

### (English Version)

Instructions:

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

#### PART - A

Answer all the following questions:

 $(10 \times 1 = 10)$ 

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



4) What is magnetic susceptibility?

X=11

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

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- 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.
  - 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 :

 $(5 \times 2 = 10)$ 

- 11) Write any two basic properties of charge.
- 12) Write the expression for drift velocity interms of current, explain the terms used.
- 13) Define magnetic 'dip' and 'declination' at a place.
- 14) Write the expression for speed of light interms 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?
  - Write the expression for de-Broglie wave length of electrons interms of electric potential and explain the terms used.

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18) Distinguish between n-type and p-type semi conductors.



#### PART - C

III. Answer any five of the following questions:

 $(5 \times 3 = 15)$ 

- 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:

 $(2 \times 5 = 10)$ 

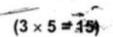
- State Gauss's law. Derive an expression for electric intensity at a point outside the uniformly charged shell.
- Two cells of emf E<sub>1</sub> and E<sub>2</sub> and internal resistance r<sub>1</sub> and r<sub>2</sub> are connected in parallel such that they send current in same direction. Derive an 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:

 $(2 \times 5 = 10)$ 

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





- 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 ∈<sub>0</sub> = 8.854×10<sup>-12</sup>Fm<sup>-1</sup>).
- 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° 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 Å 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?