

17210

13141

2 Hours / 50 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Figures to the right indicate full marks.
(3) Assume suitable data, if necessary.
(4) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

- 1. Attempt any NINE of the following:** **18**
- State Ohm's law with mathematical equation.
 - Draw a neat labelled circuit diagram of a potentiometer.
 - Define one ampere and one ohm.
 - The potential difference of 60 volt is applied across a capacitor of capacitance 20 μf . Calculate the charge on the plates.
 - Distinguish between semiconductor and insulator. (Any two points).
 - Draw the energy band diagram of a conductor.
 - State Plank's hypothesis.
 - Mention the formula of minimum wavelength of X-Rays. State meaning of symbols used.
 - What does LASER stand for ?
 - Define population inversion and optical pumping.
 - Mention nano material of zero dimension and one dimension.
 - State two properties of nano material.

P.T.O.

2. Attempt any FOUR of the following: 16

- a) Calculate the resistance of 60m length of the wire having cross-sectional area of $0.02 \times 10^{-6} \text{ m}^2$ and having resistivity $3.5 \times 10^{-7} \Omega\text{m}$.
- b) Area of parallel plate condenser is 0.7 m^2 and distance between the two plates is 2mm. The dielectric constant is 5. Calculate the capacitance of the condenser. ($\epsilon_0 = 8.9 \times 10^{-12} \text{ F/m}$).
- c) Obtain the balancing condition of Wheatstone's network.
- d) Derive an expression for the effective capacitance, when three capacitors are connected in series with each other.
- e) Distinguish between n-type and p-type of semiconductor. (Four points)
- f) Draw the forward and reverse characteristics of a PN junction diode.

3. Attempt any FOUR of the following: 16

- a) Explain the principle of the photodiode. Give its two application.
 - b) When light of wavelength 3800 \AA is incident on a metal plate electrons are emitted with zero velocity. Calculate the threshold frequency and work function of the metal. ($h = 6.625 \times 10^{-34} \text{ J.S}$)
 - c) Explain the production of X-Rays using Coolidge tube.
 - d) Explain with neat diagram the working of He-Ne laser.
 - e) i) State Einstein's photoelectric equation with meaning of symbols used.
ii) Define stopping potential.
 - f) State four applications of nano material in engineering field.
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