Total No. of printed pages = 7

END SEMESTER (REGULAR/RETEST) EXAMINATION, NOVEMBER/DECEMBER – 2024

Semester : 2nd (New)

Subject Code : Sc-204

APPLIED PHYSICS – II

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) Question Nos. 1, 2 and 3are compulsory.

(ii) Answer any *five* questions from the rest.

1. Fill in the blanks with appropriate answers : $1\times5=5$

   (a) Two 4nF capacitors in parallel will have equivalent capacitance of _____.

   (b) The direction of induced emf is given by _____ Law.

   (c) The majority charge carrier in P-type semiconductors is _____.

[Turn over

(d) 1eV = ____J.

(e) A lens has a power of –2D, the type of the lens is _____.

2. Write whether True or False : 1×5=5

(a) In series connection current remains same throughout the circuit.

(b) The magnetic field lines can never intersect each other.

(c) P-type semiconductor is obtained by doping intrinsic semiconductor with pentavalent impurities.

(d) The velocity of light in water is more than the velocity of light in vacuum.

(e) LED stands for Laser Emitting Diode.

3. Choose the correct answers : 1×5=5

(a) The principle behind optical fibres is

(i) refraction

(ii) total internal reflection

(iii) dispersion

(iv) scattering

(b) As temperature increases the resistance of a semiconductor

(i) remains same (ii) decreases

(iii) increases (iv) None of these

(c) The kinetic energy of photo-electrons emitted depends upon

(i) Intensity of light

(ii) Frequency of light

(iii) Wavelength of light

(iv) None of these

(d) The number of protons in $_{92}U^{235}$ is

(i) 327 (ii) 143

(iii) 92 (iv) 235

(e) A Step Up transformer has

(i) Larger number of turns in primary coil

(ii) Larger number of turns in secondary coil

(iii) Same number of turns

(iv) All of the above.

4. (a) Name two types of spherical lens. Write few applications of both types of lens. 2

(b) Draw the ray diagram to show the image formed when an object is placed in front of a concave mirror at point F (focus). 2

(c) What is Snell's Law. 1

(d) A lens produces an image of magnification –2D of focal length equal to 50 cm. Determine the type of lens, object distance and image distance. 3

(e) Define dispersion of light. What is the reason behind the usage of red colour for all sorts of warning signs ? 1+2=3

5. (a) Explain 'Total Internal Reflection' with a neat diagram. State the conditions for total internal reflection. 2+2=4

(b) Define electric potential. Deduce an expression for electrostatic potential at a point due to a point charge. 1+2=3

(c) State Ohm's Law and write the units of measurement for voltage, current and resistance. 2

(d) Distinguish between potential difference and emf of a cell. 2

6. (a) Write the properties of magnetic lines of force. Why two magnetic lines of force cannot intersect with each other ? 3+1=4

(b) State Faraday's laws of electromagnetism. 2

(c) Three resistances each of 3Ω are connected in parallel and the whole combination is connected across a 9 Volt battery. Find the current through each resistor. 3

(d) State Coulomb's Law of Magnetostatics. Write S.I unit of magnetic field. 1+1=2

7. (a) Define Eddy Current ? Write its application. Also state the Lenz Law. 1+1+1=3

(b) Draw the magnetic lines of force for a bar magnet. (Give appropriate direction for the lines of force) 2

(c) Three resistances each of 3Ω are connected in parallel and the whole combination is connected across a 18 Volt battery. Find the current and voltage through each resistor. 4

(d) State the Kirchoff's Law. 2

8. (a) What is Photoelectric effect? The work function of a metal is 3.3 eV. Find the threshold frequency for the metal.

(Given $h = 6.63 \times 10^{-34}$ Js; $1eV = 1.6 \times 10^{-19}$ J) 2+2=4

(b) Convert 1 amu into eV. 2

(c) Write two properties each of α, β and γ radiations. 3

(d) Distinguish among Conductor, Semi-conductor and Insulator on the basis of energy gap. 2

9. (a) (i) Differentiate among Diamagnetic, Para-magnetic and Ferromagnetic materials. 3

Or

(ii) Explain briefly how a diode can be used as a rectifier. 3

(b) What is a thermocouple? Explain the Seebeck effect briefly. 1+2=3

(c) State Joule's Law of Heating. Also write the expression for it. 2

(d) Define the following : 3

(i) Atomic Number

(ii) Mass Number

(iii) Isotopes.

10. (a) Primary coil of a transformer has 20 number of turns and the secondary coil has 30 number of turns. An input signal of 200V is supplied at the primary side, calculate the output signal. Also determine the type of transformer. 3

(b) Define electric power. What is the commercial unit for electric power ? 2

(c) What is inductance ? Write the factors affecting inductance. 2

(d) You are given $_{2}He^{4}$ and $_{79}Au^{179}$: 2+2=4

(i) Find Atomic Number and Mass Number for both the elements.

(ii) Find the number of Neutrons for both the elements.