

IPUC MID-TERM EXAMINATION, SEPT./OCT.-2026

SUBJECT : PHYSICS (33)

Time : 3 Hours

Max. Marks : 70

General Instructions :

- 1) All parts A to D are compulsory.
- 2) For Part-A questions, first written answer will be considered for awarding marks.
- 3) Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without relevant formula and detailed solutions will not carry any marks.

PART-A

I Answer ALL of the following questions:

15x1=15

- 1) The number of significant figures in 0.06900 is
a) 5 b) 4 c) 2 d) 3
- 2) Which of the following statement is incorrect?
a) Path length is a scalar quantity whereas displacement is a vector quantity.
b) The magnitude of displacement is always equal to the path length traversed by an object over a given time interval.
c) The displacement depends only on the end points whereas path length depends on the actual path followed.
d) The path length is always positive whereas displacement can be positive, negative and zero.
- 3) Speedometer of a car measures
a) average speed b) average velocity c) instantaneous speed d) Instantaneous velocity
- 4) In two equal vectors
a) Only magnitude are same b) Both magnitude and direction are same
c) Only direction are same d) Neither magnitude nor direction are the same
- 5) A ball is thrown up at an angle θ with the horizontal, the height of the ball is maximum when θ is
a) 0° b) 45° c) 90° d) 30°
- 6) Uniform circular motion has :
a) Constant velocity b) Constant speed, variable velocity
c) Zero acceleration d) Constant acceleration
- 7) Match the Column I with Column II

Column I	Column II
A) Definition of force	(p) Newton's third law
B) Measure of force	(q) Impulse
C) Effect of force	(r) Newton's second law
D) Recoiling of gun	(s) Newton's first law

a) A-q, B-p, C-r, D-s b) A-p, B-q, C-r, D-s c) A-s, B-r, C-q, D-p d) A-s, B-q, C-r, D-p
- 8) The banking of road is necessary to provide
a) Centripetal force b) Centrifugal force c) normal reaction d) frictional force
- 9) One horse power equals to
a) 746 J b) 746 kJ c) 100 J d) 100 kJ
- 10) In elastic collision
a) Only momentum is conserved
b) Only kinetic energy is conserved
c) Both momentum and kinetic energy is conserved
d) Neither momentum nor kinetic energy is conserved
- 11) Centre of mass of a uniform rod lies at
a) One end b) Midpoint c) $\frac{1}{4}$ length d) Outside
- 12) A body is being raised to a height 'h' from the surface of earth. What is the sign of work done by applied force and gravitational force respectively?
a) Positive, Positive b) Positive, Negative c) Negative, Positive d) Negative, Negative
- 13) Which of the following principles a circus acrobat employs in his performance?
a) Conservation of energy b) Conservation of linear momentum
c) Conservation of mass d) Conservation of angular momentum

(P.T.O.)

- 14) The principle used in Hydraulic lift is
a) Pascal's law b) Archimedes Principle c) Bernoulli's Principle d) Stoke's law
- 15) Gravitational potential is always
a) Zero b) Infinity c) Negative d) Positive

II Fill in the blanks : **5x1=5**
(increases, decreases, acceleration, momentum, minimum, zero)

- 16) Slope of v-t graph is _____.
- 17) When two vectors acting at a point are in opposite direction, the magnitude of resultant is _____.
- 18) The product of mass of the body and its velocity is _____.
- 19) When the force and displacement are perpendicular to each other work done is _____.
- 20) The acceleration due to gravity _____ as height increases.

PART-B

III Answer any FIVE of the following questions: **5x2=10**

- 21) Write the dimensions of physical quantity (a) Work (b) Pressure
- 22) Mention any two uses of velocity-time graph.
- 23) Define : (a) Uniform velocity (b) Instantaneous velocity.
- 24) Define scalar product of two vectors and give one example.
- 25) What is impulsive force? Give one example.
- 26) Mention different types of friction.
- 27) Give any two differences between streamline flow and turbulent flow of liquid.
- 28) Write the expression of torque in vector form. Give one illustration for torque.

PART-C

IV Answer any FIVE of the following questions: **5x3=15**

- 29) What is v-t graph? Draw the velocity-time graph for a body moving with (a) Uniform velocity
(b) Uniform acceleration starting from rest.
- 30) Derive the relation between linear velocity (V) and angular velocity (ω).
- 31) What is inertia of a body ? Explain with examples.
- 32) Prove work-energy theorem for constant force.
- 33) A man pushes a roller with a force of 50 N through a distance of 20 m. Calculate the work done if the handle of the roller is inclined at an angle 60° with the ground.
- 34) Write the kinematic equations for rotational motion.
- 35) State and explain universal law of gravitation.
- 36) Draw stress-strain curve. Show yield point and fracture point.

PART-D

V Answer any THREE of the following questions: **3x5=15**

- 37) Show the trajectory of a projectile is a parabola.
- 38) Derive an expression for maximum safe speed of a vehicle on a banked road in circular motion.
- 39) Define conservation of energy. Show that the total mechanical energy is conserved in case of a freely falling body.
- 40) Define torque. Derive the relationship between torque and angular momentum.
- 41) Derive an expression for acceleration due to gravity at a point below the surface of earth.

VI Answer any TWO of the following questions: **2x5=10**

- 42) A ball is thrown with a speed of 49 ms^{-1} making an angle of 30° with horizontal. Calculate maximum height and maximum horizontal distance covered by the ball.
- 43) A car is moving at 72 kmph. Brakes are suddenly applied causing all the tyres to skid. How far will the car move before coming to stop? (Given $g = 9.8 \text{ ms}^{-2}$ and $\mu = 0.2$)
- 44) A disc of mass 5 kg and radius 40 cm rotates about an axis passing through its centre and perpendicular to its plane. It makes 10 revolutions in one second. Calculate (a) moment of Inertia of disc about its axis. (b) rotational kinetic energy.
- 45) Assuming the earth to be a sphere of uniform mass density, how much would a body weigh at a depth equal to half the radius of the earth if it weighs 250 N on the surface of earth ? What will the weight of the same body be at the centre of the earth?