Sample Test Paper-I

Course Name : Computer, Electrical and Electronics Engineering Group

Course code   : EE/EP/EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ED/EI/IU/CO/CM/IF/CD/CW

Semester   : Second

Subject Title : Applied Science (Physics)

Marks   : 25

17210

Time: 1 Hours

Instructions:

1. All questions are compulsory.

2. Illustrate your answers with neat sketches wherever necessary.

3. Figures to the right indicate full marks.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

Q.1) Attempt any FOUR.   **08 Marks**

a) What is electric current? Give the SI unit of electric current.

b) State Ohm's law. Write the expression for Ohm's law.

c) State the factors on which capacity of a condenser depends.

d) The resistance of a copper wire of 5 m is 0.5 Ω. If the diameter of the wire is 0.045 cm, determine its specific resistance.

e) A potential gradient along a potentiometer wire is 0.02 V/cm. calculate P. D. across a potentiometer wire of length 10 m.

f) Define the terms: Valance band, conduction band and forbidden gap.

Q.2) Attempt any THREE.   **09 Marks**

a) Draw neat labeled diagram of Whetstone's network and write the balancing condition for it.

b) Three condensers are connected in series across 150 V supply. The voltages across them are 40, 50 and 60 V respectively and the charge on each is 6 X 10^{-8} C. Find the capacity of each condenser and also of the combination.

c) Differentiate between intrinsic semiconductor and extrinsic semiconductor.

d) Describe with suitable diagrams the construction and action of a P-N junction diode.

Q.3) Attempt any TWO.   **08 Marks**

a) With neat labeled diagram derive an expression for capacity of a parallel plate capacitor.

b) Draw energy band diagrams for conductor, semiconductor and insulator.

c) A battery of emf 6 volts is connected across a potentiometer wire of 4 m length. Calculate the potential gradient along the wire.

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Q.1) Attempt any FOUR. **08 Marks**

   a. Find the minimum wavelength of X-rays produced by an X-ray tube operated at 1000 KV. Given $h = 6.63 \times 10^{-34}$ Js, $e = 1.6 \times 10^{-19}$ C and $C = 3 \times 10^{8}$ m/s.

   b. State any two applications of laser.

   c. Draw the symbol of LDR, write its principle.

   d. State any two applications of nanotechnology.

   e. The photoelectric work function of certain metal is 3×10^{-19} J. Calculate its threshold frequency.

   f. Define the terms: Work function, threshold frequency.

Q.2) Attempt any THREE **09 Marks**

   a. Draw neat labeled diagram of Coolidge tube and explain production of X-rays.

   b. The energy of photon is 5.28×10^{-19} J. Calculate frequency and wavelength.

   c. Explain spontaneous emission and stimulated emission.

   d. Explain physical method of synthesis of nanoparticles.

Q.3) Attempt any TWO **08 Marks**

   a. Write construction and working of He – Ne laser with diagram.

   b. State the properties of nanoparticles.

   c. Define population inversion and optical pumping with suitable diagram.

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Semester   : Second

Subject Title : Applied Science (Physics)

17210

Marks   : 50   **Time: 2 Hours**

Instructions:

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3. Figures to the right indicate full marks.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

Q.1 Attempt any NINE.   **18 Marks**

   a) Define one ampere and one ohm.

   b) Draw labeled diagram of Wheatstone's network.

   c) Explain principle of potentiometer.

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

   e) Distinguish between semiconductor and insulator.

   f) Explain principle of photodiode.

   g) An X-ray tube is operated at 30 KV. Calculate minimum wavelength of X-rays emitted by it.

   h) What are X-rays? Mention its range of wavelength.

   i) Draw labeled diagram for He-Ne laser.

   j) Define optical pumping and population inversion.

   k) Mention nano material of zero dimensions and one dimension.

   l) State two properties of nano material.

Q.2 Attempt any FOUR   **16 Marks**

   a) Calculate the conductance of a wire if 400 mA current flows through the wire having P.D. of 10 V between its ends.

   b) A,B,C,D are four coils of resistances $2\Omega, 2\Omega, 2\Omega$ and 3Ω respectively arranged in the form of Wheatstone's network, calculate the value of resistance with which coil D be shunted in order to balance the bridge.

c) Derive expression for effective capacitance when three capacitors are connected in series combination.

d) The capacitance of parallel plate capacitor is increased from 6 µF to 37.5 µF when sheet of insulator is inserted between the plates. Calculate the dielectric constant of the insulator.

e) Draw energy band diagram for conductor, semiconductor, and insulator.

f) Describe forward characteristics of P-N junction diode.

Q.3 Attempt any FOUR   **16 Marks**

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

b) When light of wavelength 3800 A^0 is incident on a metal plate electrons are emitted with zero velocity. Calculate threshold frequency and work function of the metal.

c) Explain any four properties of X-rays.

d) Mention four applications of Laser.

e) Obtain Planck's –Einstein photo electric equation of photo electric emission.

f) Describe four applications of nano material in engineering field.