Total No. of printed pages = 6

END SEMESTER REGULAR EXAMINATION

JANUARY-2025

Semester : 1st (New)

Branch : Common to All

Subject Code : BS-102

APPLIED PHYSICS–I

Full Marks – 60

Time –Three hours

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

Instruction :

- *All* questions are compulsory.

1. Fill in the blanks : 1×5=5

   (a) The dimensional formula of Impulse is _____.

   (b) Electric Potential is a _____ quantity. (scalar/vector)

   (c) The value of acceleration due to gravity is _____ at center of Earth.

[Turn over

(d) Moment of momentum is called _____.

(e) Conductivity of a semiconductor diode is _____ in reverse bias than in forward bias. (more/less)

2. Write True or False : 1×5=5

(a) The significant figure of 1.205×10^6 is 4.

(b) Nm/s is the unit of Impulse.

(c) The escape velocity of a satellite from earth's surface is $\sqrt{2}$ times greater than orbital velocity of a near-surface satellite.

(d) A free charged particle in an electric field always moves along/opposite an electric field line.

(e) A primary cell converts chemical energy to electrical energy.

3. Choose the correct answers : 1×5=5

(a) Which of the following is a fundamental quantity ?

(i) Force (ii) Ampere

(iii) Joule (iv) Hertz

(b) If the momentum of a body is doubled, the kinetic energy

(i) increases 4 times

(ii) decreases by half

(iii) is doubled

(iv) remains unchanged

(c) Two resistors each of resistance 20Ω are connected once in parallel and then connected in series with another resistor of resistance 15Ω. The net resistance is

(i) 25Ω (ii) 30Ω

(iii) 35Ω (iv) 40Ω

(d) In case of a transistor, the central portion has to be

(i) N-type

(ii) P-type

(iii) May be N-type or P-type

(iv) None of the above

(e) The direction of induced emf is given by

(i) Kirchoff's law (ii) Newton's law

(iii) Lenz law (iv) Coulomb's law

4. (a) What is random error ? The percentage errors in measurement of mass and velocity are 2% and 3% respectively. How much will be the maximum error in estimate of Kinetic energy obtained by measuring mass and velocity. 1+2=3

(b) What is dot product and cross product of two vectors ? Give examples. 1+1+1=3

(c) State and prove the principle of conservation of linear momentum. 1+2=3

5. (a) A car moving with a speed of 126 km/hr is brought to stop within 200m. What is its retardation and how long it takes for the car to stop ? 3

(b) (i) Define work, power and energy. Write their S.I units. 3

Or

(ii) Show that work done on a body is equal to the net change in its Kinetic energy. 3

(c) (i) State and explain Newton's law of gravitation. 3

Or

(ii) Define angular velocity (ω). Establish the relation between v (linear velocity) and ω (angular velocity). 3

6 Answer any *three* questions : 3×3=9

(a) State Coulomb's law of force in electrostatics. Define unit charge from it. 2+1=3

(b) Define electric field intensity. Write its unit. State Gauss' Law. 1+1+1=3

(c) Define 1 farad. Find the expression for capacitance of a parallel plate capacitor. 1+2=3

(d) Define electric power. An electric bulb is marked 250 V – 100W. What will be the current flowing through the filament of the bulb if it is connected across 220 V line ? 1+2=3

(e) State and explain Kirchoff's laws. 3

7 Answer any *three* questions : 3×3=9

(a) A transformer has efficiency of 75%. It works at 4kW and 100V. If the secondary voltage is 240 V, calculate the primary and secondary currents. 3

(b) State and explain Faraday's law of Electromagnetic Induction. 3

(c) State Fleming's left-hand rule. Find the expression for force on a current carrying conductor placed in a magnetic field. 1+2=3

(d) Explain the causes of power loss in a transformer. 3

8. (a) Define specific resistance and conductivity. Write their units. 1+1+1=3

(b) What is the difference between intrinsic and extrinsic semiconductor. Explain how a P-type semiconductor is formed. 1+2=3

(c) (i) Explain a p-n junction diode as a half-wave rectifier. 1+2=3

Or

(ii) Write a short note on LED. 3