Total No. of printed pages = 7

END SEMESTER EXAMINATION – 2022

Semester : 2nd

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 :

1. *All* questions of PART–A are compulsory.
2. Answer any five questions from PART–B.

PART – A

Marks – 25

1. Fill in the blanks : 1×5=5

   (a) Focal length of plane mirror is ———.

   (b) When object is placed at centre of curvature of a concave mirror, image is formed at ———.

(c) The tangent drawn at any point on magnetic lines of force gives the ——— at that point.

(d) The angle of dip at the equator is ———.

(e) In a secondary cell, ——— chemical reaction takes place.

2. Answer the following questions : 1×5=5

(a) What is the reciprocal of resistance ?

(b) What do you mean by Threshold energy ?

(c) Which factor is to be multiplied with mass defect to get Binding energy ?

(d) What is spontaneous emission ?

(e) On which principle Lenz's law based ?

3. Write True or False : 1×5=5

(a) Light is an electromagnetic wave.

(b) Two parallel conducting wires carrying current in the opposite direction repel each other.

(c) X-rays consist of positively charged particles.

(d) Thermopile is a device to detect and measure the radiant heat.

(e) Holes are majority charge carriers in p-type semiconductors.

4. Match the columns : 1×5=5

Column – A	Column – B
(i) Electron	(a) Mutual induction
(ii) Transformer	(b) Total internal reflection
(iii) Maxwell's cork screw rule	(c) Majority charge carriers
(iv) Mirage	(d) Positively charged particles
(v) Alpha particle	(e) Direction of magnetic field

5. Choose the correct answer : 1×5=5

(a) Two capacitors each of capacity 6 μF are connected in parallel. The combined capacity is

(i) 12 μF (ii) 6 μF

(iii) 3 μF (iv) 1.5 μF

(b) The power of a convex lens of focal length 50 cm is

(i) + 2D (ii) – 2D

(iii) + 0.02D (iv) – 0.02 D

(c) Kilowatt hour is a unit of

(i) Energy (ii) Power

(iii) Electric charge (iv) Electric current

(d) The direction of induced emf can be obtained by

(i) Lenz's law

(ii) Fleming's right hand rule

(iii) Fleming's left hand rule

(iv) Both (i) and (ii)

(e) The number of neutrons in the nucleus of $_{90}Th^{232}$ is

(i) 232 (ii) 90

(iii) 142 (iv) 150.

PART – B

Marks – 45

6. (a) Distinguish between real and virtual image. With a neat ray diagram show the formation of a virtual image by a concave mirror. 2+2=4

(b) What is total internal reflection ? Explain it with a diagram. 2

(c) What is meant by angle of minimum deviation ? The angle of a prism is 60° and the minimum deviation of a ray through the prism is 40°. Calculate the refractive index of the prism. 1+2=3

7. (a) State inverse square law of magnetism and hence define unit pole. 2

(b) Two spheres charged with equal and opposite charges experience a force of 19.6 N. When they are placed 20 cm apart in a medium of relative permittivity 5. Determine the charge on each sphere. 3

(c) Derive the potential at a point due to a point charge. 4

8. (a) What are the defects of a simple voltaic cell ? State the method of their remedy. 2+2=4

(b) Define resistance. Give its unit. What is the effect of temperature on resistance of a conductor ? 1+1+1=3

(c) A battery of e.m.f 12 volts is connected in series with a parallel combination of three resistances 2 Ohm, 4 Ohm and 5 Ohm respectively. Calculate the current through each resistor. 2

9. (a) State Joule's law of heating. What is a thermo couple ? 2+1=3

(b) State Faraday's laws of electromagnetic induction. 3

(c) What is a transformer ? What are the types of a transformer ? Write one use of each type of transformers. 3

10. (a) Establish Einstein's Photo-electric equation. Define threshold frequency. 3+1=4

(b) Write two properties each of α, β and γ radiations. Complete the following nucle reaction : 3+2=5

$$_{90}Ra^{226} \longrightarrow \text{.....} + {}_{2}He^{4}.$$

11. (a) What is LASER ? State the differences between Spontaneous emission and Stimulated emission. 1+2=3

(b) How a diode can be used as a half wave rectifier ? 3

(c) Explain the formation of a P-type semiconductor. 3