

(6 pages)

Reg. No. :

Code No. : 30746 E Sub. Code : EMPH 31

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024.

Third Semester

Physics — Core

MECHANICS

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. According to Kepler's second law, when the planet is nearer to the sun, it moves _____.
(a) Faster (b) Slower
(c) Rest (d) None
2. Escape velocity of earth is
(a) 11.1 Km/s (b) 11.2 Km/s
(c) 11.3 Km/s (d) 11.4 Km/s

3. Unit of angular momentum is
(a) Kg.ms^{-1} (b) $\text{Kg.m}^2\text{s}^{-1}$
(c) $\text{Kg}^{-1}\text{m}^2\text{s}$ (d) $\text{Kg.m}^{-2}\text{s}^{-1}$
4. When two bodies stick together after collision, the collision said to be?
(a) Partially elastic (b) Elastic
(c) Inelastic (d) None
5. Work is a _____ quantity.
(a) Vector (b) Scalar
(c) Both (a) and (b) (d) None
6. Unit of energy is _____.
(a) Watt (b) Joule
(c) Both (a) and (b) (d) None
7. The rocket is based on the principle of law of conservation of _____.
(a) energy
(b) momentum
(c) angular momentum
(d) none

8. Moment of inertia is
 (a) L/W^2 (b) L/W^3
 (c) L/W (d) None
9. Virtual work of the force of constant is
 (a) 1 (b) 2
 (c) 3 (d) zero
10. D'Alembert principle is
 (a) $F_i = \dot{P}_i$ (b) $F_i = -\dot{P}_i$
 (c) $F_i = \pm \dot{P}_i$ (d) None

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
 Each answer should not exceed 250 words.

11. (a) State and explain Newton's law of motion.
 Or
 (b) Explain equation of motion.
12. (a) Define : Collision. Explain elastic and inelastic collision.
 Or
 (b) Define : angular momentum and torque show that the relation, $\vec{T} = \vec{r} \times \vec{F}$.

Page 3 Code No. : 30746 E

13. (a) Explain potential energy curve.
 Or
 (b) Explain conservative force with examples.
14. (a) Define : moment of inertia of a rotating body. State its significance.
 Or
 (b) Define : Collision. Discuss the direct impact of two bodies.
15. (a) Write a short note on :
 (i) Degrees of freedom
 (ii) Virtual work.
 Or
 (b) State the applications of Lagrange's equation.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
 Each answer should not exceed 600 words.

16. (a) Write a short note on :
 (i) Newton's laws
 (ii) Kepler's laws.

Or

Page 4 Code No. : 30746 E
 [P.T.O.]

- (b) Write a short note on :
- (i) Equation of motion
 - (ii) Newton's law of gravitation
 - (iii) Earth satellites.
17. (a) Define : center of mass. Calculate the total linear momentum of a system of particles about the centre of mass.
- Or
- (b) Describe the law of conservation of linear momentum from Newton's laws of motion.
18. (a) Obtain to expression for the kinetic energy of a rotating body.
- Or
- (b) Write a short note on :
- (i) work
 - (ii) power
 - (iii) energy
 - (iv) law of conservation of energy.

19. (a) Define moment of inertia. Write a short note on : (i) translational motion (ii) Rotational motion (iii) angular momentum.

Or

- (b) Obtain an expression for the acceleration of a body rolling down in an inclined plane.
20. (a) Discuss the applications of Lagrange's equation.

Or

- (b) Write a short note on :
- (i) D' Alembert's principle
 - (ii) Simple pendulum.
-