

Second Term Exam : 2024-25

Std. : 11th

Subject : Physics

Marks : 80

General Instructions :

* The question paper is divided into four sections.

- 1) Section 'A': Q. No. 1 contain's ten multiple choice type of questions carrying one mark each. Q. No. 2 contain's eight very short answer type of questions carrying one mark each.
- 2) Section 'B': Q. No. 3 to Q. No. 14 contains twelve short answer type of questions carrying two marks each. Attempt any Eight.
- 3) Section 'C': Q. No. 15 to Q. No. 26 contains twelve short answer type of questions carrying three marks each. Attempt any Eight.
- 4) Section 'D': Q. No. 27 to Q. No. 31 contains five long answer type of questions carrying four marks each. Attempt any Three.
- 5) Use of log table is allowed. Use of calculator is not allowed.
- 6) Figures to the right indicate full marks.
- 7) For each MCQ's correct answer must be written along with it's alphabet.
eg. - i) (a) ii) (b) iii) (c) iv) (d)

Section 'A'

Q. 1 Select and write the correct answer.

[10]

- i) The gravitational potential due to Earth is minimum at _____
a) the centre of the Earth
b) the surface of the Earth
c) a point inside the Earth but not all it's centre
d) infinite distance
- ii) If $\vec{A} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{B} = 3\hat{i} - 2\hat{j} + \hat{k}$, then the area of parallelogram formed from these vectors as the adjacent sides will be _____
a) $2\sqrt{3}$ square units b) $4\sqrt{3}$ square units
c) $6\sqrt{3}$ square units d) $8\sqrt{3}$ square units
- iii) The point on stress-strain curve just beyond which strain begins to increase even without increase in stress is called _____
a) elastic point b) yield point
c) breaking point d) neck point
- iv) If two temperatures differ by 25°C on celsius scale, the difference in temperature on fahrenheit scale is _____
a) 45° b) 65° c) 38° d) 25°
- v) Speed of sound is maximum in _____
a) air b) water c) vacuum d) solid
- vi) In a uniform electric field, a charge of 3 C experiences a force of 3000N. The potential difference between two points 1 cm. apart along the electric lines of force will be _____
a) 10 V b) 3 V c) 0.1 V d) 20 V

- Q. 2** Answer the following.

- 1) State Kepler's law of period.
- 2) When are average velocity and instantaneous velocity same?
- 3) If a constant force of 800 N produces an acceleration of 5 m/s^2 in a body, what is its mass?
- 4) Write the dimensions of power.
- 5) What is knee voltage?
- 6) A convex lens has focal length of 2.0 cm. Find its magnifying power if image is formed at DDV.
- 7) Write the relation between electric field (E) and electric potential (V).
- 8) State the expression for the magnetic induction at any point along the equator of a very short bar magnet.

Attempt any Eight.

Q. 3 Explain why is modulation needed?

Q. 4 Nuclear Radius R has a dependence on the mass number (A) as

$R = 1.3 \times 10^{-16} \times A^{\frac{1}{3}}$ m. For a nucleus of mass number $A = 125$, obtain the order of magnitude of R expressed in metre.

Q. 5 Explain the following terms :

(i) Cohesive force

(ii) Adhesive force

Q. 6 Two satellites A and B are revolving round a planet. Their periods of revolution are 1 hour and 8 hour respectively. The radius of orbit of satellite B is 4×10^4 km. Find radius of orbit of satellite A.

- Q. 7 State Newton's second law of motion and its importance.
- Q. 8 A car travels at a speed of 50 km/hr. for 30 minutes for next 15 minutes and then 70 km/hr. for next 45 minutes. What is the average speed of the car?
- Q. 9 Give reasons : Hot water when poured in glass beaker, it cracks.
- Q. 10 An object is placed at 15 cm. from a convex mirror having radius of curvature 20 cm., find the position and kind of image formed by it.
- Q. 11 Define electric field. State its SI unit and dimensions.
- Q. 12 State any four characteristics of the vector product (cross product) of two vectors.
- Q. 13 Distinguish between transverse waves and longitudinal waves.
- Q. 14 Calculate the current flowing through a heater rated at 2 kw. when connected to a 300 V d.c. supply.

Section 'C'

Attempt any Eight.

[24]

- Q. 15 Explain the process of diffusion in p - n junction.
- Q. 16 A body is acted upon by two forces \vec{F}_1 and \vec{F}_2 of magnitudes 6 N and 8 N. If the angle between them is 60° . Find the magnitude and the direction of their resultant.
- Q. 17 What is total internal reflection and define critical angle of incidence and obtain expression for it?
- Q. 18 A steel wire having cross sectional area 1.2 mm^2 is stretched by a force of 120 N. If a lateral strain of 1.455×10^{-4} is produced in the wire, calculate the poisson's ratio. (Given : $\gamma_{\text{steel}} = 2 \times 10^{11} \text{ N/m}^2$)
- Q. 19 What is the effect of temperature on the velocity of sound in air?
- Q. 20 Which will require more energy, heating a 2.0 kg. block of lead by 30 K or heating a 4.0 kg block of copper by 5 K?
($S_{\text{lead}} = 128 \text{ Jkg}^{-1} \text{ K}^{-1}$, $S_{\text{copper}} = 387 \text{ Jkg}^{-1} \text{ K}^{-1}$)
- Q. 21 Discuss the variation of acceleration due to gravity with altitude.
- Q. 22 A potential difference of 5000 volts is applied between two parallel plates 5 cm. apart. A small oil drop having a charge of $9.6 \times 10^{-19} \text{ C}$ falls between the plates. Find :
i) electric field intensity between the plates
ii) the force on the oil drop

- Q. 23 Derive an expression for centripetal acceleration of a particle performing uniform acceleration of a particle performing uniform circular motion by calculus method.
- Q. 24 A magnetic pole of bar magnet with pole strength of 100 Am is 20 cm. away from the centre of a bar magnet. Bar magnet has pole strength of 200 Am and has length 5 cm. If the magnetic pole is on the axis of the bar magnet, find the force on the magnetic pole.
- Q. 25 Time period of a simple pendulum depends upon the length of pendulum (l) and acceleration due to gravity (g). Using dimensional analysis, obtain an expression for time period (T) of a simple pendulum.
- Q. 26 Define:
 (i) Gravitational force (ii) Strong Nuclear force (iii) Weak Nuclear force

Section 'D'

Attempt any Three.

[12]

- Q. 27 State and prove "Gauss law of electrostatics".
- Q. 28 i) Explain the term power and write its SI unit.
 ii) Variation of a force in a certain region is given by $f = 6x^2 - 4x - 8$. It displaces an object from $x = 1\text{m}$ to $x = 2\text{m}$ in this region. Calculate the amount of work done?
- Q. 29 i) Obtain an expression for binding energy of a satellite revolving around the Earth at certain height.
 ii) Find the binding energy of a body of mass 50 kg. at rest on the surface of the Earth.
 (Given : $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$, $R = 6400 \text{ km}$, $M = 6 \times 10^{24} \text{ kg}$)
- Q. 30 What is a conical pendulum. Show that its time period is given by $2\pi \sqrt{\frac{l \cos \theta}{g}}$ where l is the length of the string, θ is the angle that the string makes with the vertical and g is the acceleration due to gravity.
- Q. 31 i) Write any four advantages of optical fibre communication over electronic communication.
 ii) A compound microscope has a magnification of 15. If the object subtends an angle of 0.5° to eye, what will be the angle subtended by the image at the eye?

