

PHYSOL-3 EXAMINATION SERIES FOR PLUS ONE

CHAPTERS 4,5,6 & 7
SUNDAY 08-05-2022 @ 7.00pm

P3ES-02

TIME: 1 HOUR

MAXIMUM SCORE:30

General Instructions to Students

- There is a ‘cool-off time’ of 15 minutes in addition to maximum writing time
- Use cool-off time to get familiarise with questions and their answers
- **Read questions and instructions carefully before answering**
- Calculations, figures, graphs should be shown in the answer sheet itself
- **You can write questions as per instruction in each section to get a maximum score of 30**
- Electronic devices except **non-programmable calculators** are not allowed in the examination

Answer any 3 questions from 1 to 5. Each carries 1 score

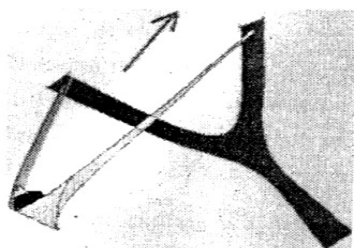
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|---|---|---|
| 1 | At the top of a projectile vertical velocity of the object will be..... | 1 |
| 2 | If $ \vec{A}+\vec{B} = \vec{A}-\vec{B} $, what is the angle between \vec{A} and \vec{B} | 1 |
| 3 | The rotational analogue of mass is | 1 |
| 4 | A machine gun fires a bullet of mass 40 g with a velocity of 1200 ms^{-1} . The man holding it can exert a maximum force of 144 N on the gun. How many bullets can he fire per second at the most? a) one b) four c) two d) three | 1 |
| 5 | A standing passenger in a moving bus tends to fall forward while the driver applies a sudden brake. It is due to.....(Inertia of Rest/Inertia of Motion) | 1 |

Answer any 5 questions from 6 to 13. Each carries 2 score

| 6 | If horizontal range is equal to 4 times maximum height. Find the angle of projection? | 2 | | | | | | | | | | | | | | | |
|-------|--|--|---|---|---|--------------------|---------------------|---|---------------------------------|-----------------------------------|---|--------------------|----------------|---|---------|--|---|
| 7 | A ball thrown by one player is caught by another player in 5 seconds then calculate the maximum height reached by the ball ($g= 10 \text{ m/s}^2$) | 2 | | | | | | | | | | | | | | | |
| 8 | Using Newton’s second law of motion, derive the equation $F = ma$ | 2 | | | | | | | | | | | | | | | |
| 9 | Match the following <table border="1" style="width: 100%; margin-top: 5px;"> <thead> <tr> <th style="width: 10%;">SL No</th> <th style="width: 40%;">A</th> <th style="width: 50%;">B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Newton’s First law</td> <td>Change in momentum.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Conservation of Linear momentum</td> <td>Action \leftrightarrow Reaction</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Newton’s third law</td> <td>Law of inertia</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Impulse</td> <td>Momentum before collision = Momentum after collision</td> </tr> </tbody> </table> | SL No | A | B | 1 | Newton’s First law | Change in momentum. | 2 | Conservation of Linear momentum | Action \leftrightarrow Reaction | 3 | Newton’s third law | Law of inertia | 4 | Impulse | Momentum before collision = Momentum after collision | 2 |
| SL No | A | B | | | | | | | | | | | | | | | |
| 1 | Newton’s First law | Change in momentum. | | | | | | | | | | | | | | | |
| 2 | Conservation of Linear momentum | Action \leftrightarrow Reaction | | | | | | | | | | | | | | | |
| 3 | Newton’s third law | Law of inertia | | | | | | | | | | | | | | | |
| 4 | Impulse | Momentum before collision = Momentum after collision | | | | | | | | | | | | | | | |
| 10 | Force and displacement vector is given as $\vec{F}=3\hat{i}+4\hat{j}-5\hat{k}$ and $\vec{d}=5\hat{i}+4\hat{j}+3\hat{k}$ a) Find work done. b) State the conditions under which a force does no work. | 1 1 | | | | | | | | | | | | | | | |
| 11 | Derive an expression for potential energy of a stretched string. | 2 | | | | | | | | | | | | | | | |
| 12 | Explain the parallel axes theorem about moment of inertia. | 2 | | | | | | | | | | | | | | | |

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| 13 | Derive the relation between torque and angular momentum. | 2 |
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Answer any 3 questions from 14 to 17. Each carries 3 score

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|----|---|-------------------|
| 14 | <p>A stone is thrown with the help of a sling with initial velocity 'u' at an angle 'θ' from the horizontal.</p>  <p>a) Working of sling is based on..... law of vector addition.</p> <p>b) Derive the expression for the maximum height reached by the stone.</p> | <p>1</p> <p>2</p> |
| 15 | A ball of mass 50g is moving with a velocity 20 m/s hit on a wall and bounce back with same speed. The time of contact between ball and wall is 0.1sec. Find the force due to hitting? | 3 |
| 16 | A motor pump can fill water in a tank of 40 m ³ at a height 5m from the ground in 30 minutes. Find the power required for this process? Given density of water is 1000 kg/m ³ . | 3 |
| 17 | <p>Moment of inertia of a uniform disc about an axis passing through the centre and perpendicular to the plane is $MR^2/2$</p> <p>a) State Perpendicular axes theorem</p> <p>b) Derive the expression for moment of inertia of a uniform disc about an axis passing through the diameter.</p> | <p>1</p> <p>2</p> |

Answer any 2 questions from 18 to 20. Each carries 4 score

| | | |
|----|--|--|
| 18 | With the help of a diagram derive the expression for the resultant of two vectors in parallelogram law of vector addition (Derive the law of cosines) | 4 |
| 19 | <p>To reduce friction and accident by skidding the roads are banked at curves.</p> <p>a)What is meant by banking of roads?</p> <p>b)Sketch the schematic diagram of a vehicle on a banked road with friction and mark the various forces.</p> <p>c) Derive an expression for maximum safe speed of a vehicle on a banked road with friction.</p> | <p>1</p> <p>1</p> <p>2</p> |
| 20 | <p>a) State the work energy theorem.</p> <p>b) Show that the potential energy of a body is completely converted into kinetic energy during its free fall under the gravity.</p> <p>c) A man carefully brings down a glass sheet from a height 2 m to the ground. The work done by him is</p> <p>(i) negative (ii) zero (iii) positive (iv) unpredictable</p> <p>OR</p> <p>a) In the absence of external torque.....of an isolated system remains constant</p> <p>b) Why planets move faster at near region of sun and slower when they are far away?</p> | <p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>3</p> |