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Preparing for JEE Exam ?

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Time : 3 Hr. **JEE MAINS TEST SERIES** **Time:**

Marks:

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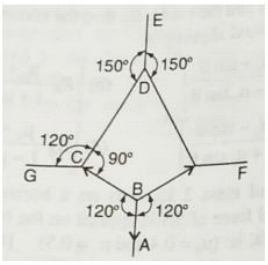
1. A speherometer has a least count of 0.005 mm and its head scale is divided into 200 equal divisions. The distance between consecutive threads on the spherometer screw is

   1) 0.005 mm 2) 1.0 mm 3) 1.0 cm 4) 0.0025 mm

2. The length of a strip measured with a metre rod is 10.0 cm. Its width measured with a vernier calipers is 1.00 cm. The least count of the metre rod is0.1 cm and that of vernier calipers is 0.01 cm. What will be error in its area ?

   1) $\pm 0.01\ cm^2$ 2) $\pm 0.1\ cm^2$ 3) $\pm 0.11\ cm^2$ 4) $\pm 0.2\ cm^2$

3. The adjacent figure is the part of a horizontally stretched net. Section AB is stretched with a force of 10N.The tensions in the sections BC and BF are

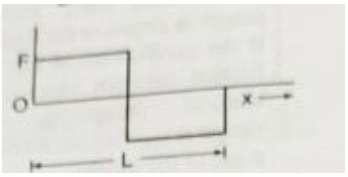


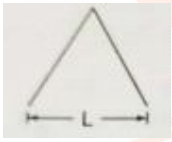
   1) 10N,11N 2) 10N,6N 3) 10N, 10N 4) Cant be calculate d due to insufficient data

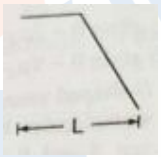
4. To a man walking at the rate of 3km/h the rain appears to fall vertically. When he increases his speed to 6 km/h it appears to meet him at an angle of 45^0 with vertical. Find the velocity of rain.

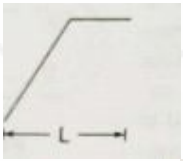
   1) $3kmph$ 2) $5kmph$ 3) $3\sqrt{2}kmph$ 4) $5\sqrt{2}kmph$

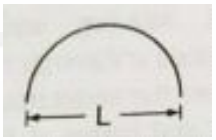
5. A person used force (F) shown in the figure to move a load with constant velocity on a surface. Identify the correct surface profile



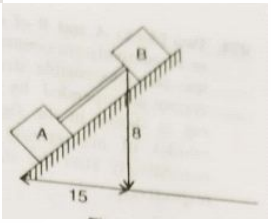
   1) 

   2) 

   3) 

   4) 

6. Blocks A and B in the figure are connected by a bar of negligible weight. If A=B=170 kg and μ_A=0.2 and μ_B=0.4, where μ_A and μ_B are the coefficients of limiting friction between blocks and plane calculate the force on the bar:(g=10 m/sec^2)

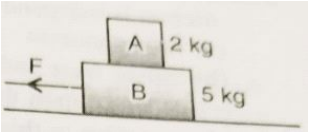


   1) 150 N 2) 75 N 3) 200 N 4) 250 N

7. A homogeneous chain of length L lies on a table. The coefficient of friction between the chain and the table is μ. The maximum length which can hang over the table in equilibrium is

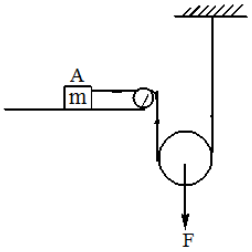
   1) $\left(\frac{\mu}{\mu+1}\right)L$ 2) $\left(\frac{1-\mu}{\mu}\right)L$ 3) $\left(\frac{1-\mu}{1+\mu}\right)L$ 4) $\left(\frac{2\mu}{\mu+1}\right)L$

8. Two blocks A(2 kg) and B(5 kg) rest one over the other on a smooth horizontal plane. The coefficient of static and dynamic friction between A and B is the same and is equal to 0.60. The maximum horizontal force that can be applied to B in order that both a and B donot have relative motion is



   1) 4.2 N 2) 4.2 kgf 3) 5.4 kgf 4) 1.2 N

9. Pulleys and strings are massless. The horizontal surface is smooth.What is the acceleration of the block ?



1) $\frac{2F}{m}$ 2) $\frac{F}{4m}$ 3) $\frac{F}{m}$ 4) $\frac{F}{2m}$

10. **A :** A table cloth can be pulled from a table without dislodging the dishes
R : To every action there is a equal and opposite reaction
1) If both A and R are correct and R is the correct explanation of A
2) If both A and R are correct but R is not the correct explanation of A
3) If A is correct but R is incorrect 4) If A is incorrect but R is correct

11. A cold soft drink is kept on the balance. When the cap is opened, then the weight
1) Increases 2) Decreases
3) First increases, then decreases 4) Remains same

12. An open carriage in goods train is moving with a uniform velocity of 72 km/h. If the train adds water with zero velocity at the rate of 10 kg s^{-1}, then the additional force is applied by engine to maintain the same velocity is
1) 72 N 2) 10 N 3) 720 N 4) 200 N

13. A satellite in force free space sweeps stationary interplanetary dust at a rate $(dM/dt)=\alpha v$. The acceleration of the satellite is
1) $-2\alpha v^2/M$ 2) $-\alpha v^2/M$ 3) $-\alpha v^2/2M$ 4) $-\alpha v^2$

14. A police jeep is chasing with velocity of 45 km/h, a thief in another jeep moving with velocity 153 km/h. Police fires a bullet with muzzle velocity of 180 m/s. The velocity with which it will strike the jeep of the thief is
1) 150 m/s 2) 27 m/s 3) 450 m/s 4) 250 m/s

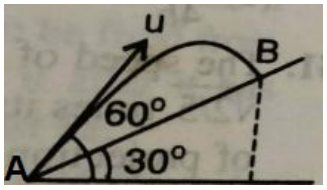
15. A cart is moving horizontally along a straight line with constant speed 30 ms^{-1}. A projectile is to be fired from, the moving cart in such a way that it will return to the cart after the cart has moved 80 m. At what speed (relative to the cart) must the projectile be fired ? (Take g=10 m/s^2)
1) 10 m/s 2) $10\sqrt{8} m/s$ 3) $\frac{40}{3} m/s$ 4) None of these

16. A projectile is thrown in the upward direction making an angle of 60^0 with the horizontal direction with a velocity of 147 ms^{-1}. Then the time after which its inclination with the horizontal is 45^0 is
1) 15 s 2) 10.98 s 3) 5.49 s 4) 2.745 s

17. A river is of width 120m which flows at a speed of 8ms^{-1}. If a man swims with a speed of 5ms^{-1} at an angle of 127^0 with the stream, his drift on reaching other bank is
1) 50 m 2) 150 m 3) 200 m 4) 300 m

18. A particle is projected with a speed v at 45^0 with the horizontal. The magnitude of the angular momentum of the projectile about the point of projection when the particle is at its maximum height h is
1) Zero 2) $\frac{mvh^2}{\sqrt{2}}$ 3) $\frac{mvh}{\sqrt{2}}$ 4) $\frac{mvh^3}{\sqrt{2}}$

19. Time taken by the projectile to reach from A to B is t. then the distance AB is equal to



1) $\frac{ut}{\sqrt{3}}$ 2) $\frac{\sqrt{3}ut}{2}$ 3) $\sqrt{3}ut$ 4) $2ut$

20. A body is projected with velocity υ at an angle θ with horizontal then the radius of curvature at point of projection is
1) $\frac{\upsilon^2\cos^2\theta}{g}$ 2) $\frac{\upsilon^2}{g\cos\theta}$ 3) $\frac{\upsilon^2}{g}$ 4) $\frac{\upsilon^2}{g\sin\theta}$

21. A plane surface is inclined making an angle β above the horizon. A bullet is fired with the point of projection at the bottom of the inclined plane with a velocity u; then the maximum range is given by

1) $\frac{u^2}{g}$ 2) $\frac{u^2}{g(1+\sin\beta)}$ 3) $\frac{u^2}{g(1-\sin\beta)}$ 4) $\frac{u^2}{g(1+\cos\beta)}$

22. From the top of a tower 19.6 m high, a ball is thrown horizontally. If the line joining the point of projection to the point where it hits the ground makes an angle of 45^0 with the horizontal, then the initial velocity of the ball is

1) 9.8 ms^{-1} 2) 4.9 ms^{-1} 3) 14.7 ms^{-1} 4) 2.8 ms^{-1}

23. A body is projected at 30^0 with the horizontal. The air offers resistance in proportion to the velocity of the body. Which of the following statements is correct?

1) The trajectory is a symmetrical parabola
2) The time rise to the maximum height is equal to the time of return to the ground
3) The velocity at the highest point is directed along the horizontal.
4) The sum of the kinetic and potential energies remains constant

24. A point moves with uniform acceleration and υ_1,υ_2 and υ_3 denote the average velocities in three successive intervals of time t_1,t_2 and t_3. Which of the following relations is correct

1)$(\upsilon_1-\upsilon_2) : (\upsilon_2-\upsilon_3)=(t_1-t_2) : (t_2+t_3)$ 2) $(\upsilon_1-\upsilon_2) : (\upsilon_2-\upsilon_3)=(t_1+t_2):(t_2+t_3)$
3) $(\upsilon_1-\upsilon_2) : (\upsilon_2-\upsilon_3)=(t_1-t_2):(t_1-t_3)$ 4) $(\upsilon_1-\upsilon_2) : (\upsilon_2-\upsilon_3)=(t_1-t_2):(t_2-t_3)$

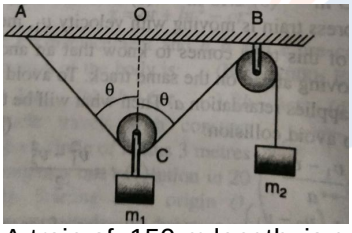
25. The acceleration experienced by a moving boat after its engine is cut off, is given a $=-k\upsilon^3$, where k is a constant if υ_0 is the magnitude of velocity at cut off, then the magnitude of the velocity at time t after the cut off is

1) $\frac{\upsilon_0}{2kt\upsilon_0^2}$ 2) $\frac{\upsilon_0}{1+2kt\upsilon_0^2}$ 3) $\frac{\upsilon_0}{\sqrt{1-2kt\upsilon_0^2}}$ 4) $\frac{\upsilon_0}{\sqrt{1+2kt\upsilon_0^2}}$

26. A car starts from rest, moves with an acceleration a and then decelerates at a constant rate b for some times to come to rest if the total time taken is t. The maximum velocity of car is given by $n\times\frac{abt}{(a+b)}$ then find n

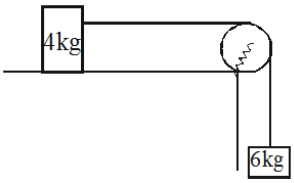
27. A particle located at x=0, at time t=0, starts moving along the positive x–direction with a velocity υ that varies $\upsilon=\alpha\sqrt{x}$. The displacement of the particle varies with time as t^n then the value of n is

28. In the arrangement shown in the figure if υ_1 and υ_2 are instantaneous velocities of masses m_1 and m_2 respectively and angle ACB=2θ at that instant, if $\theta=\cos^{-1}\left(\frac{\upsilon_2}{n\upsilon_1}\right)$ then find n



29. A train of 150 m length is going towards north direction at a speed of 10 ms^{-1}. A parrot flies at a speed of 5 ms^{-1} towards south direction parallel to the railway track. Then find the time taken by the parrot to cross the train (in seconds)

30. If the force exerted by string on the pulley in newtons is $n\times\sqrt{2}$ then find n (g=10ms^{-2})



31. **A :** A body can have acceleration even if its velocity is zero at given instant of time
R : A body is momentarily at rest when it reverses its direction of motion

1) If both A and R are correct and R is the correct explanation of A
2) If both A and R are correct but R is not the correct explanation of A
3) If A is correct but R is incorrect 4) If A is incorrect but R is correct

32. The position vector of a particle is $\vec{r}=(a\cos\omega t)i+(a\sin\omega t)j$ the velocity of the particle is

1) Parallel to position vector 2) Perpendicular to position vector
3) Directed towards origin 4) Directed away from the origin

33. A body falling freely from a given height H hits on an inclined plane in its path at a height h. As a result of this impact, the direction of velocity becomes horizontal. For what value of h/H, the body will take maximum time to reach the ground

1) $\frac{3}{4}$ 2) $\frac{1}{2}$ 3) $\frac{1}{4}$ 4) $\frac{2}{3}$

34. A parallelogram formed with $\vec{a}$ *and* $\vec{b}$ as the sides . Let $\vec{d_1}$ and $\vec{d_2}$ be the diagonals of the parallelogram. Then $a^2+b^2=$

1) $d_1^2+d_2^2$ 2) $d_1^2-d_2^2$ 3) $(d_1^2+d_2^2)/2$ 4) $(d_1^2-d_2^2)/2$

35. The dimensions of the permittivity ε_0 are

1) $[M^{-1}L^{-3}A^2T^4]$ 2) $[M^{-1}L^3A^{-2}T^{-4}]$ 3) $[M^{-1}L^{-1}A^2T^2]$ 4) $[M^{-1}L^{-3}A^2T^{-4}]$

36. A vector $\vec{Q}$ which has a magnitude of 8 is added to the vector $\vec{P}$ which lies along x–axis . The resultant of two vectors lies along y–axis and has magnitude twice that of P. The magnitude $\vec{P}$ is

1) $\frac{6}{\sqrt{5}}$ 2) $\frac{8}{\sqrt{5}}$ 3) $\frac{12}{\sqrt{5}}$ 4) $\frac{16}{\sqrt{5}}$

37. The percentage errors in the measurement of mass and speed are 2% and 3% respectively . How much will be the maximum error in the estimate of kinetic energy obtained by measuring mass and speed ?

1) 11% 2) 8% 3) 5% 4) 4%

38. The sum of two forces acting at a point is 16 N. If the resultant force is 8N and its direction is perpendicular to minimum force, then the forces are

1) 6N and 10N 2) 8N and 8N 3) 4N and 12 N 4) 2N and 14 N

39. The length and breadth of a rectangle are (5.7±0.1)x=cm and (3.4±0.2)cm the area of rectangle with error limits is approximately

1) $(198.4\pm1)cm^2$ 2) $(19.4\pm2)cm^2$ 3) $(19.4\pm2.5)cm^2$ 4) $(19.4\pm1.5)cm^2$

40. The mean time period of second' pendulum is 2.00 s and mean absolute error on the time period is 0.05 s. To express maximum estimate error, the time period should be written as

1) (2.00±0.01)s 2) (2.00±0.025)s 3) (2.00±0.05)s 4) (2.00±0.10)s

THE END