Test / Exam Name: JEE PHYSICS TEST   Standard: 11TH SCIENCE   Subject: PHYSICS
Student Name: ----------------------   Section: ----------------------   Roll No.: ----------------------

| Questions: 40 | Time: 60 Mins | Marks: 40 |

Q1. A trolley is carrying a box on its surface having coefficient of static friction equal to 0.3. Now the trolley **1 Marks**
starts moving with increasing acceleration. Find the maximum acceleration of the trolley so that the box
does not slide back on the trolley.

   A. 2ms-2   B. 3ms-2   C. 4ms-2   D. 5ms-2

Q2. The escape velocity from the earth for a rocket is 11.2km/ sec. Ignoring the air resistance, the escape **1 Marks**
velocity of 10mg grain of sand from the earth will be:

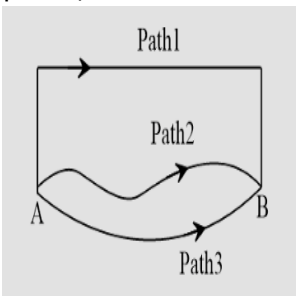   A. 0.112 km/ sec   B. 11.2 km/ sec   C. 1.12 km/ sec   D. None

Q3. Supposing Newton's law of gravitation for gravitation forces F_1 and F_2 between two masses m_1 and m_2 **1 Marks**
at positions r_1 and r_2 read $F_1 = -F_2 = -\dfrac{r^{12}}{r_{12}^3}GM_0^2\left(\dfrac{m_1 m_2}{M_0^2}\right)^n$ where M_0 is a constant of dimension of mass, r_{12}
$= r_1 - r_2$ and n is a number. In such a case:

   A. The acceleration due to gravity on earth will be different   B. None of the three laws of Kepler will be valid.
      for different objects.
   C. Only the third law will become invalid.   D. For n negative, an object lighter than water will sink in
                                                     water.

Q4. A body is moving unidirectionally under the influence of a source of constant power supplying energy. **1 Marks**
Which of the diagrams shown in correctly shows the displacement-time curve for its motion?
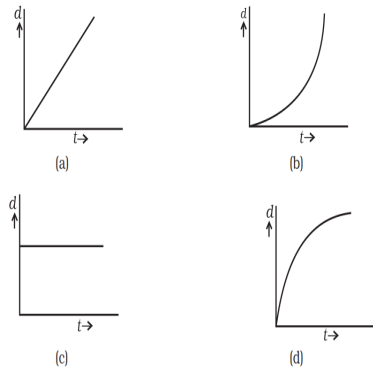
Q5. A gravitational field is present in a region. A point mass is shifted from A to B, along different paths **1 Marks**
shown in the figure. If W_1, W_2 and W_3 represent the work done by gravitational force for respective
paths, then:

   A. W1 = W2 = W3   B. W1 > W2 > W3
   C. W1 > W3 > W2   D. None of these

Q6. A car of mass 400kg travelling at 72kmph crashes a truck of mass 4000kg and travelling at 9km ph in the same direction. The car bounces back with a speed of 18kmph. The speed of the truck after the impact is:

1 Marks

   A. 9kmph   B. 18kmph   C. 27kmph   D. 36kmph

Q7. In the elastic collision of heavy vehicle moving with a velocity 10 ms^{-1} and a small stone at rest, the stone will fly away with a velocity equal to:

1 Marks

   A. 40 ms−1   B. 20 ms−1   C. 10 ms−1   D. 5 ms−1

Q8. Two particles P and Q describe SHM of same amplitude a and frequency v along the same straight line. The maximum distance between the two particles is $a\sqrt{2}$. The initial phase difference between the particle is:

1 Marks

   A. $\frac{\pi}{3}$ B. $\frac{\pi}{2}$

   C. $\frac{\pi}{6}$ D. Zero

Q9. When a mass in is connected individually to two springs S_1 and S_2, the oscillation frequencies are V_1 and V_2. If the same mass is attached to the two springs as shown in figure, the oscillation frequency would be:

1 Marks

   A. v1 + v2   B. $\sqrt{v_1^2 + v_2^2}$

   C. $\left(\frac{1}{v_1} + \frac{1}{v_2}\right)^{-1}$ D. $\sqrt{v_1^2 - v_2^2}$

Q10. Two masses of 1gm and of 4gm are moving with equal linear momenta. The ratio of their kinetic energies is:

1 Marks

   A. 4:1   B. $\sqrt{2}$: 1

   C. 1:2   D. 1:16

Q11. A bullet of mass m fired at 30° to the horizontal leaves the barrel of the gun with a velocity v. The bullet hits a soft target at a height h above the ground while it is moving downward and emerges out with half the kinetic energy it had before hitting the target. Which of the following statements are correct in respect of bullet after it emerges out of the target?

1 Marks

   A. The velocity of the bullet will be reduced to half its initial value.   B. The velocity of the bullet will be more than half of its earlier velocity.

   C. The bullet will continue to move along the same parabolic path.   D. The bullet will move in a different parabolic path.

Q12. A block of mass 10kg is suspended through two light spring balances as shown in figure:

1 Marks

A. Both the scales will read 10kg.

B. Both the scales will read 5kg.

C. The upper scale will read 10kg and the lower zero.

D. The readings may be anything but their sum will he 10kg.

Q13. Two bodies of masses 2Kg and 7Kg are moving with velocities of 2m/ s and 7m/ s respectively. What is the total momentum of the system in Kg-m/ s?　**1 Marks**

    A. 50   B. 53   C. 28   D. 0

Q14. Which of the diagrams shown in represents variation of total mechanical energy of a pendulum oscillating in air as function of time?　**1 Marks**

A.

B.

C.

D.
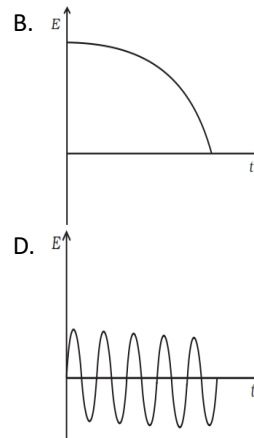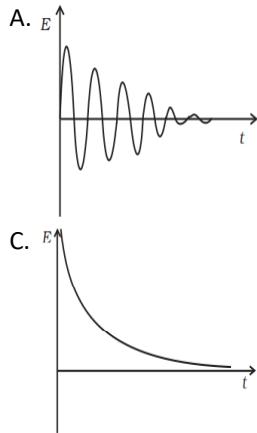
Q15. The relationship between force and position is shown in the figure (in one dimensional case). Work done by the force in displacing a body from X = 1cmto X = 5cmis:　**1 Marks**
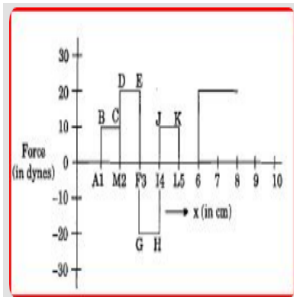
    A. 700 ergs   B. 70 ergs   C. 60 ergs   D. 20 ergs

Q16. The escape velocity of a projectile from the earth is approximately:　**1 Marks**

    A. 7km/ sec   B. 112km/ sec   C. 11.2km/ sec   D. 1.1km/ sec

Q17. A particle of mass 2kg moves along x - axis with potential energy depending upon 'x' co-ordinate as U(x)=(x^2-2x)J. The mass is 2kg .　**1 Marks**

    A. SHM with period π second

                                     B. SHM with period 2π second

    C. oscillatory but not SHM

                                       D. SHM with period $\frac{1}{2\pi}$ second

Q18. Find out the Time period of simple harmonic oscillator vibrating with frequency 2.5Hz and an amplitude of 0.05m:　**1 Marks**

    A. 0.4sec   B. 0.2sec   C. 8sec   D. 20sec

Q19. We are still looking at the oscillating thingy hanging from a spring. The system was set vibrating by pulling the thingy down below its equilibrium position and then letting it go from rest. If the initial displacement is doubled what happens to the maximum kinetic energy of the thing?　**1 Marks**
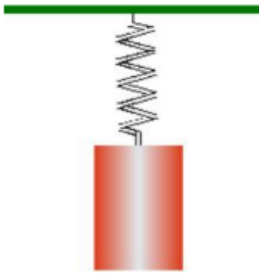
A. It is unchanged.
B. It is doubled.
C. It is increased by a factor of 4.
D. We can't tell from the information provided.

Q20. A force $F = -kx^2 (x \neq 0)$ acts on a particle in X-direction. Find the work done by the force in displacing the particle from x = -a to x = 2a. **1 Marks**

A. $\frac{3k}{2a}$
B. $\frac{4k}{a^2}$
C. $\frac{-3k}{2a^2}$
D. $\frac{-9k}{a^2}$

Q21. If the force acting on a body is 50N, and the mass is 5kg, what can be the acceleration of the body? **1 Marks**

A. 10m/ s2 B. 80m/ s2 C. 8m/ s2 D. 0.8m/ s2

Q22. A particle of man 2kg is moving on a circular path of radius 10m with a speed of 5ms and its speed is increasing at rate of $3ms^{-1}$. Find the force acting on the particle. **1 Marks**

A. 5N B. 10N C. 12N D. 14N

Q23. A cricket ball of mass 150g has an initial velocity $u = (3\hat{i} + 4\hat{j})m\ s^{-1}$ and a final velocity $v = -(3\hat{i} + 4\hat{j})m\ s^{-1}$ after **1 Marks** being hit. The change in momentum (final momentum-initial momentum) is (in kg m s^1):

A. zero
B. $-(0.45\hat{i} + 0.6\hat{j})$
C. $-(0.9\hat{i} + 1.2\hat{j})$
D. $-5(\hat{i} + \hat{j})$

Q24. The pulley in the diagram is smooth and light. The masses of A and B are 5kg and 2kg. The acceleration of the system is: **1 Marks**
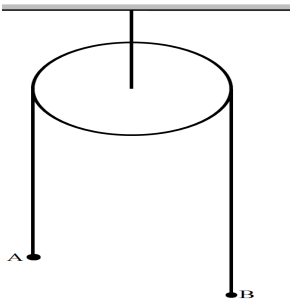
A. g
B. $\frac{7}{3}g$
C. $\frac{3}{7}g$
D. $\frac{1}{7}g$

Q25. A body of mass m is placed on earth surface which is taken from earth surface to a height of h = 3R, then change in gravitational potential energy is: **1 Marks**

A. $\frac{1}{4}mgR$
B. $\frac{2}{3}mgR$
C. $\frac{3}{4}mgR$
D. $\frac{1}{3}mgR$

Q26. Force shown acts for 2 seconds. Find out work done by force F on 10kg in 3 seconds. **1 Marks**
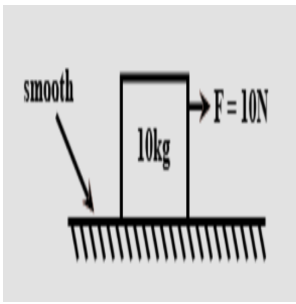
| A. 30J | B. 20J | C. 50J | D. 60J |

Q27. The motion of a particle is given by $x = A\sin\omega t + B\cos\omega t$. The motion of the particle is: **1 Marks**

A. Not simple harmonic.

B. Simple harmonic with amplitude A + B.

C. Simple harmonic with amplitude $\frac{(A+B)}{2}$.

D. Simple harmonic with amplitude $\sqrt{(A^2 + B^2)}$.

Q28. A body of mass 2kg makes an elastic collision with another body at rest and comes to rest. The mass of **1 Marks** the second body which collides with the first body is:

| A. 2kg | B. 1.2kg | C. 3kg | D. 1kg |

Q29. Due to an impulse, the change in the momentum of a body is 1.8kg ms^{-1}. If the duration of the impulse **1 Marks** is 0.2 s, then what is the force produced in it?

| A. 9N | B. 8N | C. 7N | D. 6N |

Q30. When a car is moving along a circle on a level road, then centripetal force is provided by f, where f **1 Marks** denotes as:

A. $f < \mu_S N = \frac{mv^2}{r}$

C. $f = \mu_S N = \frac{mv^2}{r}$

B. $\frac{mv^2}{r} = f \leq \mu_S N$

D. $r = \mu_k N = \frac{mv^2}{r}$

Q31. A 2kg block is dropped from a height 0.4m on a spring of force constant k = 1960N/m. The maximum **1 Marks** compression of spring is:

| A. 0.1m | B. 0.2m | C. 0.3m | D. 0.4m |

Q32. Which of the following is the correct formulation for the second law of motion? **1 Marks**
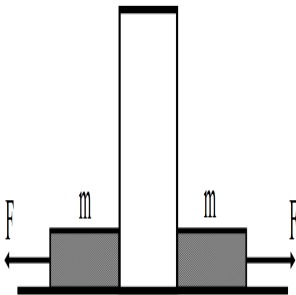
A. F = m(dv/ dt)

C. F = v(dm/ dt) + ma

B. F = ma

D. F = mv2

Q33. Figure shows a heavy block kept on a frictionless surface and being pulled by two ropes of equal mass **1 Marks** m. At t = 0, the force on the left rope is withdrawn but the force on the right end continues to act. Let F_1 and F_2 be the magnitudes of the forces by the right rope and the left rope on the block respectively:

A. F1 = F2 = F for t < 0.

C. F1 = F, F2 = F for t > 0.

B. F1 = F2 = F + mg for t < 0.

D. F1< F, F2 = F for t > 0.

Q34. A stationary ball weighing 0.25kg acquires a speed of 10m/ s when hit by a hockey stick. The impulse **1 Marks** imparted to the ball is:
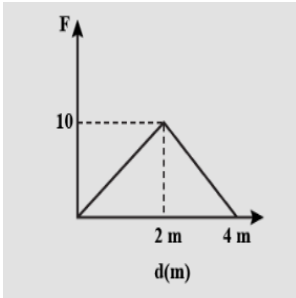
| A. 2.5Ns | B. 2.0Ns | C. 1.5Ns | D. 0.5Ns |

Q35. 25N force is required to raise 75kg mass from a pulley. If rope is pulled 12m, then the load is lifted to 3m, the efficiency of pulley system will be: **1 Marks**
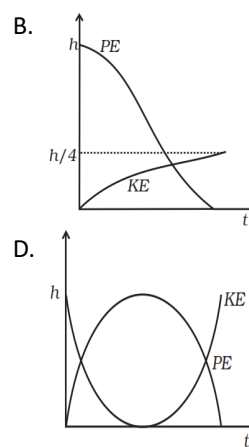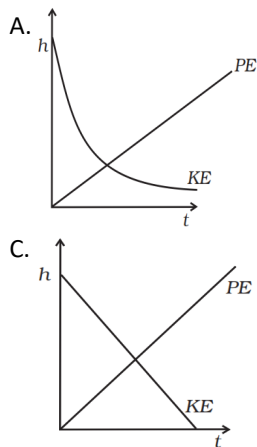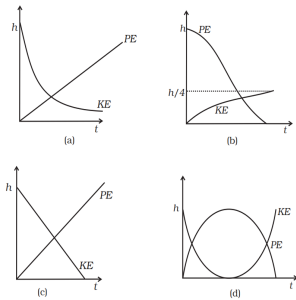
   A. 25%   B. 33.3%   C. 75%   D. 90%

Q36. Work done from $d = 0m$ to $d = 4m$ **1 Marks**

   A. 12.5J   B. 15D   C. 17.5J   D. 20D

Q37. A raindrop falling from a height h above ground, attains a near terminal velocity when it has fallen through a height $(3/4)h$. Which of the diagrams shown in correctly shows the change in kinetic and potential energy of the drop during its fall up to the ground? **1 Marks**


A.

B.

C.

D.

Q38. A particle of mass 10 kg is moving in a straight line. If its displacement, x with time t is given by $x = (t^3 - 2t - 10)m$, then the force acting on it at the end of 4 seconds is: **1 Marks**

   A. 24N   B. 240N   C. 300N   D. 1200N

Q39. A particle moving on x-axis has potential energy $U = 2 - 20x + 5x^2$ Joule along x-axis. The particle is released at $r = -3$. The maximum value of x will be (x is in meter): **1 Marks**

   A. 5m   B. 3m   C. 7m   D. 8m

Q40. A mass of 0.5kg moving with a speed of $1.5ms^{-1}$ on a horizontal smooth surface, collides with a nearly weightless spring of spring constant $k = 50N/ m^{-1}$ **1 Marks**
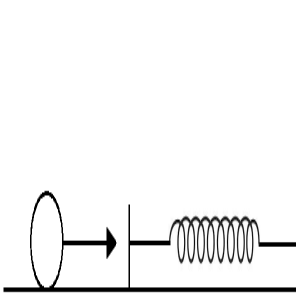
The maximum compression of the spring would be:

A. 0.15m   B. 0.12m   C. 1.5m   D. 0.5m