First Revision Test: 2012 - 13   **Register Number :**

PHYSICS (Portion: Unit - 1 to Unit - 5)

Time allowed : 3 hours]   **[Maximum Marks : 150**

Part - I

Note :   (i)   **Answer all the questions**   (30 X 1 = 30)
(ii)   **Choose the correct answer**
(iii)   **Each question carries one mark.**

1. A dipole is placed in a uniform electric field with its axis parallel to the field. It experiences
   a) only a net force   b) only a torque
   c) both a net force and torque   d) neither a net force and torque.

2. Which of the following quantities is scalar?
   a) dipole moment   b) electric force   c) electric potential   d) electric field

3. The number of electric lines of force originating from a charge of +1 C is
   a) 1.129×10^{11} b) 1.6×10^{-19} c) 6.26×10^{18} d) 8.85×10^{12}.

4. Electric field intensity is 400 V m^{-1} at a distance of 2 m from a point charge. It will be 100 V m^{-1}
   at a distance ....
   a) 0.5 m   b) 2 m   c) 4 m   d) 1.5 m.

5. The direction of the electric dipole moment is from .... to ....
   a) + q , − q   b) − q , + q   c) ∞ , − q   d) ∞, + q.

6. The total electric flux of the electric field E over any closed surface is equal to $1 / \varepsilon_o$ times the net charge
   enclosed by the surface. This is called ....
   a) Ohm's law   b) Gauss's law   c) Planck's law   d) Wien's law.

7. The material through which electric charge can flow easily is
   a) quartz   b) mica   c) germanium   d) copper.

8. A toaster operating at 240 V has a resistance of 120 Ω. The power is ....
   a) 400 W   b) 2 W   c) 480 W   d) 240 W.

9. In the case of insulators, as the temperature decreases, resistivity
   a) decreases   b) increases   c) remains constant   d) becomes zero.

10. According to Faraday's law of electrolysis, when a current is passed, the mass of the ions deposited at
    the cathode is independent of
    a) current   b) charge   c) time   d) resistance

11. The internal resistance of the secondary cells is ....
    a) zero   b) very high   c) infinity   d) very low

12. The quantity of charge passing per unit time through unit area is called as ....
    a) current   b) potential difference   c) electric potential   d) current density

13. The unit of Thomson coefficient is ....
    a) ampere   b) volt / ^{0}C   c) volt   d) ohm.

14. An ideal voltmeter is which has .... resistance.
    a) zero   b) infinite   c) minimum   d) maximum.

15. The product of the current and the loop area is called ....
    a) dipole intensity   b) magnetic dipole moment   c) permeability   d) permittivity.

16. Peltier effect is the converse of .... effect.
    a) Thomson   b) Ampere   c) Seebeck   d) Joule's heating.

17. Magnetic induction due to an infinitely long straight conductor placed in a medium of permeability μ is
    a) $\mu_0 I / 4\pi a$ b) $\mu_0 I / 2\pi a$ c) $\mu I / 4\pi a$ d) $\mu I / 2\pi a$.

18. Phosphor – bronze wire is used for suspension in a moving coil galvanometer, because it has .....
    a) high conductivity   b) high resistivity
    c) large couple per unit twist   d) small couple per unit twist.

19. Transformer works on the ………… principle.
    a) electro static induction   b) electromagnetic induction   c) Huygens's   d) self induction.
20. The self inductance of a straight conductor is …………
    a) infinity   b) zero   c) maximum   d) minimum.
21. Eddy current losses are minimized by using a core made of ……………… an alloy of steel.
    a) mumetal   b) stelloy   c) brass   d) nichrome.
22. A DC of 5A produces the same heating effect as an AC of ………..
    a) 50 A rms current   b) 5 A peak current   c) 5 A rms current   d) none of the above
23. The part of the AC generator that passes the current from the coil to the external circuit is ……….
    a) field magnet   b) split rings   c) slip rings   d) brushes.
24. Which of the following devices does not allow d.c. to pass through?
    a) resistor   b) capacitor   c) inductor   d) all the above.
25. An accelerated charge is a source of ------------------
    a) electromagnetic radiation   b) heat radiation   c) mechanical waves   d) longitudinal waves.
26. The phenomenon of ---------------- proves that light waves are transverse.
    a) refraction   b) polarisation   c) reflection   d) diffraction.
27. Refractive index of the glass is 1.5. The time taken for light to pass through a glass plate of thickness 10 cm is ………….
    a) 2×10^{-8} s   b) 2×10^{-10} s   c) 5×10^{-8} s   d) 5×10^{-10} s.
28. The ----------- spectrum is used to identify the gas.
    a) continuous   b) band   c) line   d) none of the above.
29. The path difference between two monochromatic light waves of wavelength 4000 A^o is 2×10^{-7} m. The phase difference between them is …………
    a) π b) 2π c) $(3\pi)/2$ d) $\pi/2$
30. The refractive index of the medium, for the polarising angle 45° is a ………..
    a) 1.414   b) 1.732   c) 1.0   d) 1.5

Part – II

Note :   Answer any fifteen questions.   (15 X 3 = 45)

31. Define: Coulomb.
32. State the law of conservation of electric charges.
33. During lightning, it is safer to sit inside a bus or car than in an open ground. Why?
34. What are non-polar molecules? Give an example.
35. The resistance of a nichrome wire at 0°C is 10 Ω. If the temperature coefficient of resistance is 0.004 / ^{o}C, find its resistance at boiling point of water.
36. Define: current density. Give its unit.
37. What is superconducting transition temperature?
38. The colour codes of a carbon resistor are yellow, yellow, orange. Tolerance is 5%. Find the resistance
39. What is a fuse wire ?
40. In a galvanometer, increasing the current sensitivity does not necessarily increase voltage sensitivity. Explain.
41. Calculate the resistance of the filament of a 100W, 220 V electric bulb.
42. Give any two differences between Peltier effect and Joule's law of heating.
43. Define: rms value of AC.
44. Define: Q- factor.
45. Calculate the mutual inductance between two coils when a current of 4 A changing to 8 A in 0.5 s in one coil, induces an emf of 50 mV in the other coil.
46. Explain the part played by the capacitive reactance to the AC and DC.

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47. A 300 mm long tube containing 60 cc of sugar solution produces a rotation of 9^0 when placed in a polarimeter. If the specific rotation is 60^0, calculate the quantity of sugar contained in the solution.
48. Define: optic axis of a crystal.
49. Distinguish between interference and diffraction fringes.
50. State Huygen's principle.

Part – III

Note : **(i) Answer the question 60 compulsory.** **(7 X 5 = 35)**
  (ii) Of the remaining 11 questions, answer any six questions.
  (iii) Draw diagrams wherever necessary.

51. Deduce an expression for the capacitance of a parallel plate capacitor.
52. Derive an expression for the torque on an electric dipole in a uniform electric field.
53. Two positive charges of 12 μC and 8 μC respectively are at 10 cm apart. Find the work done in bringing them 4 cm closer, so that, they are at 6 cm apart.
54. Derive the relation between the drift velocity and the current.
55. Explain the working of the Daniel cell.
56. Deduce the condition for zero deflection in the galvanometer of Wheatstone's bridge.
57. Explain : Thomson effect.
58. Write a short notes on magnetic Lorentz force.
59. Explain the ac circuit containing the resistor only.
60. A transformer has an efficiency of 80%. It is connected to a power input of at 4 kW and 100 V. If the secondary voltage is 240 V, calculate the primary and the secondary currents.

(or)

An a.c. generator consists of 10,000 turns and of area 100 cm^2. The coil rotates at an angular speed of 140 rpm in a uniform magnetic field of 3.6×10^{-2} T. Find the maximum value of the emf induced.
61. Derive the radius of the nth dark ring in Newton's ring experiment.
62. A plane transmission grating has 5000 lines per cm. Calculate the angular separation in second order spectrum of red line 7070 A^o and blue line 5000 A^o.

Part – IV

Note : (i) **Answer any four questions in detail.** **(4 X 10 = 40)**
  (ii) **Draw diagrams wherever necessary.**

63. Derive an expression for the electric field at any point on the axial line of an electric dipole.
64. Deduce an expression for the equivalent capacitance of the capacitors connected in series and in parallel.
65. Explain the construction and the working of a cyclotron.
66. Derive an expression for the magnetic induction due to infinitely long straight conductor carrying current.
67. Explain the total internal reflection on the basis of wave theory.
68. Write a short notes on emission spectra and absorption spectra with examples.
69. Explain the construction and the working of single phase AC generator.
70. A source of alternating emf is connected to a series combination of a resistor R, an inductor L and a capacitor C. Obtain with the help of a vector diagram, an expression for (i) the effective voltage, (ii) the impedance and (iii) the phase relation between the current and the voltage.

***** **Best wishes** *****
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