sale and distribution of electrical equipment and systems requiring engineering calculations or applications of engineering data; and

(c) A registered master electrician's field of practice includes the installation, wiring, operation, maintenance and repair of electrical machinery, equipment and devices, in residential, commercial, institutional, commercial and industrial buildings, in power plants, substations, watercrafts, electric locomotives, and the like. Provided, that if the installation or the machinery is rated in excess of five hundred kilovolt-amperes (500 kVA), or in excess of six hundred volts (600V) the work shall be under the supervision of a professional electrical engineer or a registered electrical engineer.

SECTION 32: Prohibition in the Practice of Electrical Engineering – No person shall:

(a) Practice or offer to practice electrical engineering in the Philippines without having previously obtained a certificate of registration and a professional license from the Board of Electrical Engineering except as provided for in Section 14 hereof;

(b) Use, or attempt to use as his own, certificate of registration, professional license or the seal of another;

(c) Give false or forged evidence of any kind to the Board or to any members thereof in obtaining a certificate of registration or professional practice;

(d) Falsely impersonate any registrant of like or different manner

(e) Attempt to use a revoked or suspended certificate of registration or an expired professional license;

(f) Use, in connection with his name or otherwise assume, use advertise any title or description tending to convey the impression that he is a professional electrical engineer, registered electrical engineer or registered master electrician without holding a valid certificate or a valid license; and

(g) Sign a document involving electrical design, plan, technical specification, valuation and the like on behalf of a professional electrical engineer.

SECTION 33: *Personnel Required* – Except otherwise provided on this Act, every electric plant, industrial plant or factory, commercial establishment, institutional building, watercraft, electric locomotives or in any other installation were persons and properties are exposed to electrical hazards shall not have less than the following complement of professional electrical engineer, registered electrical engineer and registered master electrician.

(a) Electric plants with totaled installed capacity of any size and employing voltages of any standard rating – one (1) professional electrical engineer or one (1) registered electrical engineer. However, for capacities up to five hundred kilovolt-amperes (500 kVA) and employing voltages up to six hundred volts (600 V) – one (1) registered master electrician;

(b) Industrial plants or factories, commercial establishments, or institutional buildings having a connected kVA load of any size and employing voltages of any standard rating – one (1) professional electrical engineer or one (1) registered electrical engineer. However, for connected loads up to five hundred kilovolt-amperes (500 kVA) and employing voltages up to six hundred volts (600 V) – one (1) registered master electrician;

(c) Watercrafts or electric locomotives with installed generating capacity up to the maximum size and voltages available for these units - one (1) professional electrical engineer or one (1) registered electrical engineer. However, for generating capacities up to five hundred kilovolt-amperes/kilowatts (500 kVA/kW) and employing voltages up to six hundred volts (600 V) – one (1) registered master electrician;

Provided however, that in all aforementioned cases, additional qualified personnel shall be employed to ensure safe operation and safeguard public welfare, life and property. Provided further, that when the operation requires more than one shift of personnel every twenty-four (24) hours, the minimum complement of qualified personnel shall be employed in each shift.

This section, however, shall not apply to any installation which has a connected load of fifty kilovolt-amperes (50 kVA) or less and employs voltages of not more than two hundred fifty volts (250 V) and for installations which are designed to be automatic and do not require resident personnel for their safe operation. Provided however, that their maintenance and repair shall be under the charge of duly registered personnel. Provided further, that a yearly inspection will be conducted and certified to be safe operating condition by a professional electrical engineer, a registered electrical engineer or a registered master electrician.

SECTION 34: *Preparation of Plans, Supervision of Installation, Applications of the Philippine Electrical Code* – It shall be unlawful for any person not authorized under this Act to prepare plans, designs, valuations or specifications for any electrical wiring, equipment or system; and no installation thereof shall be undertaken unless the plans, designs, valuations and specifications have been prepared by or under the responsible charge of, and signed and sealed by a professional electrical engineer; and a construction permit for the execution thereof is first secured; and unless the work is done in accordance with the Philippine Electrical Code and is executed under the responsible charge or supervision of a professional electrical engineer; a registered electrical engineer or a registered master electrician, as the case may be, and the routinary fiscal and ministerial requirements of the government agency, if any, exercising jurisdiction over the particular installation have been complied with.

SECTION 35: *Practice Not Allowed for Firms and Corporation* – The practice of electrical engineering is a professional service admission to which is based on individual and personal qualifications. Hence, no firm or corporation maybe registered or licensed as such for the practice of electrical engineering. However, persons properly qualified and licensed as professional electrical engineers may, among themselves, form a partnership or association and collectively render electrical engineering service. Individual members of such partnerships or associations shall be responsible for their own respective acts.

SECTION 36: *Posting of Certificates* – The owner, manager or the person in charge of an electric plant, industrial plant or factory, commercial establishment, institutional building, watercraft or electric locomotive shall post or cause to be posted in a conspicuous place within such plant or establishment the certificate or registration of the engineers or electricians employed in such plant or establishment, in a frame protected by transparent glass or equivalent.

SECTION 37: *Certificate of Specialty* – Certificates of specialty shall be issued by the Board, subject to the approval of the Commission, to professional electrical engineers who have been screened and recommended by the integrated and accredited electrical engineering association. These are for specific fields in which the applicants have specialized knowledge, training and experience and have demonstrated their competence and expertise. The Board shall, subject to the approval of the Commission, and after consultation with the said association, prescribe and issue the necessary guidelines for the issuance of these certificates.

SECTION 38: *Foreign Reciprocity* – No foreign engineers shall be admitted to take a board examination; be given a certificate of registration, or be entitled to any of the rights and privileges under this Act unless the country of which he is a subject or citizen specially permits Filipino engineers to practice within territorial limits on the same basis as the subject or citizens of such country.

SECTION 39: *Enforcement of the Act by Officers of the Law* – It shall be the duty of all constituted officers of the law of the national government, or any provincial, city or municipal government or of any political subdivision thereof to prosecute any person violating the provisions of this Act. The Secretary of Justice or his assistant shall act as legal adviser of the Board and render such legal assistance as maybe necessary in carrying out the previous of this Act.

SECTION 40: *Penalty Clause* – Any person who shall violate any of the provisions of this Act shall be guilty of misdemeanor and shall, upon convicted, be sentenced to a fine of not less than ten thousand pesos (P10,000.00) nor more than fifty thousand pesos (P50,000.00) or imprisonment for a period of not less than six (6) months not more than five (5) years or both at the discretion of the court.

Article V
Transitory Provisions

SECTION 41: *Terms of Office Board Members* – Upon approval of this Act, the incumbent chairman and two (2) members of the Board shall continue to serve until their terms of office expire or until their replacements have been appointment by the President and shall have been duly qualified.

SECTION 42: *New Certificates of Registration and Professional License*

(a) Associate electrical engineers and assistant electrical engineers with valid certificates of registration and professional license issued under Republic Act 184 shall register within two (2) years from the effectivity of this Act and be issued new certificates of registration and new professional license as registered electrical engineers under this Act to replace their original ones. Their serial numbers shall be provided by the registration division of the Commission.

(b) Master electricians with valid certificates of registration and professional licenses under Republic Act No. 184 shall register within two (2) years from the effectivity of this Act and be issued new certificates of registration and new professional licenses as registered master electricians with the same serial numbers as the old ones to replace their original certificates and licenses.

Article VI
Final Provisions

SECTION 43: *Repealing Clause* – Republic Act No.184 and existing provisions of provincial, city or municipal ordinances or regulations pertaining to examinations for electrical contractors, electrical inspectors, or electricians, and shall other laws, part of laws, orders, ordinances or regulations in conflict with this Act are hereby repealed or amended accordingly.

SECTION 44: *Separability Clause* – If any part of this Act or the application of such provision or circumstance is declared unconstitutional, the remainder of this Act or the application of such provision to other persons or circumstances shall not be affected by such declaration.

SECTION 45: *Effectivity Clause* – This act shall take effect after thirty (30) days following its full publication in the Official Gazette or newspaper of general circulation.

Approved:

(Sgd.) EDGARDO J. ANGARA
President of the Senate

(Sgd) JOSE DE VENECIA, JR.
Speaker of the House
of Representative

This Act, which is a consolidation of House Bill No. 11063 and Senate Bill No. 1766, was finally passed by the House of Representatives and the Senate on February 21, 1995.

(Sgd.) EDGARDO E. TUMANGAN
Secretary of the Senate

(Sgd.) CAMILO L. SABIO
Secretary General
House of Representative

Approved: February 24, 1995

(Sgd.) FIDEL V. RAMOS
President of the Philippines