Sample Paper-01

Class 11th NEET (2024)

PHYSICS

SECTION-A

1. The surface tension is $T = \frac{F}{l}$, then the dimensions of surface tension are;

(1) $[MLT^{-2}]$ (2) $[MT^{-2}]$

(3) $[M^0L^0T^0]$ (4) None of these

2. Identify the pair which has different dimensions;

(1) Planck's constant and angular momentum

(2) Impulse and linear momentum

(3) Angular momentum and frequency

(4) Pressure and Young's modulus

3. Which of the following is dimensionless?

(1) $\frac{v^2}{rg}$ (2) $\frac{v^2g}{r}$

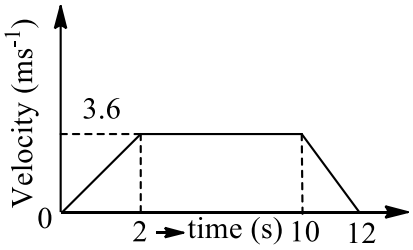
(3) $\frac{vg}{r}$ (4) v^2rg

4. A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S_1 and that covered in the first 20 seconds is S_2, then;

(1) $S_2 = 2S_1$ (2) $S_2 = 3S_1$

(3) $S_2 = 4S_1$ (4) $S_2 = S_1$

5. An elevator is going up. The variation in the velocity of the elevator is as given in the graph. What is the height to which the elevator takes the passengers?



(1) 3.6 m (2) 28.8 m

(3) 36.0 m (4) 72.0 m

6. Two bodies of different masses m_a and m_b are dropped from two different heights a and b. The ratio of the time taken by the two to cover these distances are;

(1) $a : b$ (2) $b : a$

(3) $\sqrt{a} : \sqrt{b}$ (4) $a^2 : b^2$

7. A body is moving in a circular path with acceleration a. If its velocity gets doubled, find the ratio of acceleration after and before the change;

(1) 1 : 4 (2) $\frac{1}{4} : 2$

(3) 2 : 1 (4) 4 : 1

8. A circular road of radius 1000 m has banking angle 45°. The maximum safe speed of a car having mass 2000 kg will be, if the coefficient of friction between tyre and road is 0.5;

(1) 172 m/s (2) 124 m/s

(3) 99 m/s (4) 86 m/s

9. A stone of mass 16 kg is attached to a string 144 m long and is whirled in a horizontal circle. The maximum tension the string can withstand is 16 newton. The maximum velocity of revolution that can be given to the stone without breaking it, will be;

(1) 20 ms^{-1} (2) 16 ms^{-1}

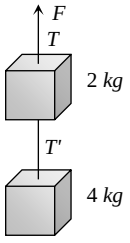
(3) 14 ms^{-1} (4) 12 ms^{-1}

10. An object is projected at an angle of 45° with the horizontal. The horizontal range and the maximum height reached will be in the ratio;

(1) 1 : 2 (2) 2 : 1

(3) 1 : 4 (4) 4 : 1

11. Two blocks are connected by a string as shown in the diagram. The upper block is hung by another string. A force F applied on the upper string produces an acceleration of 2 m/s^2 in the upward direction in both the blocks. If T and T' be the tensions in the two parts of the string, then (g = 9.8 m/s^2);



(1) T = 70.8 N and T' = 47.2 N

(2) T = 58.8 N and T' = 47.2 N

(3) T = 70.8 N and T' = 58.8 N

(4) T = 70.8 N and T' = 0

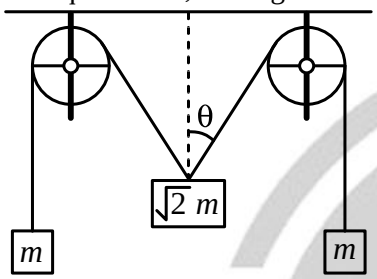
12. A block of mass 10 kg is placed on an inclined plane. When the angle of inclination is 30°, the block just begin to slide down the plane. The force of static friction is;

(1) 10 kg wt (2) 89 kg wt
(3) 49 kg wt (4) 5 kg wt

13. The minimum velocity (in ms^{-1}) with which a car driver must traverse a flat curve of radius 150 m and coefficient of friction 0.6 to avoid skidding is;

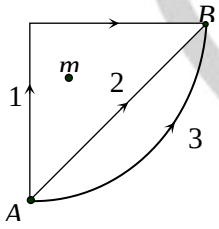
(1) 60 ms^{-1} (2) 30 ms^{-1}
(3) 15 ms^{-1} (4) 25 ms^{-1}

14. The pulley and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ should be;



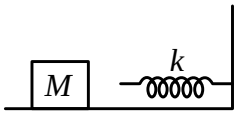
(1) 0° (2) 30°
(3) 45° (4) 60°

15. If W_1, W_2 and W_3 represent the work done in moving a particle from A to B along three different paths 1, 2 and 3 respectively (as shown) in the gravitational field of a point mass m, find the correct relation between W_1, W_2 and W_3;



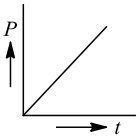
(1) $W_1 > W_2 > W_3$ (2) $W_1 = W_2 = W_3$
(3) $W_1 < W_2 < W_3$ (4) $W_2 > W_1 > W_3$

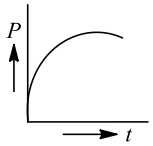
16. The block of mass M moving on the frictionless horizontal surface collides with the spring of spring constant k and compresses it by length L. The maximum momentum of the block after collision is;

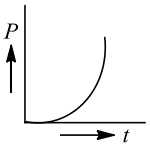


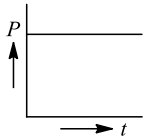
(1) $L\sqrt{Mk}$ (2) $\frac{kL^2}{2M}$
(3) Zero (4) $\frac{ML^2}{k}$

17. A motor drives a body along a straight line with a constant force. The power P developed by the motor must vary with time t as shown in figure;

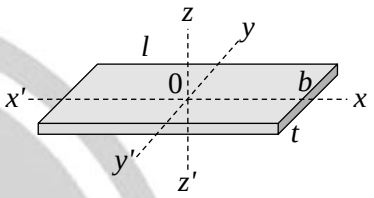
(1) 

(2) 

(3) 

(4) 

18. The rectangular block shown in the figure is rotated in turn about $x - x'$, $y - y'$ and $z - z'$ axes passing through its centre of mass O. Its moment of inertia is;



(1) Same about all the three axes
(2) Maximum about z – z' axis
(3) Equal about $x - x'$ and y – y' axes
(4) Maximum about y – y' axis

19. The moment of inertia of a sphere of mass M and radius R about an axis passing through its centre is $\frac{2}{5}MR^2$. The radius of gyration of the sphere about a parallel axis to the above and tangent to the sphere is;

(1) $\frac{7}{5}R$ (2) $\frac{3}{5}R$
(3) $\left(\sqrt{\frac{7}{5}}\right)R$ (4) $\left(\sqrt{\frac{3}{5}}\right)R$

20. The total kinetic energy of rolling solid sphere having translational velocity v is;

(1) $\frac{7}{10}mv^2$ (2) $\frac{1}{2}mv^2$
(3) $\frac{2}{5}mv^2$ (4) $\frac{10}{7}mv^2$

21. Escape velocity on the earth;

(1) Is less than that on the moon
(2) Depends upon the mass of the body
(3) Depends upon the direction of projection
(4) Depends upon the height from which it is projected

22. Radius of orbit of satellite of earth is R. Its kinetic energy is proportional to;

(1) $\frac{1}{R}$ (2) $\frac{1}{\sqrt{R}}$

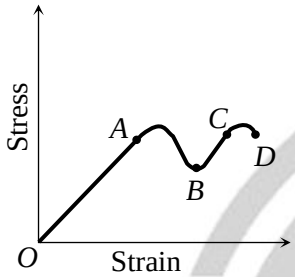
(3) R (4) $\frac{1}{R^{3/2}}$

23. Escape velocity of a body of 1 kg mass on a planet is 100 m/sec. Gravitational Potential energy of the body at the Planet is;

(1) –5000 J (2) –1000 J

(3) –2400 J (4) 5000 J

24. A graph is shown between stress and strain for a metal. The part in which Hooke's law holds good is;



(1) OA (2) AB

(3) BC (4) CD

25. A wire extends by 1 mm when a force is applied. Double the force is applied to another wire of same material and length but half the radius of cross-section. The elongation of the wire in mm will be:

(1) 8 (2) 4

(3) 2 (4) 1

26. If the Young's modulus of the material is 3 times its modulus of rigidity, then its volume elasticity will be:

(1) Zero (2) Infinity

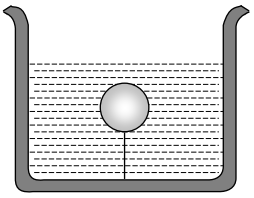
(3) 2×10^{10} Nm^{-2} (4) 3×10^{10} Nm^{-2}

27. A rod elongated by l when a body of mass M is suspended from it. The work done is;

(1) Mgl (2) $\frac{1}{2}Mgl$

(3) $2Mgl$ (4) zero

28. A solid sphere of density $\eta(>1)$ times lighter than water is suspended in a water tank by a string tied to its base as shown in fig. If the mass of the sphere is m then the tension in the string is given by;



(1) $\left(\frac{\eta-1}{\eta}\right)mg$ (2) ηmg

(3) $\frac{mg}{\eta-1}$ (4) $(\eta-1)mg$

29. When a large bubble rises from the bottom of a lake to the surface. Its radius doubles. If atmospheric pressure is equal to that of column of water height H, then the depth of lake is;

(1) H (2) $2H$

(3) $7H$ (4) $8H$

30. A capillary tube is attached horizontally to a constant pressure head arrangement. If the radius of the capillary tube is increased by 10% then the rate of flow of liquid will change nearly by;

(1) + 10% (2) + 46%

(3) −10% (4) −40%

31. For an opaque body coefficient of transmission is;

(1) Zero (2) 1

(3) 0.5 (4) ∞

32. The wavelength of maximum energy, released during an atomic explosion was 2.93×10^{-10} m. Given that the Wien's constant is 2.93×10^{-3}m–K, the maximum temperature attained must be of the order of;

(1) 10^{-7}K (2) 10^{7} K

(3) 10^{-3}K (4) 5.86×10^{7}K

33. Consider a compound slab consisting of two different materials having equal lengths, thicknesses and thermal conductivities K and $2K$ respectively. The equivalent thermal conductivity of the slab is;

(1) $\sqrt{2K}$ (2) $3K$

(3) $\frac{4}{3}K$ (4) $\frac{2}{3}K$

34. An ideal gas is heated at constant pressure and absorbs amount of heat Q. If the adiabatic exponent is γ, then the fraction of heat absorbed in raising the internal energy and performing the work, is;

(1) $1-\frac{1}{\gamma}$ (2) $1+\frac{1}{\gamma}$

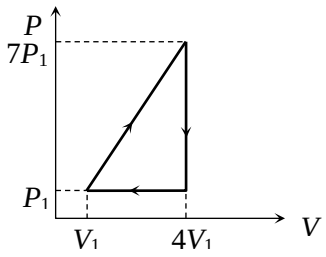
(3) $1-\frac{2}{\gamma}$ (4) $1+\frac{2}{\gamma}$

35. The volume of air increases by 5%, in its adiabatic expansion. The percentage decrease in its pressure will be:

(1) 5% (2) 6%
(3) 7% (4) 8%

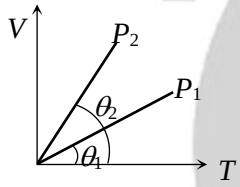
SECTION-B

36. In the cyclic process shown in the figure, the work done by the gas in one cycle is;



(1) $28\ P_1V_1$ (2) $14\ P_1V_1$
(3) $18\ P_1V_1$ (4) $9\ P_1V_1$

37. The figure shows the volume V versus temperature T graphs for a certain mass of a perfect gas at two constant pressures of P_1 and P_2. What inference can you draw from the graphs;



(1) $P_1 > P_2$
(2) $P_1 < P_2$
(3) $P_1 = P_2$
(4) No interference can be drawn due to insufficient information

38. For a gas $\gamma = \frac{7}{5}$. The gas may probably be;

(1) Helium (2) Hydrogen
(3) Argon (4) Neon

39. A bubble of 8 mole of helium is submerged at a certain depth in water. The temperature of water increases by 30°C. How much heat is added approximately to helium during expansion?

(1) 4000 J (2) 3000 J
(3) 3500 J (4) 4500 J

40. The temperature of a given mass is increased from 27°C to 327°C. The rms velocity of the molecules increases;

(1) $\sqrt{2}$ times (2) 2 times
(3) $2\sqrt{2}$ times (4) 4 times

41. **Assertion (A):** To conserve linear momentum of a system, no force should act on the system.
Reason (R): If net force on a system is zero, its linear momentum should remain constant.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

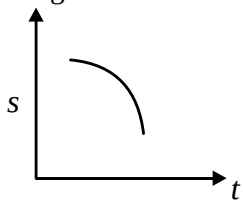
42. **Assertion (A):** A rocket moves forward by pushing the surrounding air backwards.
Reason (R): It derives the necessary thrust to move forward according to Newton's third law' of motion.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

43. **Statement I:** Two particles are moving in the same direction do not lose all their energy in completely inelastic collision.
Statement II: Principle of conservation of momentum holds true for all kinds of collisions.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

44. **Statement I:** In *s-t* graph shown in the figure, velocity of particle is negative & acceleration is positive
Statement II: The slope of *s-t* graph is negative and increasing in magnitude



(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

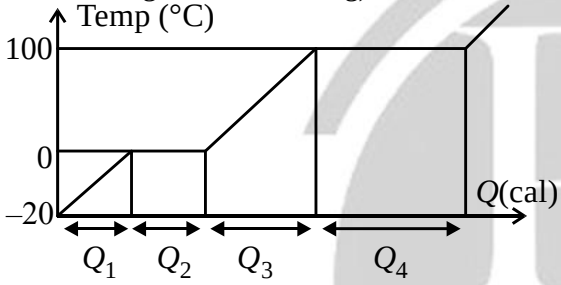
45. **Statement I:** Energy cannot be divided by volume.
Statement II: Dimensions for energy and volume are different.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

46. A wave is represented by the equation: $y = a \sin(0.01x - 2t)$ where a and x are in cm. velocity of propagation of wave is;

(1) 10 cm/s (2) 50 cm/s
(3) 100 cm/s (4) 200 cm/s

47. Figure shows the temperature variation when heat is added continuously to a specimen of ice (20 g) at –20°C at constant rate.
(Specific heat of ice = 0.53 cal/g °C and L_{ice} = 80 cal/g. L_{water} = 540 cal/g)



List-I		List-II	
(A)	Value of Q_1 (in cal)	(I)	1600
(B)	Value of Q_2 (in cal)	(II)	2000
(C)	Value of Q_3 (in cal)	(III)	10800
(D)	Value of Q_4 (in cal)	(IV)	212

(1) A → III; B → I; C → II; D → I
(2) A → I; B → IV; C → II; D → III
(3) A → I; B → IV; C → III; D → II
(4) A → IV; B → I; C → II; D → III

48. Two vectors A and B have equal magnitude x. Angle between them is 60°. Then, match the following two columns and mark the **correct** option from the codes given below.

List-I		List-II	
(A)	$\lvert A + B \rvert$	(I)	$\frac{\sqrt{3}}{2}x^2$
(B)	$\lvert A - B \rvert$	(II)	x
(C)	$A \cdot B$	(III)	$\sqrt{3}x$
(D)	$\lvert A \times B \rvert$	(IV)	None

(1) A → I; B → IV; C → II; D → III
(2) A → I; B → III; C → II; D → IV
(3) A → III; B → II; C → IV; D → I
(4) A → III; B → IV; C → I; D → II

49. A bus travelling the first one-third distance at a speed of 10 km/h, the next one-third at 20 km/h and at last one-third at 60 km/h. The average speed of the bus is;

(1) 9 km/h
(2) 16 km/h
(3) 18 km/h
(4) 48 km/h

50. An organ pipe open at one end is vibrating in first overtone and is in resonance with another pipe open at both ends and vibrating in third harmonic. The ratio of length of two pipe is;

(1) 3 : 8 (2) 8 : 3
(3) 1 : 2 (4) 4 : 1