TERM- I (2016-17)
11-PHYSICS

Time : 3Hr

Instructions:

M.M.: 70

- All questions are compulsory
- Internal choices are provided in few questions
- Q1 – Q5 carry 1 mark each
- Q6 – Q10 carry 2 marks each
- Q11 – Q22 carry 3 marks each
- Q23 carry 4 mark
- Q24 – Q26 carry 5 marks each

1 Mark Questions

Q1. Draw velocity-time graph for an object undergoing uniformly accelerated motion.

Q2. A ball is thrown straight up. What is its velocity and acceleration at the top?

Q3. If a man weighs 75 Kg on a stationary platform. What will be his apparent weight in a lift moving upwards with an acceleration of 2 m/s^2?

Q4. Define the term Conservative Force.

Q5. What provides the centripetal force to a car taking a turn on a level road?

2 Mark Questions

Q6. If two resistances $R_1 = (6\pm0.2)$ Ω and $R_2 = (8\pm0.6)$ Ω are connected in series. Find the maximum percentage error in the resistance of the combination.

Q7. A car covers the first half of the distance between two places at a speed of 40 Km/h and the second half at 60 Km/h. What is the average speed of car?

Q8. Find the value of 'n' so that the vector $\vec{A} = (2\hat{i}-3\hat{j}+\hat{k})$ and vector $\vec{B} = (3\hat{i}+4\hat{j}+n\hat{k})$ are perpendicular to each other.

Q9. Why does a cricket player lowers his hands while catching a cricket ball?

Q10. Prove 'Work Energy theorem' for a constant force.

3 Mark Questions

Q11. A car moving along a straight highway with speed of 126Km/h is brought to rest within a distance of 200m. What is the retardation of the car and how long does it take for car to stop?

Q12. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\dfrac{L}{g}}$. Measured value of L is 20 cm known to 1mm accuracy and time for 100 oscillations of the pendulum is found to be 90s using a wrist watch of 1s resolution. What is the accuracy in the determination of g?

Q13. Using graphical method, derive the first and second equation of motion.
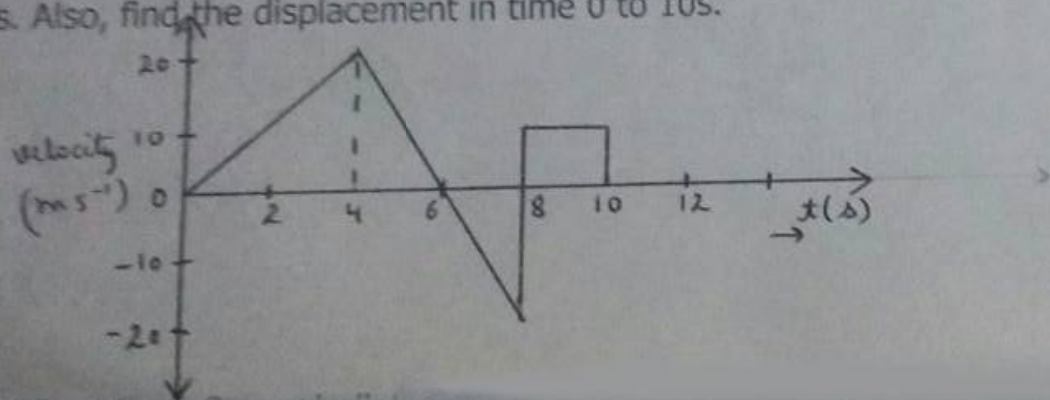
Q14. Two vectors A and B are inclined at each other at angle. Using triangle law of vector addition, find the magnitude and direction of their resultant.

Q15. Use the method of dimensions, to derive an expression for the energy of a body executing SHM; assuming this energy depends upon its mass 'm', frequency 'v' and amplitude of vibration 'r'.

Q16. Derive a relation for the maximum velocity of negotiating a curve by a vehicle on a level road.

Q17. A mass of 200 Kg is resting on a rough inclined plane of 30 °. If the coefficient of friction is $\frac{1}{\sqrt{3}}$, find the least and the greatest forces acting parallel to the inclined plane to keep the mass in equilibrium.

Q18. The velocity-time graph of an object moving along a straight line is shown in the given figure. Find the net distance covered by the object in time interval between t=0 to t=10s. Also, find the displacement in time 0 to 10s.

Q19. A police officer fires a bullet of mass 50g with speed 200m/s on soft plywood of thickness 2 cm. The bullet emerges with only 10% of its initial Kinetic Energy. What is the emergent speed of the bullet?

Q20. State Law of Conservation of Linear Momentum. A shell of mass 0.02 Kg is fired by a gun of mass 100Kg. If the muzzle speed of the shell is 80m/s, then what is the recoil speed of the gun?

Q21. At what height from the surface of the earth will the value of g be reduced by 36% from the value at the surface? Radius of Earth = 6400Km.

OR

Q21. Why Friction is a necessary evil. Draw graph showing variation of the frictional force with the applied force.

Q22. Derive an expression for the acceleration due to gravity in terms of the mass of the earth and Gravitational constant G.

4 Mark Questions

Q23. Three athletes A, B and C throw their javelins from similar positions with the same initial speeds making angle 30°, 45°, and 60° respectively with the horizontal. Each one tries to throw his javelin to a maximum distance.

a) Out of the three, which one is wiser than the other two? What value has he displayed?

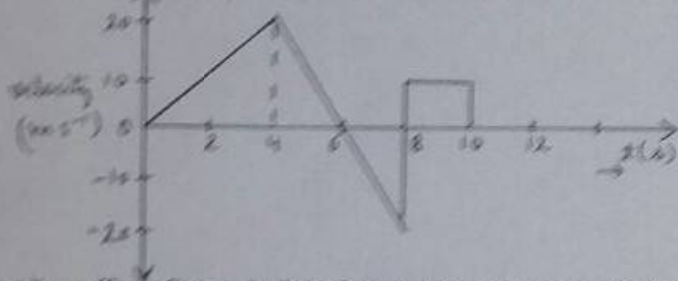b) Give a condition for maximum horizontal range of a projectile.

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Q17. A mass of 200 Kg is resting on a rough inclined plane of 30 °. If the coefficient of friction is ⅓, find the least and the greatest forces acting parallel to the inclined plane to keep the mass in equilibrium.

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2

5 Mark Questions

Q24. What is projectile? A projectile is projected with velocity u making angle θ with horizontal direction, derive an expression for the 'Time of flight'. Hence, find the time of flight for an object projected with a velocity of 30m/s at an angle of 30° with the vertical.

Q25. Define orbital velocity of a satellite and derive an expression for it.

The period of moon around the earth is 27.3 days and the radius of the orbit is 3.9 $\times 10^5$ Km. If $G=6.67 \times 10^{-11}$ $Nm^2 kg^{-2}$, find the mass of the earth.

OR

Q25. Define Elastic collision. Consider two perfectly elastic bodies A and B of masses m_1 and m_2 moving along the same straight line with initial velocities u_1 and u_2 respectively (let $u_1 > u_2$) undergoes head-on collision in 1D. Derive the expression of their final velocities. Also write, what happens if $m_1 = m_2$

Q26. A body attached to a string of length 'l' describe a vertical circle such that it just able to cross the highest point. Derive the expression for the minimum velocity at the bottom of the circle. Also find its value for string of length 1.5m tied to stone of mass 0.4 kg.