

17210

11819

2 Hours / 50 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any NINE of the following :

18

- (a) Define conductivity and state its unit.
- (b) Draw a neat labelled circuit diagram of a potentiometer.
- (c) Define potential gradient and state its SI unit.
- (d) Draw the symbol when :
 - (i) condensers are in parallel
 - (ii) condensers are in series
- (e) Define conduction band and forbidden energy gap.
- (f) Write any two applications of photodiode.
- (g) An X-ray tube is operated at 80 kV. Calculate minimum wavelength of X-rays emitted by it.
- (h) Write any two properties of X-rays.
- (i) Give full form of LASER.

- (j) Give any two applications of LASER.
- (k) What is Nano-technology ? Define nano scale.
- (l) State two properties of nano material.

2. Attempt any FOUR of the following :

16

- (a) Calculate the resistivity and conductivity of a wire having diameter 0.3 mm, length 4 m. and its resistance is 30Ω .
- (b) State and explain the balancing condition of Wheatstones network with neat diagram.
- (c) Derive an expression for the capacitance of a parallel plate capacitor.
- (d) Two condensers of capacitance $15 \mu\text{F}$ and $10 \mu\text{F}$ are connected in parallel across a battery of 12 volt. Find the resultant capacitance and charge on each condenser.
- (e) Classify the solids into conductors, semiconductors and insulators on the basis of band theory of solids.
- (f) With I-V curve, explain forward biased characteristics of P-N junction diode.

3. Attempt any FOUR of the following :

16

- (a) Distinguish between intrinsic and extrinsic semiconductor. (any four points)
 - (b) The photoelectric work function of a metal is 5 eV. Calculate it's threshold frequency. (Given $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$ and $h = 6.63 \times 10^{-34} \text{ Js}$.)
 - (c) State four applications of X-rays.
 - (d) Explain with help of neat labelled diagram the working of He-Ne Laser.
 - (e) Explain photoelectric effect with suitable diagram.
 - (f) State any four applications of nano technology in the field of engineering.
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