APPLIED PHYSICS–II

(New Course)

Full Marks – 70

Time – Three hours

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

Answer *all* questions.

GROUP – A

1. Choose the correct answer : 1×10=10

(a) An alpha particle is diverted towards west is deflected towards north by a field. The field is magnetic. What will be the direction of field ?

(i) Towards south (ii) Towards east

(iii) Downward (iv) Upward

(b) Two 4 μF capacitors in series is equal to–

(i) 8 μF (ii) 4 μF

(iii) 2 μF (iv) 16 μF

(c) Focal length of plane mirror is

(i) infinity (ii) zero

(iii) negative (iv) None of these

(d) What is the rate of flow of electric charges called ?

(i) Electric potential

(ii) Electric conductance

(iii) Electric current

(iv) None of these

(e) What is electromagnetic induction ?

(i) The process of charging a body

(ii) The process of rotating a coil of an electric motor

(iii) Producing induced current in a coil due to relative motion between a magnet and the coil

(iv) The process of generating magnetic field due to a current passing through a coil.

(f) A hole in a P-type semiconductor is

(i) An excess electron

(ii) A missing electron

(iii) A missing atom

(iv) A missing proton

(g) Kilowatt hour is a unit of

(i) Energy (ii) Power

(iii) Electric charge (iv) Electric current

(h) X-ray consists of

(i) Electron (ii) Photon

(iii) Proton (iv) Neutron

(i) A thunder clap follows the light flash because

(i) Light is produced first

(ii) Light is easily visible from far

(iii) Light travels faster than sound

(iv) Light is nearer to the observer

(j) The field of view is maximum for

(i) A plane mirror

(ii) Concave mirror

(iii) Convex mirror

2. Fill in the blanks : $1\times5=5$

(a) An electric bulb is marked "230V–100W". The resistance of its filament is ____ ohm.

(b) The angle between the magnetic meridian and geographical meridian is called ____.

(c) The difference of potential between the two terminals of a cell in open circuit is called ____.

(d) Magnetic effect of current was discovered by ____.

(e) The Right hand Thumb Rule is stated by ____.

3. Write true or false : $1\times10=10$

(a) Concave mirror can produce two types of images.

(b) The pole is located at the mid-point of a bar magnet.

(c) A convex mirror of 40 cm has focal length 80 cm.

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

(e) The kinetic energy of photo-electrons emitted depends upon the intensity of the incident light.

(f) P-type germanium is obtained by doping pure germanium with elements like aluminium.

(g) The process by which a heavy nucleus breaks up into two large fragments is called fusion.

(h) The resistance of a thin wire is less than a thick wire of same length and material.

(i) The direction of induced emf is obtained from Ohm's law.

(j) Magnetic potential at any point is a vector quantity.

GROUP – B

4. (a) Draw the virtual image that can be found for concave mirror. 2

(b) An object is placed at a distance of 150 cm from a screen and a convex lens is placed in between, produces an image magnified four times on the screen. Calculate the focal length of the lens. 4

(c) What is an optical image? Distinguish between a real image and a virtual image. 1+3=4

5. (a) Explain with a neat diagram the 'critical angle' and 'total internal reflection'. State the conditions for total internal reflection. 3+2=5

(b) An object is placed between F and 2F of a convex lens. State two characteristics of the image formed. 2

(c) Five resistances each of 2 ohm are connected in parallel. What is the total resistance? 3

6. (a) What is thermion? Explain how a diode can be used as a rectifier? 1+3=4

(b) The work function of a metal is 3.3 eV. Calculate the threshold frequency for it. (Given $h = 6.6 \times 10^{-34}$ Js). 2

(c) Define magnetic intensity. Calculate the magnetic intensity at a point on the axial line of a bar magnet. 1+3=4

7. (a) What do you understand by the term 'internal resistance' of a cell? 2

(b) How local action and polarisation are avoided in a Lechlanche cell ? 4

(c) The specific resistance of copper is 1.76×10^{-6} ohm.cm, the radius of the wire is 1 mm. Calculate the length of a wire needed for having a resistance of 10.5 ohm. 4

8. Write short notes on : $2 \times 2\frac{1}{2} = 5$

(a) Photo-electric cell

(b) Binding energy and mass defect