1 point

1) The velocity v of a particle at time t is given by $V=at+\frac{b}{t+c}$, where a,b,c are constants.The dimensions of abc are

(a) L^2T^{-2} (b) L^2T^{-1} (c)LT^2 (d)$L^{-2}T^{-1}$

- a
- b
- c
- d

1 point

2) The mass of the liquid flowing per second per unit area of cross section of the tube is proportional to p^x and v^y, where p is the pressure difference and v is the velocity, then the relation between x and y is

(a) x=y (b)x= -y (c) $y^2=x$ (d) $y=-x^2$

- a
- b
- c
- d

3) A particle is projected from the ground with a velocity of 30 m/s . After 2 second it just crosses a wall 10 m high . The angle of projection of the particle is

(a) 75^0 (b) 60^0 (c) 45^0 (d)30^0

- a
- b
- c
- d

1 point

4) There are two balls ,A and B at the same level . A is thrown up with 20 m/s . After 1sec ball B is thrown with 40 m/s ,after how much time the two balls cross each other? .

(a) 1 sec (b) 2 sec (c) 1.5 sec (d) 3sec

- a
- b
- c
- d

5) Two bodies of masses m_1 and m_2 are let fall freely from heights h_1 and h_2 respectively. The ratio of time taken by the bodies to fall through these heights is

(a) $\frac{h1}{h2}$ (b) $(\frac{h1}{h2})^2$ (c) $\sqrt{\frac{h1}{h2}}$ (d) h_1h_2

- a
- b
- c
- d

1 point

6) The maximum and minimum magnitude of the resultant of two given vectors are17 units and 7 units respectively. If these two vectors are at right angles to each other ,the magnitude of their resultant is

(a) 14 (b) 16 (c) 18 (d) 13

- a
- b
- c
- d

7) Two bodies having in the ratio 2:3 fall freely under gravity from heights 9:16. The ratio of their linear momenta on touching the ground is

(a) 2:9 (b) 3:16 (c) 1:2 (d) 3:2

- a
- b
- c
- d

1 point

8) A 1 kg particle strikes a wall with velocity 1m/s at an angle 30^0 and reflects at the same angle. If it remains in contact with wall for 0.1 seconds, then the force is

(a) Zero (b) $40\sqrt{3}$ N (c) $30\sqrt{3}$ N (d) $10\sqrt{3}$ N

- a
- b
- c
- d

1 point

9) Two bodies possess equal linear momentum, their masses are m_1 and m_2 and respective

9) Two bodies possess equal linear momentum ,their masses are m_1 and m_2 and respective kinetic energies are E_1 and E_2. The ratio $E_1:E_2$ is equal to .

(a) $m_1: m_2$ (b) $m_2 : m_1$ (c) $m_1^2 : m_2^2$ (d) $m_2^2 : m_1^2$

- a
- b
- c
- d

1 point

10) A person of 60 kg descends in a lift with an acceleration 2 m/s^2 .The cable of the lift suddenly breaks ,the weight of the person inside the lift is

(a)60 g (b)zero (c)62 g (d)54 g

- a
- b
- c
- d

2 points

11) Define the terms (i) physical unit and (ii) system of unit and give the fundamental Basic quantities .

Option 1

2 points

12) Draw the following graphs for an object projected up word with a velocity v_0 which comes back to the same point after some time

(i) Speed Vs time graph

(ii) Velocity Vs time graph

Option 1

2 points

13) Define uniform acceleration and show that in two dimensional motion with uniform acceleration each rectangular component of velocity is smillar to that of uniformly accelerated motion along one dimension .

Option 1

2 points

2 points

14) Define coefficient of friction and angle of friction and hence derive a relation between them .

Option 1

2 points

15) What you mean by the term impulse . Give it S I unit ,prove that impulse of a force is equal to the change in momentum

Option 1

3 points

16) A car accelerates from rest at a constant rate α for some time after which it decelerates at a constant rate β to come to rest . If the total time elapsed is t second, then calculate

(i) The maximum velocity attained by the car and (ii)the total distance travelled by the car in terms of α, β, t

Option 1

3 points

3 points

17) State the law of conservation of momentum and prove it by using third law of motion.

Option 1

3 points

18) What is mean by positive work ,negative work and zero work ?. Give one example for each one .

Option 1

3 points

19) state Newton's second law of motion and explain the statement second law is the real law motion .

Option 1

3 points

20)(a) State work energy theorm and prove it for variable force .

(b) If the linear momentum of a body increase by 20% what will be the % increase in kinetic energy of the body .

5 points

21) What do you mean by banking on the curved roads?.What is the need of banking and what are the advantageous of banking?. Obtain an expression for the maximum speed with which a car can safely negotiate a curved road banked at an angle θ . The coefficient of friction between the wheels and the road is μ.

Option 1

5 points

22) (a) Define the term centripetal acceleration and obtain an expression for a body moving with uniform speed V along a circular path of radius r and explain the direction of centripetal acceleration .

(b) Two balls are thrown with the same initial velocity at angles α and $(90-\alpha)$ with the horizontal .What will be the ratio of maximum height attained by them .

Option 1

5 points

23) (a) The length ℓ and breadth b and thickness t of a block of wood were measured with the help of a measuring scale . The results with permissible error (in cm) are

$\ell = 15.12 \pm 0.01$ $b = 10 \pm 0.01$ and $t = 5.28 \pm 0.01$ what is the percentage error in volume?

(b) A metal block of mass 0.5 kg is placed on a plane inclined to the horizontal at an angle of 30^0 if the coefficient of friction is 0.2. What force must be applied (i) to just prevent the block from sliding down the inclined plane (ii) to just move the block up the inclined plane and (iii)to move it up the inclined plane with an acceleration of $20 cm/s^2$?.

Option 1