2 Hours/50 Marks

Seat No.

Instructions : (1) **All** questions are **compulsory**.
(2) Attempt **all** questions including question no. **1** which is **compulsory**.
(3) Answer **each** next main question on a **new** page.
(4) Illustrate your answers with **neat** sketches **wherever** necessary.
(5) Figures to the **right** indicate **full** marks.
(6) Assume suitable data, **if** necessary.
(7) **Use** of Non-programmable Electronic Pocket Calculator is **permissible.**
(8) Mobile Phone, Pager and **any other** Electronic Communication devices are **not permissible** in Examination Hall.

MARKS

1. Attempt **any nine :** 18

   a) State unit of resistance and resistivity.

   b) State Ohm's Law.

   c) State the principle of Potentiometer device.

   d) Write factors on which capacity of parallel plate capacitor depend.

   e) State the difference between an insulator and semiconductor in terms of energy level or band energy.

   f) What is LDR ?

   g) Calculate the minimum wavelength of X-rays emitted by X-ray tube operated at 25 KV.

   h) Define X-rays using range of wave-length spectrum.

   i) Give the full form of LASER.

   j) What is spontanous emission and stimulated emission ?

   k) State two characteristics of nano materials.

   l) Name zero dimensional and one-dimensional nano material.

2. Attempt **any four :** **16**

   a) A resistance in the form of wire has length of 4 m and thickness 2 mm shows current of 500 mA for a potential difference of 12 volt. Calculate resistance in ohm and conductance in mho. Also calculate specific resistance of material of wire.

   b) State and explain balancing condition of Wheatstone's network.

   c) State and prove parallel Law of condensers.

   d) Three condensers with capacity $6\,\mu F$, $12\,\mu F$ and $18\,\mu F$ are connected in parallel circuit. If p.d. of 440 volt is given to circuit. Calculate charge on each condenser.

   e) Draw and explain Energy bands (Fermi energy) in conductor, semiconductor and insulators.

   f) Explain forward bias and reverse bias characteristics for P-N junction diode.

3. Attempt **any four :** **16**

   a) Distinguish between p-type and N-type semiconductor.

   b) The Threshold wavelength of silver is $3800\,\overset{\circ}{A}$. Calculate maximum energy in eV of photoelectrons emitted in ultra-violet light of wavelength $2600\,\overset{\circ}{A}$ is incident on it.

   c) Give four applications of X-rays.

   d) Write properties of LASER.

   e) State principle of photo cell. Give it's type and their symbols.

   f) State four applications of nano material in Engineering field.

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