

**(English Version)**

- Instructions :**
1. *All Parts are compulsory.*
  2. *Answer without relevant diagram/figure/circuit wherever necessary will not carry any marks.*
  3. *Numerical problems solved without writing the relevant formulae carry no marks.*

**PART – A**

Answer **all** the following questions :

**(10 × 1 = 10)**

- 1) State Coulomb's Law.
- 2) Define electrical resistivity of material of a conductor.
- 3) Write the expression for force acting on a moving charge in a magnetic field.

4) What is magnetic susceptibility?

$$\chi = \frac{M}{H}$$

5) How the self inductance of a coil depends on number of turns in the coil?

$$L = \mu_0 \mu_r n^2 A l$$

6) For which position of the object magnification of convex lens is -1. (minus one)?

7) For which angle of incidence reflected ray is completely polarised?

8) Mention any one type of electron emission.

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9) Write the expression for energy of an electron in electron orbit of hydrogen atom.

10) Write the relation between Half-Life and Mean-Life of radio active element.

**PART – B**

II. Answer **any five** of the following questions :

**(5 × 2 = 10)**

11) Write any two basic properties of charge.

12) Write the expression for drift velocity in terms of current, explain the terms used.

13) Define magnetic 'dip' and 'declination' at a place.

14) Write the expression for speed of light in terms of " $\mu_0$ " and " $\epsilon_0$ ", explain the terms used.

- 15) Write the ray diagram for formation of image in the simple microscope.
- 16) What is diffraction of light?
- 17) Write the expression for de-Broglie wave length of electrons in terms of electric potential and explain the terms used.
- $\lambda = h/mv$
- 18) Distinguish between n-type and p-type semi conductors.

**PART – C**

III. Answer **any five** of the following questions : **(5 × 3 = 15)**

- 19) Derive an expression for potential energy of electric-di-pole placed in an uniform electric field.
- 20) Write the expression for force per unit length between two straight parallel current carrying conductors of infinite length. Hence define SI unit of current 'ampere'.
- 21) Distinguish between 'dia' and 'ferro' magnetic materials.
- 22) Mention the three types energy loss in a transformer.

- 23) Write three experimental observations of photoelectric effect.
- 24) Write the three postulates of Bohr's atomic model.
- 25) Explain 'Conduction band' 'Valance band' and 'Energy gap', in semi conductors.
- 26) What is modulation? Write the block diagram of the receiver.



**PART – D**

IV. Answer **any two** of the following questions :

(2 × 5 = 10)

5 27) State Gauss's law. Derive an expression for electric intensity at a point outside the uniformly charged shell.

5 28) Two cells of emf  $E_1$  and  $E_2$  and internal resistance  $r_1$  and  $r_2$  are connected in parallel such that they send current in same direction. Derive an expression for equivalent resistance and equivalent emf of the combination.

Ⓟ 29) Derive an expression for the intensity of magnetic field at any point on the axis of a circular current loop.

V. Answer **any two** of the following questions :

**(2 × 5 = 10)**

30) Derive an expression for the impedance of a series LCR circuit, when an AC voltage is applied to it.

31) Derive " Lensmaker's " formula.

32) Explain the working of a n-p-n transistor in CE mode as an amplifier.

VI. Answer **any three** of the following questions :

**(3 × 5 = 15)**



- 33) In a circular parallel plate capacitor radius of each plate is 5 cm and they are separated by a distance of 2 mm. Calculate the capacitance and the energy stored, when it is charged by connecting the battery of 200 V (given  $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$ ).
- 34) Two resistors are connected in series with 5V battery of negligible internal resistance. A current of 2A flows through each resistor. If they are connected in parallel with the same battery a current of  $\frac{25}{3}$  A flows through combination. Calculate the value of each resistance.

- 35) A conductor of length 3m moving in a uniform magnetic field of strength 100 T. It covers a distance of 70 m in 5 sec. Its plane of motion makes an angle of  $30^\circ$  with direction of magnetic field. Calculate the emf induced in it.
- 36) In a Young's double slit experiment wave length of light used is  $5000 \text{ \AA}$  and distance between the slits is 2 mm, distance of screen from the slits is 1 m. Find fringe width and also calculate the distance of 7<sup>th</sup> dark fringe from central bright fringe.
- 37) Half life of U-238 undergoing  $\alpha$  - decay is  $4.5 \times 10^9$  years. What is the activity of one gram of U-238 sample?