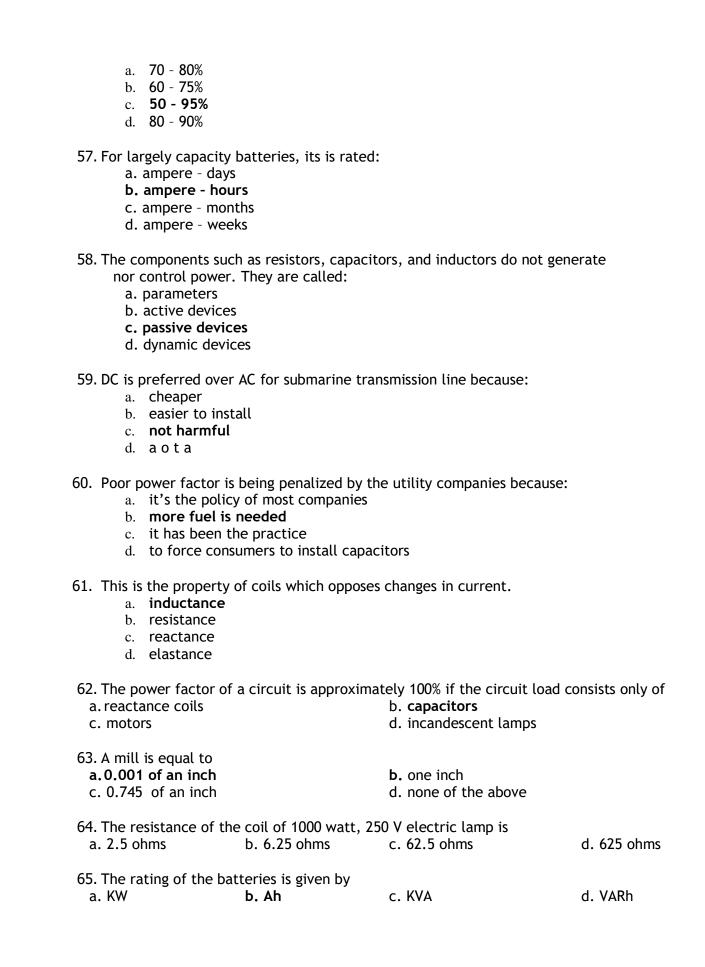## Supplementary Problem RME-Part 1

1. What are the minimum requirements to cause the flow of current?
    A. A voltage source, an ammeter, a conductor and an insulator
    B. A voltage source, a switch and a resistor
    C. **A voltage source and a conductor**
    D. A voltage source, a conductor and an insulator

2. Resistance of a conductor increases when
    A. **its length increases**
    B. its area increases
    C. both length and area increases
    D. specific resistance is kept constant

3. The specific resistance ρ depends upon
    a. The area of cross-section and the length of the conductor
    b. The material of the conductor, its area of cross-section and length
    C. **The nature of the material of the conductor only**
    D. The area of cross-section of the conductor

4. The presence of an electric current is made known by
    a. flashing   B. **effects produced**
    C. cracking   D. electric shock

5. The presence of the current is only made known by the effect it produces. Three important effects are
    a. **heating, electric shock and generation**
    b. generation, chemical and electric shock
    C. heating, magnetic and electric shock
    D. heating, magnetic and chemical

6. Voltage applied across a circuit, acts as
    a. mass of electrons   B. negative ions
    C. a component of current   D. **a force**

7. In a series circuit the current is
    A. **constant**   B. always zero
    C. proportional to the resistance   D. different in different resistors

8. In a parallel circuit the potential difference across the resistance
    a. varies   B. is different from the applied voltage
    C. is sometimes constant   D. **is always constant**

9. The resistance R_1 and R_2 are connected in parallel. The ratio of values of resistance $R_1 : R_2$ is 4 : 1. The currents in $R_1 : R_2$ will be equal to
    A. 1 : 4   B. 1 : 1   C. 4 : 1   D. 4 : 4

10. A resistance of 4 ohms is connected across 100 V supply. When another resistor 'R' ohms is connected in parallel with 4 ohms, the total current taken from supply was found to be 50 A. The value of resistance 'R' is

    a. 2 ohms   B. 3 ohms   C. 5 ohms   **D. 4 ohms**

11. The voltage applied across an electric press was reduced by 50%. The power consumed by the press will be reduced by

    A. 25%   B. 75%   C. 60%   D. 50%

12. Two electric presses are connected in parallel. The resistance of the first press is 100 ohms and that of the second is 300 ohms. The total current taken by both the presses is 4 A. The ratio of current taken by first : second will be equal to

    a. 2 : 3   B. 1 : 3   **C. 3 : 1**   D. 1.2 : 3

13. Three elements having conductance G_1, G_2 and G_3 are connected in parallel. Their combined conductance will be

    A. $G_1 + G_2 + G_3$ B. $\dfrac{1}{G_1 + G_2 + G_3}$

    C. $\dfrac{G_1G_2 + G_2G_3 + G_3G_1}{G_1 + G_2 + G_3}$ D. $\dfrac{1}{\dfrac{1}{G_1} + \dfrac{1}{G_2} + \dfrac{1}{G_3}}$

14. Four resistances R_1, R_2, R_3 and R_4 are connected in series against 220 V supply. The resistances are such that $R_1 > R_2 > R_3 > R_4$. The least power consumption will be in

    a. resistor R_1 **B. resistor R_4**
    C. resistor R_3 D. resistor R_2

15. When current flows through heater coil it glows but supply wiring does not glow because

    a. supply wiring is covered with insulation layer
    b. current through supply line flows at slower speed
    c. supply wires are made of superior material
    D. resistance of heater coil is more than that of supply wires

16. Resistors commonly used in power circuits are

    a. carbon resistors   B. etched circuit resistors
    C. wire wound resistors   D. deposited metal resistors

17. Cells are connected in parallel to

    A. increase the internal resistance   B. decrease the current capacity
    C. increase the current capacity   D. increase the voltage output

18. Cells are connected in series to

    A. decrease the voltage output   **B. increase the voltage output**
    C. decrease the internal resistance   D. increase the current capacity

19. When current flows in a conductor, heat is produced because

    a. heat $\alpha\ I^2$ b. of electronic collision
    c. of interatomic collision   d. of Joules law

20. The condition in ohms law is that
    a. ratio V/I should be constant
    b. current should be proportional to voltage
    c. the temperature should remain constant
    d. the temperature should vary

21. Ohms law can be applied with certain reservation to
    a. rectifying devices   b. semiconductors
    c. electrolytes   d. Thermionic valves

22. Resistors commonly used in power circuits are
    a. carbon resistor   b. etched circuit resistors
    c. wire wound resistors   d. deposited metal resistors

23. Capacitors are said to
    a. block a.c. and pass d.c.   **b. block d.c. and pass a.c.**
    c. pass a.c. and d.c.   d. block a.c. and d.c.

24. One factor affecting voltages of the primary cell is the
    a. area of the plates   b. distance between the plates
    c. types of plates and electrolytes d. thickness of the plates

25. The average dry cell gives an approximate voltage of
    a. 1.3 V   **b. 1.5 V**   c. 1.1 V   d. 1.7 V

26. Cells are connected in parallel to
    a. increase the internal resistance   b. decrease the current capacity
    c. increase the current capacity   d. increase the voltage output

27. Cells are connected in series to
    a. decrease the voltage output   **b. increase voltage output**
    c. decrease the internal resistance   d. increase the current capacity

28. One advantage of a secondary cell is that it
    a. can be recharged   b. can be used for portable equipment
    c. it is compact, easy to carry   d. cannot be recharge

29. Electrolyte of a storage battery is formed by adding
    a. water to hydrochloric acid   **b. sulphuric acid to water**
    c. hydrochloric acid to water   d. water to sulphuric acid

30. The ampere hour capacity of battery depends on
    a. the thickness of the plates   **b. the area of the plates**
    c. the strength of the electrolytes   d. the distance between the plates

31. The internal resistance of a discharged battery
    a. is more   b. is less   c. remains constant d. is negative

32. A fuel cell converts _____ energy into electrical energy
    a. mechanical   b. magnetic   **c. chemical**   d. solar

33. In most generators the output voltage is induced by
   a. rotating magnetic field past stationary coils
   b. relative motion between the field and the armature coils
   c. converting electrical energy into mechanical energy
   d. air gap

34. The value of peak factor for pure sine wave is
   a. 1.414   b. 0.707   c. 0.637   **d. 1.110**

35. When the sole purpose of an alternating current is to product heat, the selection of conductor is based on
   a. average value of current   b. peak value of current
   c. rms value of current   d. any of the above

36. In the impedance triangle the inductive reactance and impedance phasor are analogous to the _____ and _____ phasor respectively in the voltage triangle
   a. inductive voltage, total voltage   b. inductive current, total current
   c. inductive voltage, resistive voltage   d. inductive current, resistive current

37. The phase angle of a series RL circuit is the angle between the _____ phasor and the _____ phasor
   a. resistance, inductive reactance   **b. resistance, impedance**
   c. inductive reactance, impedance   d. none of these

38. The resistance phasor for a series RC circuit points to the right. The capacitive reactance phasor points _____ while the diagonal of the rectangle having there two phasors as sides represent the _____.
   a. up, impedance   **b. down, impedance**
   c. left, current   d. up, total voltage

39. The impedance of a series RLC circuit is _____.
   a. $\sqrt{(R)^2 + (X_l-X_c)^2}$ b. $\sqrt{(R)^2 + (X_l)^2-(X_c)^2}$

   c. $\sqrt{(R)+ (X_l-X_c)}$ d. $\sqrt{(R+X_l-X_c)^2}$

40. The capacitor of power factor correction are rated in terms of
   a. voltage   b. VA   c. KW   **d. KVAR**

41. For the same load, if the power factor of load is reduced, it will
   a. draw more current   b. less current
   c. same current but less power   d. less current but more power

42. One of the reasons for improving the power factor is
   a. to increase the reactive power   **b. to decrease the reactive power**
   c. to increase the real power   d. to adjust the apparent power

43. The advantage of using static capacitor to improve the power factor is because they
   a. are not variable   **b. are almost loss free**

c. provide continuous change of power factor   d. provide stability

44. An ideal current source has zero
    a. voltage on no load
    b. internal resistance
    c. internal conductance
    d. stray current

45. A passive network has
    a. no source of e.m.f
    b. no source of current
    c. neither source of current nor source of e.m.f.d. no circuit

46. Which of the following is an active elements of a circuit
    a. ideal current source   b. resistance   c. inductance   d. capacitance

47. Which of the following statement is not correct?
    a. voltage source is an active element   **b. current source is a passive element**
    c. resistance is a passive element   d. conductance is a passive element

48. Open circuit voltage is the potential difference between two points when the impedance between these points is
    a. infinity   b. reactive   c. zero   d. capacitive

49. A material best suited for manufacturing of fuse wire
    a. Auminum   **b. Silver**   c. Lead   d. Copper

50. As the force contact is increased, the contact resistance will
    a. increase linearly b. Increase exponentially   c. remain unaltered **d. decrease**

51. Which of the following contact point metals has the highest conductivity?
    a. Silver   b. Tungsten   **c. Gold**   d. Copper

52. A fuse is normally a
    a. current limiting devices   b. voltage limiting device
    c. power limiting device   d. power factor correcting device

53. The material used for bus bars should have
    a. low resistivity   b. higher softening temperature
    c. low cost   **d. all of the above**

54. Which of the following is not valid in case of aluminum as compared to copper? Aluminum has higher
    a. resistuvity   b. coefficient of linear expansion
    c. tensile strength   d. joint resistance

55. Among all the a.c. systems, the most superior systems is the
    a. **three-phase, 3-wire with maximum voltage between conductors**
    b. three-phase, 3-wire with maximum voltage between conductors and earth
    c. three-phase, 3-wire with r.m.s. voltage between conductors
    d. three-phase, 3wire with r.m.s. voltage between conductors and earth

56. The average power factor of fluorescent and mercury lamps:

a. 70 – 80%
b. 60 – 75%
c. **50 – 95%**
d. 80 – 90%

57. For largely capacity batteries, its is rated:
    a. ampere – days
    b. ampere – hours
    c. ampere – months
    d. ampere – weeks

58. The components such as resistors, capacitors, and inductors do not generate nor control power. They are called:
    a. parameters
    b. active devices
    c. passive devices
    d. dynamic devices

59. DC is preferred over AC for submarine transmission line because:
    a. cheaper
    b. easier to install
    c. **not harmful**
    d. a o t a

60. Poor power factor is being penalized by the utility companies because:
    a. it's the policy of most companies
    b. **more fuel is needed**
    c. it has been the practice
    d. to force consumers to install capacitors

61. This is the property of coils which opposes changes in current.
    a. **inductance**
    b. resistance
    c. reactance
    d. elastance

62. The power factor of a circuit is approximately 100% if the circuit load consists only of
    a. reactance coils   b. **capacitors**
    c. motors   d. incandescent lamps

63. A mill is equal to
    a. **0.001 of an inch**   b. one inch
    c. 0.745 of an inch   d. none of the above

64. The resistance of the coil of 1000 watt, 250 V electric lamp is
    a. 2.5 ohms   b. 6.25 ohms   c. 62.5 ohms   d. 625 ohms

65. The rating of the batteries is given by
    a. KW   b. **Ah**   c. KVA   d. VARh

66. A voltage source and a voltmeter have
    a. zero and ideally infinite zero input impedance respectively
    b. ideally infinite and zero input impedances respectively
    c. high and low input impedances respectively
    d. none of the above

67. If two resistances connected in parallel and each dissipates 10 watts, the total power supplied by the voltage source equals
    a. 5 watts   b. 10 watts   **c. 20 watts**   d. 100 watts

68. If a parallel circuit is open in the main line, the current
    a. increases in each branch
    b. is zero in all branches
    c. is zero in the highest resistive branch
    d. increases in the branch of the lowest resistance

69. In a series parallel circuit, any two resistances in the same current path must be in
    a. parallel with each other
    b. parallel with the voltage source
    c. series with the voltage source
    d. series with each other

70. In which of the following circuits will produced maximum current delivered from the voltage source?
    a. 5 volts across a one ohm resistance
    b. 5 volts across two 5 ohm resistance in series
    c. 5 volts across two 5 ohm resistance in parallel
    d. 500 volts across a 1MQ resistance

71. Three 60 volts 60-watt bulbs are in parallel across the 60-meter line. If one bulb burns open
    a. rest of the two bulbs will not light
    b. all three bulbs will light
    c. the other two bulbs will light
    d. there will be heavy current in the main line

72. If a wire conductor of 0.1 ohm resistance is doubled in resistance becomes
    a. 0.1 ohm   b. 0.02 ohm   **c. 0.2 ohm**   d. 0.05 ohm

73. A closed switch has a resistance of
    a. infinity
    b. zero
    c. about 500 ohms
    d. about 50 ohms at room temperature

74. Two 500-ohm 1-watt resistors, connected in parallel. Their combined resistance and wattage rating is
    a. 5000 ohms, 1 watt   b. **250 ohms, 2 watts**
    c. 1000 ohms, 2 watts   d. 5000 ohms, 2 watts

75. A resistor connected across a 45-volt battery and produced a 1-mA of current. The required resistance with suitable wattage rating is
    a. 4.5 ohms, 1 watt   b. 45 ohms, 10 watts
    c. 4500 ohms, 2 watts   **d. 45,000 ohms, 1/3 watt**

76. A 45-volt source with an internal resistant of 2 ohms is connected across a wire-wound resistor. The maximum power will dissipate in the resistor when its resistance equals.
    a. Zero   **b. 2 ohms**   c. 45 ohms   d. infinity

77. Which of the following can produce maximum induced voltage?
    a. 1 amp DC current   b. 50-amp. DC current
    c. 1-amp. 60 cycles AC current   **d. 1-amp, 450 cycles AC current**

78. When the alternating voltage reverses in polarity, the current it produces
    a. reverses its direction
    b. **has the same direction**
    c. has phase angle of 180 degree
    d. alternates at 1.4 times the frequency of the applied voltage

79. An alternating current can induce voltage because it has
    a. high r.m.s. value   b. **varying magnetic field**
    c. stronger held than direct current d. constant magnetic field

80. An open coil has
    a. zero resistance and high inductance
    b. **infinite resistance and zero inductance**
    c. infinite resistance and normal inductance
    d. zero resistance and inductance

81. Inductive reactance is measured in ohms because it
    a. reduces the amplitude of alternating current
    b. increases the amplitude of alternating current
    c. increases the amplitude of direct current
    d. **has a back e.m.f. opposing the voltage output of a battery**

82. Inductive reactance applies to sine wave only because it
    a. increases with lower frequency
    b. increases with lower inductance
    c. **depends on the frequency**
    d. decreases with the higher frequencies

83. In a sine wave AC circuit with a resistive branch and conductive branch in parallel, the
    a. voltage across the inductor leads the voltage across the resistance by 90^0
    b. **resistance branch current is 90^0 out of phase with the inductive branch current**
    c. resistive and inductive branch current are 180^0 out of phase
    d. Inductive and resistive branch current are in phase.

84. If an AC voltages is applied to capacitive circuit, the alternating current can flow in the circuit because
    a. of high peak value

b. charging current can flow
c. discharge current can flow
d. varying voltage produces the changing and discharging currents

85. The amount of capacitive reactance with higher frequencies
    a. **decreases**
    b. increases
    c. is the same for all levels of frequencies
    d. decreases as the voltage increases

86. A steady DC voltage is applied to capacitor, after it charges to battery voltage, the current in the circuit
    a. depends on the current rating of the battery
    b. is greater for large values of capacitances
    c. is smaller for larger values of capacitances
    d. is zero for any value of capacitances

87. The Ohm's law states that
    a. **V is proportional to I**   b. I is proportional to V
    c. V is proportional to IR   d. V is proportional to R

88. When two or more circuit elements are connected in series
    a. **the currents flowing through them are the same**
    b. the voltages across them are the same
    c. the powers dissipated in them are the same
    d. the energies stored in them are the same

89. When two or more circuit elements are connected in parallel
    a. **the voltages across them are the same**
    b. the currents flowing through them are the same
    c. the powers dissipated in them are the same
    d. the energies stored in them are the same

90. Resistance is measured in
    a. ohms   b. henrys   c. farads   d. watts

91. Inductance is measured in
    a. ohms   **b. henrys**   c. farads   d. watts

92. Capacitance is measured in
    a. ohms   b. henrys   **c. farads**   d. watts

93. The impedance of an inductor is
    a. purely imaginary   b. infinite at DC
    c. constant   **d. a sinusoidal function of frequency**

94. The impedance of a capacitor is
    a. purely imaginary   b. infinite at DC
    c. constant   **d. a sinusoidal function of frequency**

95. At very high frequencies, an inductor acts like
    a. an open circuit   b. a short circuit
    c. a voltage source   d. a capacitor

96. At very low frequencies, an inductor acts like
    a. a short circuit   b. an open circuit
    c. a current source   d. a capacitor

97. At very high frequencies, a capacitor acts like
    a. an open circuit   **b. a short circuit**
    c. a voltage source   d. a capacitor

98. At very low frequencies, an capacitor acts like
    a. a short circuit   **b. an open circuit**
    c. a current source   d. a capacitor

99. An inductor and a resistor produced a current of I_L and I_R respectively. What is the appropriate expression for the total current at the source?

    a. $\sqrt{(I_R)^2 + (I_l)^2}$ b. $\sqrt{(I_R) + (I_l)}$

    c. $\sqrt{(I_R)^2 + (I_l)}$ d. $\sqrt{(I_R + I_l)^2}$

100. What is the correct expression for the total power dissipated at the inductor and a resistor, having a Q VAr and P Watts?

    a. $\sqrt{(P) + (Q)}$ b. $\sqrt{(R + Q)^2}$

    c. $\sqrt{(P)^2 + (Q)}$ **d.** $\sqrt{(P)^2 + (Q)^2}$