Standard Questions

Electricity & Magnetism

1. A 100-watt electric bulb is used for 10 hours. What will be the cost of electricity consumed, if the consumption cost is Rs. 5 per unit?
   (a) Rs. 5 (b) Rs. 10
   (c) Rs. 25 (d) Rs. 50
2. If a bulb of 100 watt burns for 10 hours, the expenditure of electricity will be –
   (a) 0-1 unit (b) 1 unit
   (c) 10 units (d) 100 units
   Ans. (b)
   See the explanation of above question.
3. Five bulbs each of 100-watt capacity in a tunnel are illuminated continuously for twenty hours. The consumption of electricity will be:
   (a) One unit (b) Two units
   (c) Ten units (d) Twenty units
4. The value of 1 kilowatt hour is –
   (a) 3.6×10^6 J (b) 3.6×10^3 J
   (c) 10^3 J (d) 10^5 J
5. An electric bulb of 100 watt is used for 4 hours. The unit of electric energy used is-
   (a) 400 (b) 25
   (c) 4 (d) 0.4
6. Electricity consumption bill is based on the measurement of –
   1. Watt 2. Voltage
   3. Ohm 4. Ampere
   Select your answer of the following codes –
   (a) Only 1 (b) 1 and 2
   (c) 2 and 3 (d) 1 and 4
7. How many units of electricity will be consumed if you use a 60-watt electric bulb for 5 hours every day for 30 days?
   (a) 12 (b) 9
   (c) 6 (d) 3
8. An electric bulb is connected to 220 v generator. The current is 0.5 A. The power of the bulb is
   (a) 110 w (b) 110 v
   (c) 440 w (d) 220 w
9. The total resistance of a circuit having two parallel resistors is 1.403 kilo-ohm. If one of the resistors is 2.0 kilo-ohm, then the other resistor will be
   (a) 1.403 kilo-ohm (b) 2.0 kilo-ohm
   (c) 3.403 kilo-ohm (d) 4.70 kilo-ohm
10. Of the two bulbs in a house, one glows brighter than the other. In this context which of the following statements is correct?
    (a) The brightness does not depend on the resistance.
    (b) Both the bulbs have same the resistance.
    (c) The bright bulb has larger resistance.
    (d) The dim bulb has larger resistance.
11. Of the two bulbs in a house, one glows brighter than the other. Which of the two has a larger resistance?
    (a) The dim bulb
    (b) The brighter bulb
    (c) Both have the same resistance
    (d) The brightness does not depend on the resistance
12. How two identical bulbs should be connected to get maximum light?
    1. Both are connected in series.
    2. Both are connected in parallel.
    Select the correct answer using the code given below:
    Code:
    (a) In case 1 more
    (b) In case 2 more
    (c) Same in both 1 and 2
    (d) Nothing can be said
13. A dynamo which is said to generate electricity actually acts as a:
    (a) Source of ions
    (b) Source of electric charge
    (c) Converter of energy
    (d) Source of electrons
14. 'Dynamo' is a device, which converts:
    (a) Chemical energy into electrical energy
    (b) Electrical energy into mechanical energy
    (c) Mechanical energy into electrical energy
    (d) Electrical energy into chemical energy
15. Dynamo is a machine which is used for –
    (a) Conversion of high voltage to low voltage
    (b) Conversion of electrical energy to mechanical energy
    (c) Conversion of mechanical energy to electrical energy
    (d) Conversion of low voltage to high voltage
16. Turbines and Dynamos are used to convert which energy to electrical energy?
    (a) Chemical energy
    (b) Solar energy
    (c) Mechanical energy
    (d) Magnetic energy
17. When electrical energy is converted into motion
    (a) There is no heat loss
    (b) Heat loss is 50 percent
    (c) Heat loss is 30 percent
    (d) Heat loss is 80 percent

18. A device which converts electrical energy into mechanical energy is –
(a) Dynamo (b) Transformer
(c) Electric motor (d) Inductor
19. In electrical motor:
(a) heat is converted into electrical energy
(b) electrical energy is converted into heat
(c) electrical energy is converted into mechanical energy
(d) mechanical energy is converted into electrical energy
(e) None of the above / More than one of the above
20. The device which works on the principle of electromagnetic induction is
(a) Ammeter (b) Voltmeter
(c) Dynamo (d) Electric motor
21. A device which converts chemical energy into electrical energy is called –
(a) Battery (b) Motor
(c) Generator (d) Moving coil meter
22. Electric motors operating at low voltages tend to burn out because –
(a) They draw more current which is inversely proportional to the voltage.
(b) They draw more current which is inversely proportional to the square root of the voltage.
(c) They draw heat proportional to v^2
(d) Low voltage sets in electrical discharge.
23. Faraday constant:
(a) depends on the amount of the electrolyte
(b) depends on the current passed in the electrolyte
(c) depends on the volume of the solvent in which the electrolyte is dissolved
(d) is a universal constant
24. Consider the following statements regarding a motor car battery –
1. The voltage is usually 12 V.
2. Electrolyte used is hydrochloric acid.
3. Electrodes are lead and copper.
4. Capacity is expressed in ampere-hour.
Which of the above statements are correct?
(a) 1 and 2 (b) 2 and 3
(c) 3 and 4 (d) 1 and 4
25. Nickel-Cadmium (Ni-Cd) battery is used in :
(a) Calculator
(b) Cordless electronic appliances
(c) Transistors
(d) All of the above
26. Which of the following metals is used as filament in lighting bulbs?
(a) Iron (b) Molybdenum
(c) Silver (d) Tungsten
27. The filament of an electric bulb is made of –
(a) Magnesium (b) Iron
(c) Nichrome (d) Tungsten
28. Filament of electric bulb is made of:
(a) Tungsten (b) Nichrome
(c) Lead (d) Aluminium
29. Consider the following statements:
An ordinary light bulb has a rather short life because the:
1. Filament wire is not uniform.
2. Bulb cannot be evacuated completely.
3. Wires supporting the filament melt at high temperatures.
Which of the above statements are correct?
(a) 1 and 3 (b) 2 and 3
(c) 1 and 2 (d) 1, 2 and 3
30. The temperature of the filament of lighted electric bulb is generally:
(a) 100°C to 500°C (b) 1000°C to 1500°C
(c) 2000°C to 2500° (d) 3000°C to 3500°C
31. Lightning can even burn a tree because it contains tremendous amount of
(a) Heat energy (b) Electric energy
(c) Chemical energy (d) Nuclear energy
32. Consider the following statements:
Assertion (A): Lightning conductors prevent buildings from damages in the event of lightning strike.
Reason (R): The electric charge conducts to ground through the wire, instead of passing through the structure.
Select the correct answer using the codes given below:
Code:
(a) Both (A) and (R) are correct, and (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).
(c) (A) is correct but (R) is wrong.
(d) (A) is correct but (R) is wrong.
33. In a three-pin electrical plug longest pin should be connected to
(a) Ground terminal (b) Live terminal
(c) Neutral terminal (d) Any terminal
34. In electric apparatus 'earth' is used:
(a) To reduce the expenditure
(b) Because the apparatus used 3-phase
(c) For safety
(d) In the form of fuse
35. The electric current does not flow between two properly connected charged bodies if they are having
(a) Same charge (b) Same capacity
(c) Same resistivity (d) Same potential

36. A fuse is used in main electric supply as a safety device. Which one of the following statements about the fuse is correct?
    (a) It is connected in parallel with the main switch
    (b) It is made mainly from silver alloys
    (c) It must have a low melting point
    (d) It must have a very high resistance
37. Principle of fuse is
    (a) Chemical effect of electricity
    (b) Mechanical effect of electricity
    (c) Heating effect of electricity
    (d) Magnetic effect of electricity
38. A fuse wire is characterized by:
    (a) Low resistance and high melting point.
    (b) Low resistance and low melting point.
    (c) High resistance and low melting point.
    (d) High resistance and high melting point.
39. Fuse wire used for safety of household have:
    (a) Low melting point
    (b) High melting point
    (c) High resistance
    (d) Low resistance.
40. The filament of a halogen lamp is an alloy of–
    (a) Tungsten and iodine
    (b) Tungsten and bromine
    (c) Tungsten and sodium
    (d) Molybdenum and sodium
41. Assertion (A): The temperature of a metal wire rises when an electric current is passed through it.
    Reason (R): Collision of metal atoms with each other releases heat energy.
    Code:
    (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
    (b) Both (A) and (R) are true but (R) is not a correct explanation of (A)
    (c) (A) is true but (R) is false
    (d) (A) is false but (R) is true
42. Domestic electrical wiring is basically a:
    (a) Series connection
    (b) Parallel connection
    (c) Combination of series and parallel connections
    (d) Series connection within each room and parallel connection elsewhere
43. A wire with black insulation during electric supply is–
    (a) Live wire (b) Earth wire
    (c) Neutral wire (d) Fuse wire
44. What is the order of magnitude of electric resistance of the human body (dry)?
    (a) 10^2 ohm (b) 10^4 ohm
    (c) 10^6 ohm (d) 10^8 ohm
45. Full form of C.F.L. is –
    (a) Compact Fluorescent Lamp
    (b) Centrally Fixed Lamp
    (c) Chemical Fluorescent Lamp
    (d) Condensed Fluorescent Lamp
46. Light Emitting Diode (LED) work on principle of:
    (a) Laser
    (b) Thermionic emission
    (c) Photoelectric code
    (d) Electroluminescence
47. Assertion (A): Light Emitting Diode (LED) lamps offer longer service life as compared to Compact Fluorescent Lamps (CFL).
    Reason (R): Light Emitting Diodes (LED) lamps are more energy efficient as compared to the Compact Fluorescent Lamps (CFL).
    Select the correct answer using the codes given below:
    (a) Both (A) and (R) are true, and (R) explains (A).
    (b) Both (A) and (R) are true, but (R) does not explains (A).
    (c) (A) is true, and (R) is false.
    (d) (A) is false, and (R) is true.
48. What is the difference between a CFL and an LED Lamp?
    1. To produce light, a CFL uses mercury vapour and phosphor while an LED lamp uses semi-conductor material.
    2. The average life span of a CFL is much longer than of an LED lamp.
    3. A CFL is less energy-efficient as compared to an LED lamp.
    Which of the statements given above is/are correct?
    (a) 1 only (b) 2 and 3
    (c) 1 and 3 (d) 1, 2 and 3
49. With reference to street-lighting, how do sodium lamps differ from LED lamps?
    1. Sodium lamps produce light in 360 degrees but it is not so in the case of LED lamps.
    2. As street-lights, sodium lamps have longer life span than LED lamps.
    3. The spectrum of visible light from sodium lamps is almost monochromatic while LED lamps offer significant colour advantages in street-lighting.
    Select the correct answer using the code given below.
    (a) 3 only (b) 2 only
    (c) 1 and 3 only (d) 1, 2 and 3
50. What gases are filled in fluorescent tube?
    (a) Neon (b) Sodium

(c) Mercury (d) Mercury and neon

51. In comparison to an electric bulb, a fluorescent tube is preferred because –
(a) It has greater external outer surface to radiate/emit the light.
(b) There is no effect of voltage fluctuation on it.
(c) In the tube, electric energy almost converted into light energy.
(d) None of these.

52. How does the white light produce in the tube?
(a) by heating up the copper wire
(b) by heating up the filament
(c) by accelerating the atoms
(d) by oscillating the molecules

53. Which is the gas inside an electric bulb?
(a) Oxygen (b) Air
(c) Carbon dioxide (d) None of the above

54. Fluorescent tubes are fitted with a choke. The choke coil-
(a) Steps up the line voltage
(b) Steps down the line voltage
(c) Reduces current in the circuit
(d) Chokes low frequency current

55. With reference to the electric potential which of the following statements is/are correct?
1. It is a scalar quantity.
2. It is a vector quantity.
Select the correct answer using the codes given below.
Codes:
(a) Only 1 (b) Only 2
(c) Both 1 and 2 (d) Neither 1 nor 2

56. If potential difference and current flowing through a wire is increased twice each then electric power:
(a) Will remain unaffected
(b) Will increase four times
(c) Will increase two times
(d) Will decrease half

57. Two wires have their lengths, diameters and resistivities all in the ratio of 1: 2. If the resistance of the thinner wire is 10 ohm, the resistance of the thicker wire is:
(a) 5 ohm (b) 10 ohm
(c) 20 ohm (d) 40 ohm

58. Small drops of the same size are charged to V volts each. If n such drops coalesce to form a single large drop, its potential will be:
(a) $n^{2/3}$ V (b) $n^{1/3}$ V
(c) n V (d) N^{-1} V

59. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R).
Assertion (A): Transformer is useful for stepping up or stepping down voltages.
Reason (R): Transformer is a device used in D.C. circuits.
In the context of the above two statements, which one of the following is correct?
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not a correct explanation of (A).
(c) (A) is true but (R) is false
(d) (A) is false but (R) is true

60. Transformer is used for-
(a) Converting AC into DC
(b) Converting DC into AC
(c) To step-up DC voltages
(d) To step-up or step-down AC voltages

61. Which of the following is the purpose for which a transformer is used?
(a) To convert AC into DC
(b) To convert DC into AC
(c) To step-up or step-down AC voltage
(d) To step-up DC voltage

62. A mobile phone charger is –
(a) An inverter
(b) A UPS
(c) A step-up transformer
(d) A step-down transformer

63. Some pairs of devices and associated energy changes are given below:
(i) Electric generator – Mechanical to electrical
(ii) Electric motor – Electrical to mechanical
(iii) Diesel engine – Light to electrical
(iv) Solar cell – Chemical to mechanical
Which of the above pair/s is/are correctly matched?
(a) (i) and (ii) (b) (i) and (iii)
(c) (ii) and (iv) (d) (iii) and (iv)

64. The basic difference between an AC generator and a DC generator is that –
(a) AC generator has an electromagnet while a DC generator has permanent magnet
(b) AC generator has slip rings while the DC generator has a commutator
(c) DC generator will generate a higher voltage
(d) AC generator will generate a higher voltage

65. Alternate current is not preferable –
(a) To charge storage battery
(b) To run/start a electric motor
(c) To transmit electric power
(d) To heat up electric toaster

66. The device used for converting alternating current to direct current is called –
(a) Inverter (b) Rectifier
(c) Transformer (d) Transmitter
67. Alternating current is converted to direct current –
(a) By Dynamo (b) By Motor
(c) By Transformer (d) By Rectifier
68. Assertion (A): In India, electricity distribution companies calculate the consumption of electricity in kWh.
Reason (R): Electrical system in India works at a frequency of 60 Hz.
Code:
(a) both (A) and (R) are individually true, and (R) is the correct explanation of (A).
(b) both (A) are (R) are individually true, but (R) is not a correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.
69. Which of the following option represents the consumption of power in ascending order–
(a) Television, fan, electronic press, electronic kettle
(b) Television, fan, electronic kettle, electronic press
(c) Fan, television, electronic press, electronic kettle
(d) Electronic press, electronic kettle, fan, television
70. The earth's magnetic field is due to
(a) Currents circulating inside the core
(b) Presence of a huge magnet at is centre
(c) Moving charges in space outside
(d) None of the above
71. What is the source of electrical energy in an artificial satellite?
(a) Solar cells
(b) Mini nuclear reactor
(c) Dynamo
(d) Thermopile
72. Consider the following statements:
Assertion (A): Space-based solar power (SBSP), it is suggested be made a national goal.
Reason (R): Supply of SBSP is 99% uninterrupted throughout the year, besides the enormity of energy availability.
Select the correct answer using the codes given below:
Code:
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.
73. With reference to technologies for solar power production, consider the following statements:
1. 'Photovoltaics' is a technology that generates electricity by direct conversion of light into electricity, while 'Solar Thermal' is a technology that utilizes the Sun's rays to generate heat which is further used in electricity generation process.
2. Photovoltaics generates Alternating Current (AC), while Solar Thermal generates Direct Current (DC).
3. India has manufacturing base for Solar Thermal Technology, but not for Photovoltaics.
Which of the statements given above is/are correct?
(a) 1 only (b) 2 and 3 only
(c) 1, 2 and 3 (d) None
74. With reference to solar water pumps, consider the following statements:
1. Solar power can be used for running surface pumps and not for submersible pumps.
2. Solar power can be used for running centrifugal pumps and not the ones with piston.
Which of the statement given above is/are correct?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2
75. Which one of the following elements is used in solar cells?
(a) Silicon (b) Cerium
(c) Astatine (d) Vanadium
76. Photovoltaic cells are:
(a) Solar cells (b) Thermal cells
(c) Sulphur cells (d) Molar cells
77. Photovoltaic cells are related to:
(a) Nuclear Energy
(b) Geo Thermal Energy
(c) Solar Energy
(d) Wind Energy
78. Insulators have resistivity of the order of:
(a) $10^6\Omega$m to $10^8\Omega$m
(b) $10^{-12}\Omega$m to $10^{-17}\Omega m$
(c) $10^{-8}\Omega$m to $10^{-6}\Omega m$
(d) $10^{12}\Omega$m to $10^{17}\Omega$m
79. What constitutes current in a metal wire?
(a) electrons (b) protons
(c) neutrons (d) None of these

80. Most liquids that conduct electricity are solutions of acids, bases and.....
    (a) Copper (b) Aluminum
    (c) Salts (d) Iron
81. The attribute specifies (in pixels) the distance between two adjacent cells.
    (a) Width (b) Height
    (c) Cell padding (d) Cell spacing
82. When an ebonite rod is rubbed with fur, the charge acquired by the fur is
    (a) negative (b) positive
    (c) neutral (d) none
83. The resistivity p of a material may be expressed in units of-
    (a) ohm (b) ohm/cm
    (c) ohm-cm (d) ohm-cm^2
84. Electric Motor converts energy to mechanical energy.
    (a) Sound (b) Mechanical
    (c) Chemical (d) Electrical
85. A suitable unit for expressing electric field strength is
    (a) $\frac{V}{C}$ (b) A - m
    (c) C/m^2 (d) N/C
86. How many electrons will have a charge of one coulomb?
    (a) 6.2×10^{18} (b) 6.2×10^{19}
    (c) 5.2×10^{18} (d) 5.2×10^{19}
87. G. S. Ohm is the discoverer of the following?
    (a) Law of Electrostatic Attraction
    (b) Photoelectric effect
    (c) Law of Electric Resistance
    (d) Thermionic Emission (Electrons emitting from hot-source)
88. An electron volt is equal to
    (a) 0.62×10^{13}J (b) 1.6×10^{-13}J
    (c) 0.62×10^{19}J (d) 1.6×10^{-19}J
89. Two charges are placed at a distance apart. If a glass slab is placed between them, force between them will
    (a) increase (b) decrease
    (c) remain same (d) be zero
90. The work done in moving a positive charge on an equipotential surface is
    (a) finite and positive
    (b) infinite
    (c) finite and negative
    (d) zero
91. A soap bubble is given negative charge then its radius
    (a) Decreases
    (b) increases
    (c) remains unchanged
    (d) none of these
92. A hollow sphere of copper is positively charged. Then the electric field inside the sphere is
    (a) the same as the field at the surface
    (b) greater than the field at the surface
    (c) less than the field at the surface but not zero
    (d) zero
93. The potential inside a hollow spherical conductor
    (a) is constant
    (b) varies directly as the distance from the centre
    (c) varies inversely as the distance from the centre
    (d) none of these
94. Which of the following cells convert electrical energy into chemical energy?
    (a) Galvanic (b) Electrochemical
    (c) Voltaic (d) Electrolytic
95. The capacitance unit of convenient size is
    (a) farad (b) microfarad
    (c) kilo farad (d) mega farad
96. No current flows between two charged bodies when connected
    (a) if they have same capacity
    (b) if they have the same quantity of charge
    (c) if they have same potential
    (d) none of these
97. As the electric charge on the surface of a hollow metal sphere increases, the electric field intensity inside the sphere
    (a) decrease
    (b) increase
    (c) remains the same
    (d) none of these
98. The electric field due to point charge at a distance R form it is E. If the same charge is placed on a metallic sphere of Radius R, the

electric field on the surface of the sphere will be

(a) zero (b) $\frac{E}{2}$

(c) E (d) 2 E

99. A hollow metal sphere of radius 5 cm is charged so that the potential on its surface is 10 V. The potential at the centre of sphere is

(a) zero (b) 10 V

(c) more than (d) none

100. Who invented the electric tram?

(a) James Cook

(b) William Harvey

(c) Fyodor Pirotsky

(d) Robert Boyles

101. What happens when the filament inside the bulb is broken?

(a) Bulb glows more intensely

(b) Bulb glows with very low intensity

(c) Bulb gets fused

(d) No change happens

102. Working of safety fuses depends upon:

1. Magnetic effect of the current.
2. Chemical effect of the current.
3. Magnitude of the current.
4. Heating effect of the current.

Select the correct answer using the code given below.

(a) 1, 2, 3 and 4 (b) 1, 2 and 3 only

(c) 3 and 4 only (d) 4 only

103. Capacity of a parallel plate condenser can be increased by

(a) increasing the distance between the plate

(b) increasing the thickness of the plate

(c) decreasing the thickness of the plate

(d) decreasing the distance between the plate

104. The capacitance of parallel plate condenser does not depend on

(a) area of the plate

(b) metal of the plate

(c) medium between the plate

(d) distance between the plate

105. Two metallic wires made from copper have same length but the radius of wire 1 is half of that of wire 2. The resistance of wire 1 is R. If both the wires are joined together in series, the total resistance becomes:

(a) 2R (b) $\frac{R}{2}$

(c) $\frac{5}{4}R$ (d) $\frac{3}{4}$R

106. For an electric dipole, the field at a point on the equatorial line and the dipole moment are

(a) in the same direction

(b) in opposite direction

(c) perpendicular to each other

(d) not related

107. Electron volt (eV) is a unit of

(a) energy (b) potential

(c) current (d) charge

108. The unit of intensity of electric field is

(a) newton/coulomb

(b) joule/coulomb

(c) volt-meter

(d) newton/meter

109. A wire of copper having length / and area of cross-section A is taken and a current I is flown through it. The power dissipated in the wire is P. If we take an aluminium wire having same dimensions and pass the same current through it, the power dissipated will be:

(a) P (b) <P

(c) > P (d) 2P

110. Which one of the following devices changes low voltage alternating current to high voltage alternating current and vice versa?

(a) Generator (b) Motor

(c) Transformer (d) Vibrator

111. The dielectric constant of metals is

(a) 1 (b) greater than 1

(c) 0 (d) infinite

112. Electric current is measured using which of the following instrument?

(a) Anemometer (b) Ammeter

(c) Voltmeter (d) Wattmeter

113. Ohm's law is valid in case of

(a) superconductor (b) insulator

(c) semiconductor (d) conductor

114. Which of the following instruments can detect the presence of a current in a circuit?

(a) Galvanometer

(b) Sphygmomanometer

(c) Barometer

(d) Magnetometer

115. At which place Earth's Magnetic field becomes horizontal?
(a) Magnetic meridian
(b) Magnetic equator
(c) Geographical pole
(d) Tropic of Cancer

116. What will be the resistance of a wire across which, when 2V potential difference is applied, 1A current flows Through the wire?
(a) 0.5 Ohms (b) 2 Ohms
(c) 20 Ohms (d) 0.02 Ohm

117. In bringing an electron towards another electron, the electrostatic potential energy of the system.
(a) Remains same (b) Becomes zero
(c) increases (d) Decreases

118. Capacity of a conductor depends upon
(a) Size of conductor
(b) Thickness of conductor
(c) material of conductor
(d) All of these

119. A point charge is brought in an electric field. The field at a nearby point
(a) may increase if the charge in positive
(b) may decrease if the charge is negative
(c) both (a) and (b)
(d) None of these

120. A Circular coil of single turn has a resistance of 20Ω. Which one of the following is the correct value for the resistance between the ends of any diameter of the coil?
(a) 50 Ω (b) 10 Ω
(c) 20 Ω (d) 40 Ω

121. If the length of a wire is doubled and its cross section is also doubled, then its resistance will
(a) Become one fourth
(b) Become four time
(c) Become two times
(d) Remain unchanged

122. The resistance of a wire is R. It is stretched uniformly so that its length is doubled. The resistance now becomes
(a) 2R (b) R/2
(c) 4 R (d) R/4

123. The specific resistance of a wire
(a) varies with its length
(b) varies with its cross-section
(c) varies with its mass
(d) does not depend on its length, cross-section and mass

124. The equivalent resistance of n identical resistors connected in parallel is x. If the resistors are connected in series, the equivalent resistance would be
(a) nx (b) n^2x
(c) x/n (d) x/n^2

125. The reciprocal of specific resistance is
(a) conductive resistance
(b) specific conductance
(c) resistance
(d) plate resistance

126. In a solenoid, the current flowing through the wire is I and number of turns per unit length is n. This gives a magnetic field B inside the solenoid. If number of turn per unit length is increased to $2n$, what will be the value of magnetic field in the solenoid?
(a) B (b) 2 B
(c) B/2 (d) B/4

127. A galvanometer is converted into an ammeter when we connect a
(a) High resistance in series
(b) High resistance in parallel
(c) low resistance in series
(d) Low resistance in parallel

128. A galvanometer can be converted into a voltmeter by connecting with it a
(a) High resistance in parallel
(b) Low resistance on parallel
(c) high resistance in series
(d) Low resistance in series

129. The reciprocal of resistance is
(a) conductance b) resistivity
(c) conductivity (d) none of the above

130. When a number of resistors are connected in series in a circuit, the value of current:
(a) becomes half (b) decreases
(c) increases (d) remains the same

131. Kirchoff's first law, i.e. $\Sigma I = 0$ at a junction, deals with conservation of
(a) charge (b) energy
(c) momentum (d) angular momentum

132. Which of the following has low resistivity?
(a) Nichrome (b) Glass
(c) Ebonite (d) Diamond

133. The resistivity of a wire depends on its
(a) length
(b) area of cross-section
(c) shape
(d) material

134. Electric resistance is measured by a/an
(a) Ammeter (b) Potentiometer
(c) Voltameter (d) Ohmmeter

135. The resistance of an ideal voltmeter is
(a) zero (b) very low
(c) very high (d) infinite

136. The resistance of an ideal ammeter is
(a) zero (b) very low
(c) very high (d) infinite

137. A simple circuit contains a 12V battery and a bulb having 24 ohm resistance. When you turn on the switch, the ammeter connected in the circuit would read
(a) 0.5A (b) 2A
(c) 4A (d) 5A

138. Three resistors with magnitudes 2, 4 and 8 ohm are connected in parallel. The equivalent resistance of the system would be
(a) Less than 2 ohm
(b) More than 2 ohm but less than 4 ohm
(c) 4 ohm
(d) 14 ohm

139. Electromotive force is most closely related to
(a) electric field
(b) magnetic field
(c) potential difference
(d) mechanical force

140. Which finger shows the direction of current in Fleming's left-hand rule?
(a) Index finger (b) Middle finger
(c) Thumb finger (d) Ring finger

141. Constantan wire is used in making standard resistance because its
(a) melting point is high
(b) density is high
(c) specific resistance is low
(d) temperature coefficient of resistance is negligible

142. Potentiometer measures potential more accurately because
(a) it measures potential in the closed circuit
(b) it measures potential in the open circuit
(c) it uses high resistance potentiometer wire
(d) none of these

143. The ……. is connected in parallel in an electric circuit.
(a) Voltmeter (b) Fuse
(c) Galvanometer (d) Ammeter

144. If two Coulomb of charge flows through any cross-section of a conductor in one second, what will be the current Flowing through it?
(a) 1/2 Ampere (b) 1/4 Ampere
(c) 2 Amperes (d) 1 Ampere

145. Two electric bulbs whose resistances are in the ratio 1:2 are connected in parallel to a constant voltage source The power dissipated in them have the ratio
(a) 1:2 (b) 1:1
(c) 2:1 (d) 1:4

146. If two bulbs of 25 W and 100 W, rated at 220 V, are connected in series across a 440 V supply
(a) 25 W bulb will fuse
(b) 100 W bulb will fuse
(c) none will fuse
(d) Both will fuse

147. In a parallel circuit, if one electrical appliance stops working due to some defect, then all the other Appliances:
(a) will keep working double of what they did
(b) will not work
(c) will work normally
(d) will keep working half of what they did

148. Keeping voltage constant, if more lamps are put into a series circuit, the overall current in the circuit:
(a) Increases
(b) Decreases
(c) Remains the same
(d) Becomes infinite

149. Thermocouple thermometer is based on
(a) Seebeck effect
(b) Compton effect
(c) Peltier effect
(d) Photoelectric effect

150. A thermoelectric couple is made from copper and iron. At the hot junction, current
(a) Flows from copper towards iron
(b) Flows from iron towards copper
(c) flow decreases
(d) Flow increases

151. When the hot and cold junctions of a thermocouple are interchanged the thermo-emf
(a) Becomes zero (b) Becomes double
(c) remain same (d) Changes sign

152. For electroplating a spoon, it is placed in the voltameter at
(a) The position of anode
(b) The position of cathode
(c) anywhere in the electrolyte
(d) None of these

153. As the temperature of hot junction increases, the thermos-emf
(a) Always increases
(b) Always decreases
(c) may increase or decrease
(d) Always remains constant

154. In the electrolyte's the amount of mass deposited or liberated at an electrode is directly proportional to
(a) Square of electric charge
(b) Amount of charge
(c) square of current
(d) None of these

155. The temperature at which thermoelectric power of a thermos couple becomes zero is called
(a) inversion temperature
(b) neutral temperature
(c) junction temperature
(d) Null temperature

156. The conductivity of a superconductor is
(a) infinite (b) very large
(c) very small (d) zero

157. A piece of copper and another germanium are cooled from room temperature to 40 K. The resistance of
(a) each of them decreases
(b) each of them increases
(c) copper increases and germanium decreases
(d) copper decreases and germanium increases

158. If a wire of resistivity ρ is stretched to double its length, then its new resistivity will
(a) be half (b) be double
(c) be four times (d) not change

159. When a body is earth connected, electrons from the earth flow into the body. This means the body is
(a) charged negatively
(b) an insulator
(c) uncharged
(d) charged positively

160. Specific resistance of a conductor increases with
(a) increase in temperature
(b) increase in cross-section area.
(c) decrease in cross-section area
(d) none of these

161. The practical unit of resistance is Ω. 1 Ω is equal to
(a) 10^8 emu (b) 10^9 emu
(c) 10^{13} emu (d) none of these

162. Current provided by a battery is maximum when
(a) internal resistance is equal to external resistance
(b) internal resistance is greater than external resistance
(c) internal resistance is less than external resistance
(d) none of these

163. The direction of magnetic field at any location on the earth's surface is commonly specified in terms of
(a) field declination
(b) field inclination
(c) both field declination and field inclination
(d) horizontal component of the field

164. An electric fan and heater are marked as 100 W and 220 V and 1000 W and 220 V respectively. The resistance of heater is
(a) zero
(b) greater than that of the fan
(c) lesser than that of fan
(d) equal to that of fan

165. Filament of electric bulb is made of
(a) Tungsten (b) Nichrome
(c) Lead (d) Aluminum

166. Fuse wire should have
(a) low resistance, high melting point
(b) low resistance, low melting point
(c) high resistance, low melting point
(d) high resistance, high melting point

167. If a high-power heater is connected to electric mains, then the bulbs in the house become dim because there is a
(a) current drop
(b) potential drop
(c) no current drop
(d) no potential drop

168. If potential difference and current flowing through a wire is increased twice each then electric power
(a) Will remain unaffected
(b) Will increase four times
(c) Will increase two times
(d) Will decrease half

169. Metals are good conductor of heat than insulator because
(a) their atoms are relatively apart
(b) they contain free electron
(c) they have reflecting surface
(d) none of these

170. A positive charge $+q$ is placed at the centre of a hollow metallic sphere of inner radius a and outer radius b. The electric field at a distance r from the centre is denoted by E. In this regard, which one of the following statements is correct?
(a) $E = 0$ for $a < r < b$
(b) $E = 0$ for $r < a$
(c) $E = q / 4\pi\varepsilon_0 r$ for $a < r < b$
(d) $E = q / 4\pi\varepsilon_0 a$ for $r < a$

171. A thermoelectric refrigerator works on
(a) jule effect (b) seebeck effect
(c) peltier effect (d) none of these

172. If the electric current in a lamp decreases by 5% then the power output decreases by
(a) 25% (b) 10%
(c) 5% (d) 20%

173. Which of the following units measure energy?
(a) kilowatt-hour
(b) $(volt)^2(sec)\ (ohm)^{-1}$
(c) (weber) (ampere)
(d) all of them

174. When no current is passed through a conductor
(a) the free electrons do not move
(b) the average thermal velocity of a free electron over a large period of time is zero
(c) the average of thermal velocities of all the free electrons at an instant is zero
(d) (b) and (c) both

175. A particle of mass m and charge q travels from rest through a potential difference V. Its final energy is
(a) qV (b) mqV
(c) qV/m (d) mq/V

176. At a point inside a charged conductor the
(a) electric field is zero
(b) electric field is constant
(c) potential is constant
(d) (a) and (c) both

177. The electric potential at the center of a charged conductor is
(a) zero
(b) twice that of the surface
(c) same as on the surface
(d) none of these

178. Good resistance coils are made of
(a) copper (b) manganin
(c) gold (d) silver

179. When a metal is heated, its resistance
(a) decreases
(b) increases
(c) may increase or decrease
(d) remains constant

180. An example of a non-ohmic device is
(a) platinum resistance thermometer
(b) copper wire
(c) potentiometer wire
(d) triode

181. The statement "Algebric sum of the current meeting at a node is zero"
(a) Ampere's law (b) Lenz's law
(c) Faraday law (d) Kirchhoff's law

182. The EMF of the Daniel cell is
(a) 0.56 V (b) 1.12 V
(c) 2.56 V (d) 3.12 V

183. The primary cell is a
(a) secondary cell
(b) primary cell
(c) both (a) and (b)
(d) none of these

184. The electrolyte in the dry cell is
(a) zinc
(b) acid of sulpher
(c) ammonium chloride
(d) magnese dioxide

185. The electrolyte in a car battery is
(a) hydrochloric acid
(b) sulphuric acid
(c) nitric acid
(d) distilled water

186. The coil of an electric heater is made of-
(a) aluminium (b) tungsten
(c) nichrome (d) none of these

187. Magnetic effect of current was discovered by
(a) Faraday (b) oersted
(c) Kirchhoff (d) joule

188. The unit of Magnetic flux is
(a) weber (b) henry
(c) weber/m^2 (d) ampereim

189. A magnetic field
(a) always exerts a force on a charged particle
(b) never exerts a force on a charged particle
(c) exerts a force on a charged particle if it is moving across the magnetic lines of force
(d) exerts a force on a charged particle if it is moving along the magnetic lines of force

190. Two electron beams are travelling parallel to each other. They
(a) attract each other
(b) repel each other
(c) do not affect each other
(d) none of these

191. If the potential difference applied to an X-ray tube is doubled while keeping the separation between the filament and the target as same, what will happen to the cutoff wavelength?
(a) Will remain same
(b) Will be doubled
(c) Will be halved
(d) Will be four times of the original wavelength

192. If a current is passed in a spring, it
(a) gets compressed
(b) gets expanded
(c) oscillates
(d) remains unchanged

193. Step-up transformers are used for-
(a) increasing electrical power
(b) decreasing electrical power
(c) decreasing voltage
(d) increasing voltage

194. Magnetic field due to an infinite current carrying wire varies with the distance (r) from the wire as
(a) r (b) r^2
(c) $\frac{1}{r}$ (d) $\frac{1}{r^2}$

195. The magnetic induction associated with currents flowing in a hollow copper tube will be
(a) only inside
(b) only out side
(c) both inside and outside
(d) neither inside nor outside

196. When a charged particle enters a uniform magnetic field its kinetic energy
(a) remains constant
(b) increased
(c) decreases
(d) becomes

197. The magnetic field lines in the middle of a solenoid are
(a) circle
(b) parallel to the axis
(c) spirals
(d) perpendicular to the axis

198. The unit of magnetic induction is
(a) weber/m^2 (b) weber/meter
(c) weber (d) none of these

199. In a filament type light bulb, most of the electric power consumed appears as
(a) visible light
(b) infra-red rays
(c) ultra-violet rays
(d) fluorescent light

200. A moving charge produces
(a) an electric field only
(b) a magnetic field only
(c) both electric and magnetic fields
(d) neither an electric nor a magnetic field

201. Two free parallel wires carrying currents in opposite directions.
(a) do not affect each other
(b) attract each other
(c) repel each other
(d) none of these

202. The current sensitivity of a moving coil galvanometer depends on
(a) the number of turns in the coil
(b) moment of inertia of the coil
(c) strength of the magnetic field
(d) (a) and (c) both

203. In order to increase the current sensitivity of a moving coil galvanometer the
(a) number of turns of the coil should be increase.
(b) strength of the magnetic field should be increased
(c) area of the coil should be increased
(d) all of the above

204. A horizontal cable carries a current from west to east. The direction of the magnetic field produced by the current at a point vertically above the wire is
(a) south to north (b) east to west
(c) north to south (d) west to east

205. A metallic cylinder carries a direct current. The magnetic field produce by it exists
(a) outside the cylinder only
(b) inside the cylinder only
(c) both inside and outside the cylinder
(d) none of these

206. To make the field radial in moving coil galvanometer
(a) the number of turns in the coil is increased
(b) poles are cylindrically cut
(c) magnet is taken in the form of horse shoe
(d) coil is wound an aluminum frame

207. Which part of the magnet has the least magnetic power?
(a) At north pole
(b) At south pole
(c) In the middle
(d) None of the option is correct

208. A source of magnetic field is
(a) a static electric charge
(b) a moving electric charge
(c) a current loop
(d) both (b) and (c)

209. A magnetic needle is kept in non-uniform magnetic field. It experiences
(a) a force and a torque
(b) a force but not a torque
(c) a torque but not a force
(d) none of these

210. The SI unit of pole strength is
(a) Am^2 (b) Am^{-1}
(c) Am^{-2} (d) Am

211. Magnetic lines of force
(a) cannot intersect at all
(b) intersect at infinity
(c) intersect within the magnet
(d) intersect at the neutral point

212. When magnet is heated, it
(a) loses its magnetism
(b) gains magnetism
(c) gains magnetism up to certain temperature
(d) none of these

213. In the case of a bar magnet, the line of magnetic induction
(a) start from the north pole and end at the south pole
(b) run continuously through the bar and outside.
(c) emerge in circular paths from the middle of the bar.
(d) none of these

214. Time period in a vibration magnetometer will be infinity
(a) at magnetic equator
(b) at geographic equator
(c) at magnetic pole
(d) no where

215. Degeneration of a magnet can be done by
(a) rough handling

(b) heating
(c) magnetizing in the opposite direction
(d) all the above

216. All the magnetic materials lose their magnetic properties when
(a) dipped in water
(b) dipped in oil
(c) brought near a piece of iron
(d) strongly heated

217. The relative permeability of a paramagnetic material is
(a) greater than unity
(b) less than unity
(c) equal to unity
(d) negative

218. Which of the following is most suitable for the core of an electromagnet?
(a) air (b) soft iron
(c) steel (d) none

219. The susceptibility of a diamagnetic material is
(a) small and negative
(b) Small and positive
(c) large and negative
(d) Large and positive

220. The relative permeability of a diamagnetic material is
(a) greater than unity
(b) less than unity
(c) equal to unity
(d) Negative

221. The susceptibility of a paramagnetic material is
(a) Small and negative
(b) Small and positive
(c) large and negative
(d) Large and positive

222. The susceptibility of a paramagnetic material
(a) Varies directly as the temperature
(b) Varies inversely as the temperature
(c) does not depend on the temperature
(d) None of these

223. The temperature at which a ferromagnetic material becomes paramagnetic is called
(a) Critical temperature
(b) Inversion temperature
(c) curie temperature
(d) Neutral temperature

224. The core of an electromagnet is made of soft iron because soft iron has
(a) Small susceptibility and small retentivity
(b) Large susceptibility and small retentivity
(c) large density and large retentivity
(d) Small density and large retentivity

225. Soft iron is used in many parts of electrical machines for
(a) Low hysteresis loss and low permeability
(b) High hysteresis loss and low permeability
(c) low hysteresis loss and high permeability
(d) High hysteresis loss and high permeability

226. A small piece of an unmagnetized material gets repelled when it is brought near a powerful magnet the material is
(a) Paramagnetic (b) Diamagnetic
(c) ferromagnetic (d) Non magnetic

227. Vibration magnetometer works on the principle of
(a) Torque acting on the bar magnet
(b) Force acting on the bar magnet
(c) both the force and the torque acting on the bar magnet
(d) None of these

228. Tangent galvanometer is used to measure
(a) Steady currents
(b) Currents impulses
(c) earth's magnetic field
(d) None of these

229. Identity the paramagnetic substance:
(a) Iron (b) Aluminum
(c) Nickel (d) Copper

230. Magnetic permeability is maximum for
(a) Diamagnetic substances
(b) Paramagnetic substances
(c) ferromagnetic substances
(d) All of these

231. The susceptibility of diamagnetic material
(a) Decreases with temperature

(b) Does not vary with temperature
(c) increase with temp
(d) None of these

232. Which one of the following is not made of soft iron?
(a) Electromagnet
(b) Core of transformer
(c) core of dynamo
(d) Magnet of loudspeaker

233. The north pole of the earth's magnet is near the geographical
(a) south (b) east
(c) west (d) north

234. The material of a permanent magnet has
(a) high retentivity, low coercivity
(b) low retentivity, low coercivity
(c) retentivity, low coercivity
(d) high retentivity, high coercivity

235. A substance, when inserted between the poles of a magnet, is pushed out, it is
(a) diamagnetic (b) paramagnetic
(c) ferromagnetic (d) none of these

236. When the radius of the T.G. coil is decreased, its sensitiveness
(a) decreases
(b) increases
(c) remains unaltered
(d) none of these

237. An example for diamagnetic substance is
(a) Copper (b) Iron
(c) Nickel (d) Aluminum

238. The inherent property of all matter is/are
(a) paramegnetism
(b) diamagnetism
(c) ferromagnetism
(d) all of the above

239. Au, Ag, Cu, Zn, Sb, Bi, H_2O and air are examples of-
(a) diamagnetic (b) paramagnetic
(c) ferromagnetic (d) none of these

240. Na, Al, Mn, Pt, $CaCl_2$, and oxygen are example of
(a) diamagnetic (b) paramagnetic
(c) ferromagnetic (d) none of these

241. Fe, Co, Ni and Fe_3O_4 are example of
(a) ferromagnetic (b) paramagnetic
(c) diamagnetic (d) none of these

242. A hydrogen atom is paramagnetic. A hydrogen molecule is
(a) diamagnetic (b) paramagnetic
(c) ferromagnetic (d) none of these

243. If a diamagnetic substance is brought near north and south pole of a bar magnet, it is
(a) attracted by poles
(b) repelled by poles
(c) attracted by north pole and repelled
(d) none of these

244. The vertical component of earth's magnetic field is zero at a place where angle of dip is
(a) 0° (b) 45°
(c) 60° (d) 90°

245. No force is exerted by magnetic field on a stationary
(a) electric dipole
(b) magnetic dipole
(c) current loop
(d) none of these

246. Magnetic dipole moment is a vector quantity directed from
(a) south to north
(b) north to south
(c) east to west
(d) west to east

247. Eddy currents are produced in a material when it is
(a) heated
(b) placed in an electric field
(c) placed in a time varying magnetic field
(d) placed in a uniform magnetic field

248. Faraday's law of electromagnetic induction is related to the
(a) law of conservation of charge
(b) law of conservation of energy
(c) third law of motion
(d) none of these

249. The inductance of coil is proportional to
(a) its length
(b) the number of turns
(c) the resistance of the coil
(d) the square of the number of turns

250. A.C. power is transmitted from a power house at a high voltage
(a) the rate of transmission is faster at high voltages
(b) it is more economical due to less power loss.
(c) power cannot be transmitted at low voltage.
(d) a precaution against theft of transmission line.

251. Armature current in de motor will be maximum when the
(a) motor has acquired maximum speed.
(b) motor has acquired intermediate speed
(c) motor has just started moving
(d) none of these

252. Core of a dynamo is laminated because
(a) magnetic field increases
(b) magnetic saturation level in core increases
(c) residual magnetism in core decreases
(d) loss of energy in core due to eddy currents decreases

253. Quantity that remains unchanged in a transformer is
(a) voltage (b) current
(c) frequency (d) none

254. The unit of inductance is equivalent of
(a) $\frac{\text{volt} \times \text{ampere}}{\text{second}}$ (b) $\frac{ampere}{\text{volt} \times \text{ampere}}$
(c) $\frac{volt}{\text{ampere} \times \text{second}}$ (d) $\frac{volt \times second}{ampere}$

255. The direction of induced current is such that it opposes the very cause that has produced it. This is the law of
(a) Lenz (b) Faraday
(c) Kirchhoff (d) Fleming

256. If the rotational velocity of a dynamo armature is doubled, then the induced emf will
(a) become half
(b) become double
(c) remain unchanged
(d) none of these

257. Energy stored in the choke coil in the form of:
(a) heat
(b) electric energy
(c) magnetic energy
(d) none of these

258. The core of a transformer is laminated to reduce
(a) copper loss
(b) magnetic loss
(c) eddy current loss
(d) hysteresis loss

259. Ampere rule is used to find the
(a) direction of current
(b) direction of magnetic field
(c) direction of motion of the conductor
(d) none of these

260. A compass needle just above a wire in which electrons are moving towards east, will point
(a) east (b) west
(c) north (d) south

261. A motor convert
(a) mechanical energy into electrical energy
(b) mechanical energy into sound energy
(c) electrical energy into mechanical energy
(d) none of these

262. Dynamo' is a device, which converts
(a) Chemical energy into electrical energy
(b) Electrical energy into mechanical energy
(c) Mechanical energy into electrical energy
(d) Electrical energy into chemical energy

263. By inserting a soft iron piece into solenoid, the strength of the magnetic field
(a) increase
(b) decrease
(c) first increase then decrease
(d) remains unchanged

264. By increasing the number of turns in the coil, the strength of the magnetic field
(a) decrease
(b) increases
(c) first increases then decreases
(d) remains unchanged

265. If the current in the core decreases, the strength of the magnetic field
(a) decreases (b) increases
(c) remains same (d) none of these

266. Fleming's right-hand rule gives
(a) the magnitude of the induced emf
(b) the magnitude of the magnetic field
(c) the direction of the induced emf
(d) none of these

267. The intensity of a magnetic field is defined as the force experienced by a
(a) standard compass
(b) unit positive charge
(c) unit negative charge
(d) unit north pole

268. The split ring in motion is called
(a) armature (b) rotor
(c) commutator (d) core

269. In a hydel station the motion produced in turbines is due to the
(a) burning of coal
(b) burning of diesel
(c) flow of water
(d) production of steam

270. The frequency of AC mains in India is
(a) 100 Hz (b) 50 Hz
(c) 100 Hz (d) 50 Hz

271. At a grid sub stations the voltage is stepped up to reduce loss of
(a) current (b) electrical energy
(c) power (d) resistance

272. A switch is always connected to the
(a) earth wire (b) neutral wire
(c) line wire (d) none of these

273. A fuse wire is always connected to the
(a) line wire (b) earth wire
(c) neutral wire (d) none of these

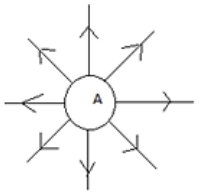
274. A Fuse wire is characterised by
(a) Low resistance and high melting point
(b) High resistance and high melting point
(c) High resistance and low melting point
(d) Low resistance and low melting point

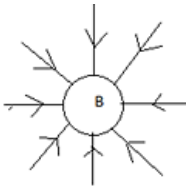
275. Laws of electrolysis is given by
(a) Faraday (b) Maxwell
(c) Lenz (d) Bohar

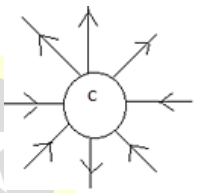
276. Laws of heating are given by
(a) Joule (b) Ohm
(c) Lenz (d) Faraday

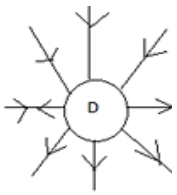
277. Magnetite is a/an
(a) natural magnet
(b) electromagnet
(c) U-shaped magnet
(d) none of these

278. Which of the following figures represents the magnetic lines of force due to an isolated north pole?

(a) 

(b) 

(c) 

(d) 

279. "The sum of emfs and potential differences around a closed loop equals zero" is a consequence of
(a) Ohm's law.
(b) Conservation of charge.
(c) Conservation of momentum.
(d) Conservation of energy.

280. Electromagnets are used in
(a) electric balls only
(b) telephone only
(c) dynamos only
(d) all of the above

281. A carbon microphone is best used in a
(a) dynamo (b) telephone
(c) transformer (d) none of these

282. 1 T equals
(a) 1 $NA^{-1} m^{-1}$ (b) 1 $NA^{-1} m^{-2}$
(c) 1 Nam (d) none

283. If a bar magnet is cut length wise into 3 parts, the total number of poles will be
(a) 2 (b) 3
(c) 4 (d) 6

284. The wire having a red plastic covering is a
(a) line wire (b) neutral wire
(c) earth wire (d) none of these

285. The wire having black plastic covering is a-
(a) line wire (b) neutral wire
(c) earth wire (d) none of these

286. The wire having a green plastic covering is a-
(a) line wire (b) neutral wire
(c) earth wire (d) none of these

287. Which of the following quantities remain constant in a step-down transformer?
(a) current (b) voltage
(c) power (d) none

288. Good conductors have many loosely bound-
(a) protons (b) neutrons
(c) atoms (d) electrons

289. Phase difference between voltage and current in a capacitor in AC circuit is
(a) π (b) $\frac{\pi}{2}$
(c) 0 (d) $\frac{\pi}{3}$

290. Alternating current can be measured by
(a) moving coil galvanometer
(b) hot wire ammeter
(c) tangent galvanometer
(d) none of these

291. The phenomenon of electromagnetic induction implies a production of induced
(a) resistance in a coil when the magnetic field changes with time
(b) current in a coil when an electric field changes with time
(c) current in a coil when a magnetic field changes with time
(d) voltage in a coil when a magnetic field changes with time

292. A choke coil has
(a) high inductance and high resistance
(b) high inductance and low resistance
(c) low inductance and high resistance
(d) low inductance and low resistance

293. Choke used to limit high frequency AC has
(a) a paramagnetic core
(b) a diamagnetic core
(c) air core
(d) iron core

294. The mass of a copper wire of resistance R_1 and length I_1 is four times the mass of another copper wire of length l_2 and resistance R_2. If $R_1 = R_2$ which one of the following is correct?
(a) $l_1 = l_2$ (b) $l_1 = 4l_2$
(c) $l_1 = 2l_2$ (d) $2l_1 = l_2$

295. Which type of cell can be used if a device requires 75 A of current for 15 seconds?
(a) simple voltaic cell
(b) Daniel cell
(c) Leclanche cell
(d) Lead-acid cell

296. Why does the experience a strong shock when one accidentally touches a live wire of say, 220 V?
(a) the resistance of human body is very low
(b) the resistance of human body is very high
(c) the human body is sensitive to even feeble current
(d) The human body is sensitive to large currents only

297. Which one of the following statements is correct? The space surrounding a charge in uniform motion has
(a) only an electric has
(b) only a magnetic field
(c) both electric and magnetic field
(d) neither an electric field nor a magnetic field

298. Two electric fans p and 2p watt respectively are connected in series. What is the power of the combination in watt?
(a) p (b) 3p
(c) 2p/3 (d) 3p/2

299. Consider the following statements
(1) An isolated electric charge exist, but an isolated magnetic monopole does not exist.
(2) Electric lines of force are not closed, but magnetic lines of force are closed
Which of the statements given above is/are correct?
(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) neither 1 nor 2

300. A large magnet is broken into two pieces. If the lengths of two pieces are in the ratio of 3: 4. What is the ratio of their pole strengths?
(a) 3:4 (b) 4:3
(c) 1:1 (d) 3:2

301. The basic difference between an AC generator and a DC generator is that
(a) AC generator has an electromagnet while a DC generator has permanent magnet
(b) AC generator has slip rings while the DC generator has a commutator
(c) DC generator will generate a higher voltage
(d) AC generator will generate a higher voltage

302. Alternating current instead of direct current is used in long distance electric transmission because
(a) It is easy to generate
(b) Rectification is possible
(c) Energy losses are minimum
(d) It causes fewer accidents

303. A wire is bent in the form of uniform circular ring. A and Bare two points on the ring such that ∠AOB = 60°, where O is the centre of ring. If the equivalent resistance across A and B is 5 Ω. What is the resistance of whole wire?
(a) 5 Ω (b) 6 Ω
(c) 30 Ω (d) 36 2

304. A circuit has a fuse having a rating of 5A. What is the maximum number of 100 W-220 V bulbs that can be safely connected in parallel in the circuit?
(a) 20 (b) 15
(c) 11 (d) 10

305. A 100 W electric bulb is used for 10 hours a day. How many units of energy are consumed in 30 days?
(a) 1 (b) 10
(c) 30 (d) 300

306. Five bulbs each rated as 220 V 100 W burnt 4 hours. What is the cost of electricity consumed if the rate is 50 paise per unit?
(a) 1 Rupee (b) 2 Rupee
(c) 4 Rupees (d) 8 Rupees

307. Consider the following statements household electrical appliances are not usually connected in series, because
1. Switching of an appliance would switch off the rest
2. A fuse would blow as soon as one appliance is used.
3. Power consumption would be very much greater.
4. The appliances would get damaged due to high current.
(a) 1 only (b) 2 and 3
(c) 3 and 4 (d) 1,2 and 4

308. An ammeter is connected in series with an unknown resistance and a voltmeter is connected across the terminals of the resistance. If the ammeter reads 1.2 A and the voltmeter reads 18 V the value of the resistance is
(a) 21.6 Ω (b) 18.0 Q
(c) 15.0 Ω (d) 9.0 Ω

309. A charge particle moves with velocity $\vec{V}$ in a uniform magnetic field $\vec{B}$. The magnetic force experienced by the particle is
(a) always zero
(b) zero, if $\vec{B}$ and $\vec{V}$ are perpendicular
(c) zero, if $\vec{B}$ and $\vec{V}$ are parallel
(d) zero, if $\vec{B}$ and $\vec{V}$ are inclined at 45°

310. Domestic electrical wiring is basically a:
(a) series connection
(b) parallel connection
(c) combination of series and parallel connections
(d) series connection within each room and parallel connection elsewhere

311. Consider the following statements:
At the present level of technology available in India, solar energy can be conveniently used to
(1) Supply hot water to residential buildings
(2) Supply water for minor irrigation projects
(3) Provide street lighting

(4) Electrify a cluster of villages and small towns.
(a) 1, 2, 3 and 4 are correct
(b) 2 and 4 are correct
(c) 1 and 3 are correct
(d) 1, 2 and 3 are correct

312. A fuse is used in mains electric supply as a safety device. Which one of the following statements about the fuse is correct?
(a) It is connected in parallel with the main switch
(b) It is made mainly from silver alloys
(c) It must have a low melting point
(d) It must have a very high resistance

313. Consider the following statements:
An ordinary light bulb has a rather short life because the
1. filament wire is not uniform
2. bulb cannot be evacuated completely
3. wires supporting the filament melt at high temperatures.
Which of the above statements are correct?
(a) 1 and 3 (b) 2 and 3
(c) 1 and 2 (d) 1, 2 and 3

314. Fluorescent tubes are fitted with a choke. The choke coil:
(a) steps up the line voltage
(b) steps-down the line voltage
(c) reduces current in the circuit
(d) chokes low frequency current

315. Consider the following statements regarding a motor car battery:
(1) The voltage is usually 12 V
(2) Electrolyte used in hydrochloric acid
(3) Electrodes are lead and copper
(4) Capacity is expressed in ampere-hour.
Which of the above statements are correct?
(a) 1 and 2 (b) 2 and 3
(c) 3 and 4 (d) 1 and 4

316. Two wires have their lengths. diameters and resistivities all in the ratio of 1: 2. If the resistance of the thiner wire is 10 ohm, the resistance of the thicker wire is-
(a) 5 phm (b) 10 ohm
(c) 20 ohm (d) 40 ohm

317. What is the order of magnitude of electric resistance of the human body (dry)?
(a) 102 ohm (b) 100hm
(c) 10 ohm (d) 10 ohm

318. Assertion (A) : In our houses, the current in AC electricity line changes direction 60 times per second.
Reason (R): The frequency of alternating voltage supplied is 50 Hz.
(a) both A and R are individually true and R is the correct explanation of A.
(b) both A and R are individually true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

319. Which one of the following is printed on a commonly used fluorescent tube light?
(a) 220 K (b) 273 K
(c) 6500 K (d) 9000 K

320. Which one of the following non-metals is not a poor conductor of electricity?
(a) Sulphur (b) selenium
(c) bromine (d) phosphorus

321. Four wires of same material and of dimensions as mentioned below are stretched by a load of same magnitude separately. Which one of them will be elongated maximum?
(a) wire of 1 m length and 2 mm diameter
(b) wire of 2 m length and 2 mm diameter
(c) wire of 5 m length and 105 mm diameter
(d) wire of 1 m length and 1 mm diameter

322. In a dry cell (battery), which of the following are used as electrolytes?
(a) Ammonium chloride and zinc chloride
(b) sodium chloride and calcium chloride
(c) magnesium chloride and zinc chloride
(d) ammonium chloride and calcium chloride

323. Indiscriminate disposal of used fluorescent electric lamps causes mercury pollution in the environment. Why is mercury used in the manufacture of these lamps?

(a) a mercury coating on the inside of the lamp makes the light bright white.
(b) when the lamp is switched on, the mercury in the lamp causes the emission of ultra-violet radiations.
(c) when the lamp is switched on, it is the mercury which converts the ultra-violet energy into visible light.
(d) none of the statement given above is correct about the use of mercury in the manufacture of fluorescent lamps.

324. What is the difference between a CFL and an LED LAMP?
(1) To produce light, a CFL uses mercury vapour and phosphor while an LED lamp uses semi-conductor material.
(2) The average life span of a CFL is much longer than of and LED lamp.
(3) A CFL is LESS energy-efficient as compared to an LED lamp.
Which of the statements given above is/are correct?
(a) 1 only (b) 2 and 3
(c) 1 and 3 (d) 1, 2 and 3

325. In electric supply lines in India, which parameter is kept constant?
(a) voltage (b) current
(c) frequency (d) power

326. What is the maximum number of different electrical combination possible with three equal resistances?
(a) 2 (b) 3
(c) 4 (d) 5

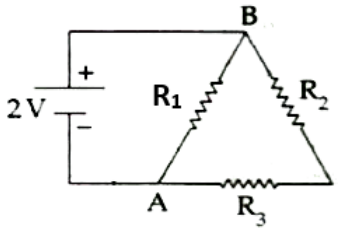
327. A substance which radiates temperature is said to be light when heated to a light
(a) luminescent (b) incandescent
(c) fluorescent (d) phosphorescent

328. Ohm's law does not apply to which of the following?
(a) A.C. circuits
(b) conductors
(c) semi-conductors
(d) none of the above

329. Which one of the following is used in storage batteries?
(a) copper (b) lead
(c) tin (d) zinc

330. A DC voltmeter is capable of measuring a maximum of 300 volts. If it is used to measure the voltage across a device operating at 220 voltage AC supply, the reading of the voltmeter will be
(a) 300 volt (b) 220 volt
(c) 110 volt (d) 0 volt

331. In the electrical circuit (ABC) as shown in the figure given below, the resistances R_1, R_2 and R_3 are same and equal 30 Ω. If a source of voltage 2 V is connected across one arm, the current drawn from the voltage source is-



(a) $\frac{1}{5}$A (b) $\frac{1}{10}$A
(c) $\frac{1}{15}$A (d) $\frac{1}{45}$A

332. The circuit element where the impressed voltage is always in phase with the resulting current is
(a) an ideal resistor
(b) an ideal capacitor
(c) an ideal coil
(d) an ideal transformer

333. A permanent magnet repels
(a) ferromagnetic substances only
(b) diamagnetic substances only
(c) paramagnetic substances only
(d) both paramagnetic and diamagnetic substances

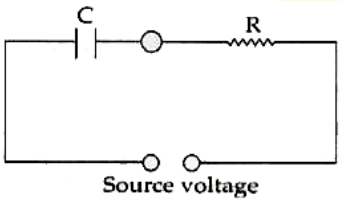
334. A straight horizontal conductor carries a steady electric current from south to north.
Which one of the following events would happen if a small magnetic compass is placed just above the wire?
(a) the needle remains perpendicular to the conductor
(b) the needle remains parallel to the conductor
(c) the north pole of the needle is deflected towards east.

(d) the north pole of the needle is deflected towards west.

335. A proton, when accelerated through a potential difference of V volts, has an associated wavelength of λ. In order to have the same associated wavelength, an α-particle must be accelerated through a potential difference of
(a) V volts (b) 4 V volts
(c) 2 V volts (d) V/8 volts

336. 'mho' is the unit of
(a) resistance (b) specific resistance
(c) conductivity (d) none

337. The time constant in seconds of an electrical circuit containing a capacitance of C units and resistance of R units, as shown in the figure, is given by



(a) CR (b) 1/CR
(c) C/R (d) R/C

338. The core of a transformer is laminated so that
(a) ratio of the voltages across the secondary and primary is doubled
(b) the weight of the transformer can be kept low
(c) the rusting of the core is prevented
(d) energy loss due to eddy currents is minimized

339. Which of the following is not correctly matched?
(a) Voltameter - potential difference
(b) Ammeter- electric current
(c) Potentiometer - E.M.F.
(d) Meter bridge - electrical resistance

340. Consider the following statements. A copper voltameter measures the
(1) quantity of current passing through the circuit
(2) amount of copper deposited
(3) resistance of the circuit
Which of these statements are correct?
(a) 1, 2 and 3 (b) 1 and 2
(c) 2 and 3 (d) 1 and 3

341. Permanent magnet can be made from
(a) cobalt (b) aluminum
(c) zinc (d) lead

342. MCB, which cuts off the electricity supply in case of short-circuiting works on the
(a) electroplating effect of current
(b) chemical effect of current
(c) heating effect of current
(d) magnetic effect of current

343. Instrument used to store the electric charge is known as
(a) inductor (b) capacitor
(c) transformer (d) transistor

344. Which of the following pairs of material serves as electrodes in chargeable batteries commonly used in device such as torch light, electric shaver etc.?
(a) iron and cadmium
(b) nickel and cadmium
(c) lead peroxide and lead
(d) zinc and carbon

345. Conversion of chemical energy into electrical energy occur in
(a) atomic bombs (b) electric heaters
(c) battery (d) dynamo

346. What is the most commonly used substance in fluorescent tubes?
(a) sodium oxide & argon
(b) sodium vapour & neon
(c) mercury vapour & argon
(d) mercury oxide & neon

347. A fuse is used in an electric circuit to-
(a) break the circuit when excessive current flows through the circuit
(b) break the circuit when power gets off
(c) indicate if the current is flowing uninterrupted
(d) complete the circuit for flow of current

348. A fuse wire is made of
(a) an alloy of tin and copper
(b) an alloy of tin and lead
(c) an alloy of tin and aluminum
(d) an alloy of nickel and chromium

349. A transformer works with
(a) alternating current

(b) direct current
(c) both AC and DC
(d) any signal

350. Electricity is produced through dry cell from
(a) chemical energy
(b) thermal energy
(c) mechanical energy
(d) nuclear energy

351. Fleming's right-hand rule is used to find the direction of the
(a) Alternate current
(b) Direct current
(c) Induced current
(d) Actual current

352. The unit of electrical power is
(a) Volt (b) Watt
(c) Kilowatt hour (d) Ampere

353. The resistance of the human body (dry condition) is of the order of
(a) 10^1 Ohm (b) 10^2 Ohm
(c) 10^3 Ohm (d) 10^4 Ohm

354. A wire of resistance R is cut into 'n' equal parts. These parts are then connected in parallel. The equivalent resistance of the combination will be
(a) R (b) $\frac{R}{n}$
(c) $\frac{n}{R}$ (d) $\frac{R}{n^2}$

355. If a wire of resistance R is melted and recast to half of its length, then the new resistance of the wire will be
(a) R/4 (b) R/2
(c) R (d) 2R

356. Water is heated with a coil of resistance R connected to domestic supply. The rise of temperature of water will depend on:
1. Supply voltage.
2. Current passing through the coil.
3. Time for which voltage is supplied.
Select the correct answer from among the following:
(a) 1, 2 & 3 (b) 1 & 2 only
(c) 1 only (d) 2 & 3 only

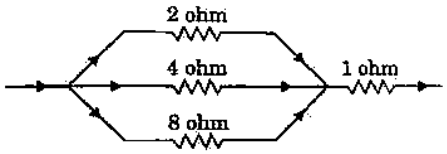
357. The product of conductivity and resistivity of a conductor
(a) depends on pressure applied
(b) depends on current flowing through conductor
(c) is the same for all conductors
(d) varies from conductor to conductor

358. Which one of the following statements regarding Ohm's law is not correct?
(a) Ohm's law is an assumption that current through a conductor is always directly proportional to the potential difference applied to it.
(b) A conducting device obeys Ohm's law when the resistance of a device is independent of magnitude and polarity of applied potential difference.
(c) A conducting material obeys Ohm's law when the resistance of material is independent of the magnitude and direction of applied electric field.
(d) All homogeneous materials obey Ohm's law irrespective of whether the field is within range or strong.

359. Who invented the battery?
(a) Volta (b) Roentgen
(c) Faraday (d) Maxwell

360. What would be the amount of electric charge flow across a circuit, when 0.75 A current is drawn by filament of an electric bulb for 5 minutes?
(a) 220 C (b) 300 C
(c) 225 C (d) 210 C

361. Consider the following part of an electric circuit:
The total electrical resistance in the given part of the electric circuit is:



(a) 15/8 ohm (b) 15/7 ohm
(c) 15 ohm (d) 17/3 ohm

362. In wind power, which form of energy is converted into electrical energy?
(a) Kinetic energy
(b) Potential energy
(c) Solar energy
(d) Radiant energy

363. Three wire of resistance 1 ohm, 2 ohm and 3 ohm respectively are connected in parallel. The equivalent resistance of the circuit is
(a) $\frac{6}{11}$ ohm (b) $\frac{11}{6}$ ohm
(c) 6 ohm (d) $\frac{1}{6}$ ohm

364. The potential difference across a conductor of resistivity e is constant. The heat generate in the conductor is directly proportional to
(a) e (b) $\frac{1}{\sqrt{T}}$
(c) $\frac{1}{e}$ (d) e^2

365. If potential difference and current flowing through a wire is increased twice each then electric power
(a) Will remain unaffected
(b) Will increase four times
(c) Will increase two times
(d) Will decrease half

366. Which one of the following statements about bar magnet is correct?
(a) The pole strength of the north-pole of a bar magnet is larger than that of the south-pole
(b) When a piece of bar magnet is bisected perpendicular to its axis, the north and south poles get separated
(c) When a piece of bar magnet is bisected perpendicular to its axis, two new bar magnets are formed
(d) The poles of a bar magnet are unequal in magnitude and opposite in nature

367. Which one of the following statements is not correct?
(a) The earth's magnetic field is due to the motion of metals like iron and nickel in the core of the earth
(b) The magnetic field lines of force are widely separated near the poles of a magnet but these lines come closer to one another at other places
(c) If the cross-sectional area of a magnetic field increases, but the flux remains the same, the flux density decreases
(d) When the speed of a conductor moving through a magnetic field is increased, the induced voltage increases

368. Let a resistor having 4 ohm resistance be connected across the terminals of a 12-volt battery. Then the charge in coulomb passing through the resistor per second is:
(a) 12 (b) 4
(c) 3 (d) 0.33

369. Liquids and gases never show
(a) diamagnetic property
(b) paramagnetic property
(c) ferromagnetic property
(d) electromagnetic property

370. A copper wire of radius *r* and length *l* has a resistance of R. A second copper wire with radius 2*r* and length *l* is taken and the two wires are joined in a parallel combination. The resultant resistance of the parallel combination of the two wires will be
(a) 5R (b) $\frac{5}{4}$R
(c) $\frac{4}{5}$R (d) $\frac{R}{5}$

371. A parallel-plate capacitor of capacitance C_1, is made using two gold plates. Another parallel-plate capacitor of capacitance C_2 is made using two aluminum plates with same plate separation, and all the four plates are of same area. If ρ_g and ρ_α are respectively the electrical resistivities of and aluminium, then which one of the following relations is correct?
(a) $C_1 > C_2$ (b) $C_2 > C_1$
(c) $C_1\rho_\alpha = C_2\rho_g$ (d) $C_1 = C_2$

372. Transformer is a device to convert
(a) D. C. to A. C.
(b) Low voltage D. C. into high voltage D. C.
(c) Low voltage A. C. into high voltage A. C.
(d) Mechanical energy into electrical energy

373. When you walk on a woolen carpet and bring your finger near the metallic handle

of a door an electric shock is produced. This is because

(a) charge is transferred from your body to the handle
(b) the temperature of the human body is higher than of the handle
(c) a chemical reaction occurs when you touch the handle
(d) the human body and the handle arrive at thermal equilibrium by the process

374. With reference to technologies for solar power production, consider the following statements:
1. 'Photovoltaics' is a technology that generates electricity by direct conversion of light into electricity, while 'solar Thermal' is a technology that utilizes the sun's rays to generate used in electricity generation process.
2. Photovoltaics generates Alternating current (AC), while solar Thermal generates Direct current (DC).
3. India has manufacturing base for solar Thermal technology, but not for Photovoltaics.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 & 3 only
(c) 1, 2 & 3 (d) None

ANSWER KEYS

1	**A**	11	**A**	21	**A**	31	**B**	41	**C**
2	**B**	12	**B**	22	**A**	32	**A**	42	**B**
3	**C**	13	**C**	23	**D**	33	**A**	43	**C**
4	**A**	14	**C**	24	**D**	34	**C**	44	**B**
5	**D**	15	**C**	25	**D**	35	**D**	45	**A**
6	**A**	16	**C**	26	**D**	36	**C**	46	**D**
7	**B**	17	**A**	27	**D**	37	**C**	47	**A**
8	**A**	18	**C**	28	**A**	38	**C**	48	**C**
9	**D**	19	**C**	29	**D**	39	**A & C**	49	**C**
10	**D**	20	**C & D**	30	**C**	40	**C**	50	**D**

51	**D**	61	**C**	71	**A**
52	**D**	62	**D**	72	**A**
53	**D**	63	**A**	73	**A**
54	**A**	64	**B**	74	**D**
55	**A**	65	**A**	75	**A**
56	**B**	66	**B**	76	**A**
57	**B**	67	**D**	77	**C**
58	**A**	68	**C**		
59	**C**	69	**C**		
60	**D**	70	**A**		

78	**D**	88	**D**	98	**C**	108	**A**	118	**A**
79	**A**	89	**B**	99	**B**	109	**C**	119	**C**
80	**C**	90	**D**	100	**C**	110	**C**	120	**A**
81	**D**	91	**B**	101	**C**	111	**D**	121	**D**
82	**B**	92	**D**	102	**C**	112	**B**	122	**C**
83	**C**	93	**A**	103	**D**	113	**D**	123	**D**
84	**D**	94	**D**	104	**B**	114	**A**	124	**B**
85	**D**	95	**B**	105	**C**	115	**B**	125	**B**
86	**A**	96	**C**	106	**B**	116	**B**	126	**B**
87	**C**	97	**C**	107	**A**	117	**C**	127	**D**

128	**C**	138	**A**	148	**B**	158	**D**	168	**B**
129	**A**	139	**C**	149	**A**	159	**D**	169	**B**
130	**B**	140	**B**	150	**A**	160	**A**	170	**A**
131	**A**	140	**D**	151	**D**	161	**B**	171	**C**
132	**A**	142	**B**	152	**B**	162	**A**	172	**B**
133	**D**	143	**A**	153	**C**	163	**A**	173	**D**
134	**C**	144	**C**	154	**B**	164	**C**	174	**D**
135	**D**	145	**C**	155	**B**	165	**A**	175	**A**
136	**A**	146	**A**	156	**A**	166	**C**	176	**D**
137	**A**	147	**C**	157	**D**	167	**A**	177	**C**

178	**B**	188	**A**	**198**	**A**	**208**	**D**	**218**	**B**
179	**B**	189	**C**	**199**	**A**	**209**	**A**	**219**	**A**
180	**D**	190	**B**	**200**	**C**	**210**	**D**	**220**	**B**
181	**D**	191	**C**	**201**	**C**	**211**	**A**	**221**	**B**
182	**B**	192	**A**	**202**	**D**	**212**	**A**	**222**	**B**
183	**B**	193	**D**	**203**	**D**	**213**	**B**	**223**	**C**
184	**C**	194	**C**	**204**	**B**	**214**	**C**	**224**	**B**
185	**B**	195	**B**	**205**	**C**	**215**	**D**	**225**	**C**
186	**C**	196	**A**	**206**	**B**	**216**	**D**	**226**	**B**
187	**B**	197	**B**	**207**	**C**	**217**	**A**	**227**	**A**

228	**A**	238	**B**	248	**B**	258	**C**	268	**C**
229	**B**	239	**A**	249	**D**	259	**B**	269	**C**
230	**C**	240	**B**	250	**B**	260	**D**	270	**B**
231	**B**	241	**A**	251	**C**	261	**C**	271	**C**
232	**D**	242	**A**	252	**D**	262	**C**	272	**C**
233	**A**	243	**B**	253	**C**	263	**A**	273	**A**
234	**D**	244	**A**	254	**D**	264	**B**	274	**C**
235	**A**	245	**A**	255	**A**	265	**A**	275	**A**
236	**B**	246	**A**	256	**B**	266	**C**	276	**A**
237	**A**	247	**C**	257	**C**	267	**D**	277	**A**

278	**A**	288	**D**	298	**C**	308	**C**	318	**D**
279	**D**	289	**B**	299	**C**	309	**C**	319	**C**
280	**D**	290	**B**	300	**C**	310	**B**	320	**B**
281	**B**	291	**C**	301	**B**	311	**C**	321	**C**
282	**A**	292	**B**	302	**C**	312	**C**	322	**A**
283	**D**	293	**D**	303	**D**	313	**B**	323	**B**
284	**A**	294	**C**	304	**C**	314	**C**	324	**C**
285	**B**	295	**B**	305	**C**	315	**D**	325	**C**
286	**C**	296	**C**	306	**A**	316	**B**	326	**C**
287	**C**	297	**C**	307	**A**	317	**C**	327	**B**

328	**C**	338	**D**	348	**B**	358	**D**	368	**C**
329	**B**	339	**A**	349	**A**	359	**A**	369	**C**
330	**D**	340	**B**	350	**A**	360	**C**	370	**D**
331	**B**	341	**A**	351	**C**	361	**B**	371	**D**
332	**A**	342	**C**	352	**B**	362	**A**	372	**C**
333	**B**	343	**B**	353	**C**	363	**A**	373	**A**
334	**C**	344	**B**	354	**B**	364	**C**	374	**A**
335	**D**	345	**C**	355	**B**	365	**B**		
336	**C**	346	**C**	356	**D**	366	**C**		
337	**A**	347	**A**	357	**C**	367	**B**		

SOLUTIONS

1. Ans. (a)
Energy Consumption of 100-watt electric bulb which is used for 10 hours = 100 ×10
= 1000-watt hour
= 1 kilowatt hour
= 1 unit.
According to question the cost of 1 unit of electricity = Rs 5.

2. Ans. (b)
See the explanation of above question.

3. Ans. (c)
Consumption of electricity by one bulb
(No of unites) = $\frac{\text{watt} \times \text{hours}}{1000}$
$= \frac{100 \times 20}{1000}$
= 2 unit
Thus, consumption of electricity by 5 bulbs = 2 × 5
= 10 units

4. Ans. (a)
1 Kilowatt hour = 1 (kilowatt) (1 hour)
= (1000 joule/sec.) (3600 sec.)
= 36 × 10^5 Joule
= 3.6 × 10^6 Joule
Thus, option (a) is correct.

5. Ans. (d)
The electric energy consumed = 100 watt × 4 hour
= 400-watt hour
= $\frac{400}{1000}$ kilowatt hour
= 0.4-kilowatt hour
= 0.4 unit

6. Ans. (a)
Electricity consumption bill is based on the measurement of kilowatt hour. The kilowatt hour is the unit of electricity consumption, equal to 1000 watt in 1 hour (1 unit).

7. Ans. (b)
We know that-
Number of units = watt × hour/1000
$= \frac{60 \times 30 \times 5}{1000}$ = 9 unit

8. Ans. (a)
Given,
v = 220 v
i = 0.5 A
we know that,
P = $\frac{w}{t} = \frac{vit}{t}$ ($\because$ w = vit)

$= vi = 220 \times 0.5 \Longrightarrow 110$ watts

9. Ans. (d)

If total resistance of a parallel circuit is R, then

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots ....$$

According to the question,

$$\frac{1}{1.403} = \frac{1}{2} + \frac{1}{R_2}$$

$$\text{or, } \frac{1}{R_2} = \frac{1}{1.403} - \frac{1}{2}$$

$$\text{or, } \frac{1}{R_2} = \frac{2-1.403}{2.806}$$

$$\text{or, } R_2 = \frac{2.806}{0.597} = 4.70 \text{ kilo-ohm}$$

10. Ans. (d)

The bulb which decays more energy will generate more brightness.

Power (P) = Voltage (V) × Current (I)

It is known that V = I × Resistance (R)

$P = \frac{V^2}{R}$; $P \propto \frac{1}{R}$ Thus, the bulb of high resistance decays low energy and will generate dim light.

11. Ans. (a)

See the explanation of above question.

12. Ans. (b)

Bulbs in parallel are brighter than bulbs in series. In a parallel circuit the voltage for each bulb is the same as the voltage in the circuit while the parallel combination of resistors reduces the effective resistance of the circuit.

The power dissipated by a bulb is given by

$P = V^2/R$,

where V is the voltage of the light bulb and R is the electrical resistance.

The total resistance of the series circuit is

$R_{series} = R + R = 2R$.

The total resistance of the parallel circuit is

$1/R_{parallel} = 1/R + 1/R$

or

$R_{parallel} = R/2$.

Thereby, the power for the light bulbs in series is

$P_{series} = V^2/2R$

and the power for the light bulbs in parallel is

$P_{parallel} = 2V^2/R$

Hence, from the above equations it is clear that in parallel circuit the bulbs will shine brightly.

13. Ans. (c)

A dynamo, which is also known as an electrical generator produces direct current through a commutator. It is basically a device which converts mechanical rotation into electric current according to Faraday's law.

14. Ans. (c)

A dynamo is an electrical generator that produces direct current with the use of a commutator. It converts mechanical energy into electrical energy.

15. Ans. (c)

See the explanation of above question.

16. Ans. (c)

See the explanation of above question.

17. Ans. (a)

When electrical energy is converted into motion, there is no heat loss.

18. Ans. (c)

Electric motor is a device which converts electrical energy into mechanical energy. Electric motors involve rotating coils of wire which are driven by the magnetic force exerted by a magnetic field or an electric current.

19. Ans. (c)

See the explanation of above question.

20. Ans. (c) & (d)

Among the above options, both Dynamo and Electric motor are such devices that work on the principle of electromagnetic induction. Dynamo converts mechanical energy into electrical energy and electric motor converts electrical energy into mechanical energy.

21. Ans. (a)

An electrical battery is a device consisting of two or more electrochemical cell that converts stored chemical energy into electrical energy. There are different types of batteries but all have three basic components; a positive electrode, negative electrode, and electrolyte.

22. Ans. (a)

Electric motors operating at low voltages tend to burn out because they draw more current which is inversely proportional to the voltage.

23. Ans. (d)

The Faraday constant represents the magnitude of electric charge per mole of electrons. It is denoted by the symbol 'F' and is named after English scientist Michael Faraday. It is a universal constant. It has the currently accepted value

$F = 96485.332123 \text{ C.mol}^{-1}$.

24. Ans. (d)

A motor car battery usually has six 2V cells connected in series, which gives it a steady voltage of about 12V. The capacity of battery is expressed in ampere-hour. An amperehour is the total amount of electrical charge transferred when a current of one ampere flows for one hour. Therefore, the total usable charge stored in a battery can be stated in term

of ampere-hour. The electrolyte used is a 35% solution by weight of sulphuric acid H_2SO_4 with 65% of water. The electrodes used in motor car batteries are lead (Pb) and lead dioxide ($PbO_{2)}$.

25. Ans. (d)
The nickel-cadmium battery is a type of rechargeable battery using nickel oxide hydroxide and metallic cadmium as electrodes, while potassium hydroxide is used as alkaline electrolyte. It is used in calculator, cordless electronic appliances, transistors, portable power tools, photography equipments, flashlight etc.

26. Ans. (d)
Tungsten metal is used as filament in lighting bulbs. In 1781, Carl Wilhelm Scheele and Torbern Bergman suggested that it might be possible to obtain a new metal by reducing tungsten acid. Two years later in 1783, Juan Jose and Fausto Elhuyar were the first to isolate tungsten through the reduction of this acid with charcoal. For this reason, they are credited with the discovery of this element. Its melting point is 3422°C and its boiling point is 5555°C.

27. Ans. (d)
See the explanation of above question.

28. Ans. (a)
See the explanation of above question.

29. Ans. (d)
An ordinary light bulb has a rather short life because the: -
(1) Filament wire is not uniform (2) bulb cannot be evacuated completely and (3) wires supporting the filament melt at high temperature.

30. Ans. (c)
Tungsten metal is used as filament in electric bulb. When electric current flows through it, its temperature goes up to 1500°C to 2500°C. Generally, electric bulbs convert only 5% to 10% of electric energy into light.

31. Ans. (b)
Lightning can even burn a tree because it contains tremendous amount of electrical energy. Lightning is an electrical discharge caused by imbalance between storm clouds and the ground, or within the clouds themselves.

32. Ans. (a)
A lightning conductor is a metal rod mounted on the top of an elevated structure, electrically bonded using a wire or electrical conductor to interface with ground through an electrode, engineered to protect the structure in the event of lightning strike. If lightning hits the structure, it will preferentially strike the rod and would be conducted to ground through wire instead of passing through the structure. Hence the building will be saved by using this lighting conductor.

33. Ans. (a)
In the three-pin plug, there are three ends namely live, neutral and earth. The earth pin on a plug is longer than the line and neutral pins. This means the earth pin is the first to connect and last to disconnect for safety of electrical device. It provides an alternative and easy path for leakage or fault current flow.

34. Ans. (c)
See the explanation of above question.

35. Ans. (d)
According to Ohm's law, if there is a potential difference (V) across a resistor then there is a current (I) flowing through it. Current flows in a circuit as a result of difference in potential between two points in the circuit.

36. Ans. (c)
An electric fuse is a safety device used to prevent damage to an electrical circuit when excessive current flows through it. The electric fuse works on the principle of the heating effect of electric current. It consists of a piece of wire made of a metal or an alloy of low melting point. As the current increases beyond a limit, the wire in the electric fuse melts and breaks off. The fuse is then said to have blown off. The circuit is broken and current stop flowing through it. Thus, a fuse prevents fires.

37. Ans. (c)
See the explanation of above question.

38. Ans. (c)
Fuse is a piece of wire with high resistance and very low melting point. When a high current flows through the circuit, it gets heated and melts.

39. Ans. (a) & (c)
See the explanation of above question.

40. Ans. (c)
The filament of a halogen lamp is an alloy of tungsten and sodium. Due to the presence of sodium in filament, it produces yellow light.

41. Ans. (c)
When electric current passes through the conducting wire, moving electrons continuously collide with the atoms of the conductor. In this process, they transfer their energy to the atoms of the conductor and

therefore, temperature of the conductor increases. Thus, assertion (A) is correct but reason (R) is false.

42. Ans. (b)

Domestic electrical wiring is basically a parallel connection. In parallel circuit, each branch receives equal current. In a parallel connection if one of the bulbs is removed from the circuit i.e. if one of the branches in the circuit is broken, electric current will still flow in other branches and other bulbs will continue to glow.

43. Ans. (c)

The electric power line reaches our house through three wires namely a live wire, neutral wire, and earth wire. To avoid confusion, we follow a colour code for insulating these wires. The red wire is a live wire, and the black wire is neutral. The earth wire is given green plastic insulation.

44. Ans. (b)

The order of magnitude of electric resistance of the human body (dry) is generally in the range of 10^4 (10000) ohms and it may be as high as 10^5 (100000) ohms or more. Wet or broken skin may drop the body's resistance to 1000 ohms or less.

45. Ans. (a)

C.F.L. is short form of Compact Fluorescent Lamp. CFL uses significantly less energy than traditional light bulbs (75% less).

46. Ans. (d)

Light Emitting Diode (LED) work on the Principle of Electroluminescence. Electroluminescence (EL) is an optical and electrical phenomenon in which a material emits light in response to the passage of an electric current or to a strong electric field. It is the result of radiative recombination of electrons and holes in a material, usually a semiconductor. The excited electrons release their energy as photons – light. A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.

47. Ans. (a)

In Light Emitting Diode (LED) Lamps, gallium arsenide is used as main light emission component which converts electric energy into light. Its life span is greater than that of CFL because LED lamps consume less energy than CFL.

48. Ans. (c)

CFL uses mercury vapour and phosphor to produce light. The gases become excited by electricity and when combined with mercury particles, produces invisible ultraviolet light. The UV light then hits the white phosphor coating inside the bulb causing it to fluorescence and emit white light. LED lamp uses semi-conductor material to produce light. CFLs have a life of about 6000 to 10,000 hours, while LED has a life span of about 50,000 hours. LED lamps are more energy efficient as compared to CFL.

49. Ans. (c)

Lights from sodium lamps i.e. sodium vapour lights are omnidirectional. Omnidirectional lights produce light in 360 degrees. This is a large system inefficiency because at least half of the light needs to be reflected and redirected to the desired area being illuminated. Whereas LED lamps emit light directionally i.e. over 180 degrees which means there are far fewer losses from the need to redirect or reflect light. Hence, statement 1 is correct. LEDs have an extremely long lifespan relative to every other lighting technology (including sodium lamps). New LEDs can last 50,000 to 100,000 hours or more i.e. more than 3-4 times than sodium lamps. Hence, statement 2 is incorrect. Sodium vapour lights have the worst colour rendering. Low pressure sodium lamps in particular are monochromatic resulting in the colours of illuminated objects being nearly indistinguishable, which means that the objects illuminated by them appear shadowy black rather than the colour you would see during daylight. LEDs waste much less energy producing waste heat and they also provide an incredibly better variety of high colour rendering index options to the user (thus eliminating the monochromatic black appearance of objects illuminated by sodium lamps). Hence, statement 3 is correct.

50. Ans. (d)

Fluorescent lamps are filled with the low-pressure gases specially Mercury and noble gases like Argon, Neon, Xenon and Krypton.

51. Ans. (d)

In comparison to electric bulb, fluorescent tubes transform more electric energy into light energy. A bulb of 100 watt converts only 5 percent of electric energy into light energy but fluorescent tubes convert approximately 22% of electric energy into light energy. Thus, none of the statement is true.

52. Ans. (d)
A tube light or fluorescent lamp is a kind of light that uses a combination of electricity and mercury vapour to create light energy. The electricity causes electrons to travel at high speed between the poles. These electrons hit the mercury gas molecules and oscillate them. The mercury gas is then ionized by the current flowing within, producing ultraviolet radiation. Since the human eye is unable to see this radiation, the glass tube is coated with a fluorescent material which changes it into white light. Thus, among the given options, option (d) is the correct answer.

53. Ans. (d)
The electric bulb was invented by Edison. A coiled filament of tungsten metal with a high melting point fit inside it. To prevent the metal from oxidation, Nitrogen and Argon gases are filled in the bulb instead of vacuum.

54. Ans. (a)
Starter in tube lights increases the current and sends it to the choke. Choke coil steps up the voltage of the transmitted current and send it back to tube light resulting tube light to glow. After this work of the starter gets finished and choke is used to step up and step down the voltage thus prevent the tube light from any damage.

55. Ans. (a)
Electric potential is a scalar quantity. It is the amount of work needed to move a unit charge from a reference point to a specific point against an electric field.

56. Ans. (b)
Power P = V × I
where V = Voltage
I = Current
Since both the voltage and current are increased twice
$\Rightarrow$ P' = (2.V) (2I)
P' = 4 V. I = 4P
Hence, the electric power will increase four times.

57. Ans. (b)
We know that,
$$R = \rho \frac{1}{\alpha}$$
R = resistance, ρ = resistivity, l = length, a = Area.
Let the ρ_1, l_1 and r_1 is resistivity, length, and radius of first wire respectively then,
As per the question
Resistivity of second wire $\rho_2 = 2\rho_1$
Length of second wire $l_2 = 2l_1$
Radius of second wire $r_2 = 2r_1$
$$\Rightarrow R_1 = \frac{\rho_1 l_1}{a_1} = \frac{\rho_1 l_1}{\pi r_1}$$
$$R_2 = \frac{\rho_2 l_2}{a_2} = \frac{2\rho_1 \times 2l_1}{\pi(2r_1)^2}$$
$$= \frac{4\rho_1 l_1}{4\pi r_1^2} = \frac{\rho_1 l_1}{\pi r_1^2}$$
$$\Rightarrow \quad \frac{R_1}{R_2} = 1$$
Since resistance of thin wire $R_1 = 10\Omega$
Therefore, resistance of thicker wire $R_2 = 10\Omega$

58. Ans. (a)
Let the charge on every small drop = q
Radius of every small drop = r
Charge on large drop (Q) = nq
Radius of large drop = R
∵ the total volume of n drops = volume of the large drop
$$\therefore \quad n \times \frac{4}{3}\pi r^3 = \frac{4}{3}\pi R^3$$
$$\Rightarrow \quad R = n^{1/3} \times r$$
Now, $\frac{V'}{V} = \frac{Q'C}{qC'}$
$$= \frac{Q'}{q} \times \frac{r}{R}$$
$$= \frac{nq}{q} \times \frac{r}{n^{1/3} \times r}$$
$$\Rightarrow \quad V' = n^{2/3} \times V$$
$\Rightarrow$ So, potential of large drop = $n^{2/3}$ V

59. Ans. (c)
A transformer transfers electric energy between two or more interconnected circuits through electric induction. It converts the high voltage to low voltage and low voltage to high and transmits it. Transformers can only function with alternating current (AC) not with direct current (DC).

60. Ans. (d)
The transformer is used to step-up and step-down the alternating current. There are two types of coils in transformers (i) Primary coil (2) Secondary coil. Alternating current flows through the primary coil which inflicts the potential in the secondary coil.

61. Ans. (c)
See the explanation of above question.

62. Ans. (d)
A mobile phone charger works on the simple principle of conversion of AC (alternating current) to DC (direct current). As we connect charger to 220-volt AC switchboard, the first job of the charger is to step down the high 220 v in 9 v or 10v. A step down transformer is used in mobile phone charger.

63. Ans. (a)
An electric generator is a device that converts mechanical energy obtained from an external source into electrical energy as the output. A motor converts electrical energy to mechanical energy. A diesel engine is an internal-combustion engine in which heat produced by the compression of air in the cylinder is used to ignite the fuel. Solar (or photovoltaic) cells convert the sun's energy into electricity.

64. Ans. (b)
The rotating armature of an AC generator is connected to an external circuit by the means of slip rings. In a DC generator, the commutator is used to reverse the directions of the natural alternating voltage every half cycle. So, AC generator has slip rings while DC generator has a commutator.

65. Ans. (a)
Direct Current is used to charging the batteries with the help of rectifier which converts AC to DC. Thus, alternate current is not preferable for it.

66. Ans. (b)
Rectifier is an electric device that converts alternating current (AC) to direct current (DC).
Inverter is an electronic circuit that changes direct current (DC) to Alternating Current (AC). The transformer supplies alternating current or electric power from power grid to those appliances which use different voltages.
Transmitter is an electronic device which, with the aid of antenna produces electromagnetic signals/radio waves. Primarily it is used for radio, television and in other communication tools.

67. Ans. (d)
See the explanation of above question.

68. Ans. (c)
50Hz frequency of power transmission is fixed in our country for normal operation of the power grid. In there an increase or decrease of 0.5 Hz is acceptable. But if it increases or decreases more than that limit, the grid gets failed. In India, electricity distribution companies calculate the consumption of electricity in kWh (units). Thus, (A) is true, but (R) is false.

69. Ans. (c)
Manufacturer of electronic equipment sets a power rating for every equipment which shows the maximum power that can be consumed by the specific device. According to the question, the ascending or increasing order of the electronic items by their power rating are– fan, television, electronic press, electronic kettle.

70. Ans. (a)
The earth's magnetic field is believed to be generated by electric currents in the conductive material of its core, created by convection currents due to heat escaping from the core.

71. Ans. (a)
In artificial satellites solar (or photovoltaic) cells convert the sun's energy into electrical energy through photovoltaic effect. The photovoltaic effect is the creation of voltage and electric current in a material upon exposure to light.

72. Ans. (a)
Space-based solar power (SBSP) is a system for the collection of solar power in space for use on earth. SBSP would differ from current solar collection methods in such a way that the means used to collect energy would reside on an orbiting satellite instead of the earth surface. The power is then transmitted via electromagnetic waves at 2.45 GHz to dedicated receiver stations on earth. "Rectenna" convert the electromagnetic energy into electricity which is used in the local grid. The supply of SBSP will be 99% uninterrupted throughout the year besides the enormity. Former president Dr. APJ Abdul Kalam suggested that the space-based solar power (SBSP) should be made a national goal.

73. Ans. (a)
Photovoltaics refers to a technology which converts light into electricity using semiconducting materials that exhibit photovoltaic effect. Solar cells produce direct current electricity from sunlight. On the other hand, Solar Thermal Technology works on the principle of converting solar energy into heat energy by absorbing it which can be further used for electricity generation.
In March, 2013 Ministry of New and Renewable Energy, Government of India informed that India has capacity of generating 2000 MW electricity through solar photovoltaic modules. This clarifies that India has infrastructure for photovoltaic technology.

74. Ans. (d)
Solar-powered pumps run on electricity generated by photovoltaic panels or the radiated thermal energy available from collected sunlight as opposed to grid

electricity or diesel run water pumps. Solar power can be used for running surface pumps as well as for submersible pumps. Solar-powered submersible pumps support varied applications like field irrigation or supply potable water, while drawing water from underground water sources like bore-wells or sumps. Some solar submersible pumps use the same centrifugal mechanism as a surface pump, while others use a positive displacement mechanism. A solar-powered reciprocating pump is class of positive displacement pump with piston, which is used for various purposes such as, car washing, irrigation, colour spraying, large fountain, garden water pump etc. From the above explanation it is clear that both of the given statements are incorrect.

75. Ans. (a)

Solar cells are the components of solar arrays that convert radiant light from the sun into electricity that is then used to power electrical devices. Solar cells contain materials with semiconducting properties in which their electrons become excited and turned into an electrical current when struck by sunlight. While there are a dozen of variation of solar cells, the two most common types are those made of crystalline silicon (both monocrystalline and polycrystalline) and those made with what is called thin film technology. The majority (90 %) of the solar cells on the market today are made of silicon.

76. Ans. (a)

The conversion of light energy into electrical energy is based on the phenomenon called photovoltaic effect. A photovoltaic cell is the basic unit of the system where the photovoltaic effect is utilized to produce electricity from light energy. Silicon is most widely used semiconductor material for constructing photovoltaic cell.

77. Ans. (c)

See the explanation of above question.