Sample Paper-05

Class 11th NEET (2024)

PHYSICS

SECTION-A

1. In a new system of unit, mass is measured in multiple of x kg, length in multiple of y m and time in multiple of z second. What is the value of 10 J in new system of unit?

(1) $\frac{x^2y^2}{10z^2}$ (2) $\frac{10x^2y}{z^2}$

(3) $\frac{10xy^2}{z^2}$ (4) $\frac{10z^2}{xy^2}$

2. Two bodies of same mass are moving with same speed V in mutually opposite directions. They collide and stick together. The resultant velocity of the system will be:

(1) Zero (2) $\frac{V}{2}$

(3) V (4) From zero to ∞

3. Water is flowing through a non-unform radius tube, If ratio of the radius of entry and exit end of the pipe is 3 : 2, then the ratio of velocities of entering and exit liquid is:

(1) 4 : 9 (2) 9 : 4

(3) 8 : 27 (4) 1 : 1

4. A man of mass 80 kg stands on a plank of mass 40 kg. The plank is lying on a smooth horizontal floor. Initially both are at rest. The man starts walking on the plank towards north and stops after moving a distance of 6 m on the plank. Then;

(1) the centre of mass of plank-man system remains stationary.

(2) the plank will slide to the north by a distance of 4 m.

(3) the plank will slide to the south by a distance of 8 m.

(4) the plank will slide to the south by a distance of 12 m.

5. The moment of inertia of a solid sphere is 40 kg-m^2 about its diametric axis. The moment of inertia about any tangent to sphere is:

(1) 100 kg-m^2 (2) 40 kg-m^2

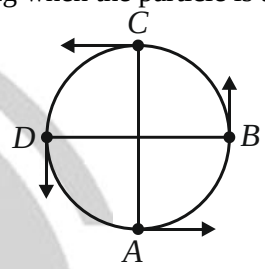
(3) 140 kg-m^2 (4) 60 kg-m^2

6. A rod of length L is hinged from one end. It is brought to a horizontal position and released. The angular velocity of the rod, when it is in vertical position is:

(1) $\sqrt{\frac{2g}{L}}$ (2) $\sqrt{\frac{3g}{L}}$

(3) $\sqrt{\frac{g}{2L}}$ (4) $\sqrt{\frac{g}{L}}$

7. A particle is moving with constant speed in a vertical circle as shown below. Minimum tension in the string when the particle is at.



(1) A (2) B

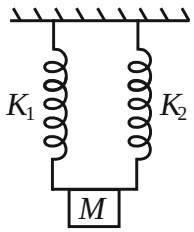
(3) C (4) D

8. 2 kg ice at –20°C is mixed with 5 kg water at 20°C. Then final amount of water in the mixture would be;
specific heat of ice = 0.5 cal/g°C
specific heat of water = 1 cal/g°C,
Latent heat of fusion for ice = 80 cal/g.

(1) 6 kg (2) 5 kg

(3) 4 kg (4) 2 kg

9. The spring constant of two springs of same length are K_1 and K_2 as shown in figure. If an object of mass M is suspended and set vibration, the time period will be:



(1) $2\pi\sqrt{\frac{MK_1}{K_2}}$ (2) $2\pi\sqrt{\frac{M}{K_1K_2}}$

(3) $2\pi\sqrt{\frac{M}{K_1-K_2}}$ (4) $2\pi\sqrt{M/(K_1+K_2)}$

10. Match **List-I** with **List-II** to find out the **correct** option.

List-I		List-II	
(A)	Isobaric process	(I)	No heat exchange
(B)	Isothermal process	(II)	Constant pressure
(C)	Adiabatic process	(III)	Constant Internal energy
(D)	Isochoric process	(IV)	Work done is zero

(1) (A) – (III), (B) – (II), (C) – (I), (D) – (IV)
(2) (A) – (II), (B) – (III), (C) – (I), (D) – (IV)
(3) (A) – (II), (B) – (III), (C) – (I), (D) – (I)
(4) (A) – (IV), (B) – (I), (C) – (II), (D) – (II)

11. List I represents the standing waves in air columns and string. List II represents frequency of the note. Match **List-I** with **List-II**.
[v = velocity of the sound in the medium]

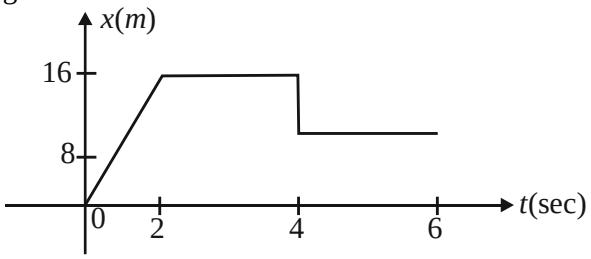
List-I		List-II	
(A)	Second harmonic for the tube open at both ends	(I)	$\frac{v}{4\ell}$
(B)	Fundamental frequency for the tube closed at one end	(II)	$\frac{v}{2\ell}$
(C)	First overtone for the tube closed at one end	(III)	$\frac{3v}{4\ell}$
(D)	Fundamental frequency for the string fixed at both ends	(IV)	$\frac{v}{\ell}$
		(V)	$\frac{5v}{4\ell}$

(1) (A) – (IV), (B) – (I), (C) – (III), (D) – (II)
(2) (A) – (V), (B) – (III), (C) – (I), (D) – (II)
(3) (A) – (IV), (B) – (II), (C) – (V), (D) – (I)
(4) (A) – (I), (B) – (II), (C) – (III), (D) – (V)

12. Which of the following statement is **correct**?
I. Escape velocity does not depends on mass of the body which is projected.
II. Escape velocity depends on radius of the planet.
III. Escape velocity depends on mass of the planet.
IV. Escape velocity does not depends on angle of projection of body.
(1) I and II only
(2) I, II and III only
(3) I, III and IV only
(4) I, II, III and IV

13. A projectile is fired with velocity u making angle θ with the horizontal. What is the change in velocity when it is at the highest point:
(1) u (2) $u \cos\theta$
(3) $u \sin\theta$ (4) u-$u \cos\theta$

14. Position-time graph of a particle of mass 3kg is given below.



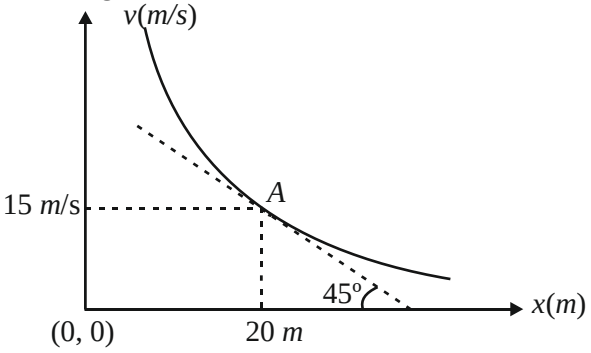
The impulse at t = 2s is;
(1) +24 kg-ms^{-1} (2) –24 kg-ms^{-1}
(3) +16 kg-ms^{-1} (4) –16 kg-ms^{-1}

15. A wooden block is taken to bottom of a lake of water and then released. It rise up with a:
(1) Constant acceleration.
(2) Decreasing acceleration.
(3) Constant velocity.
(4) Decreasing velocity.

16. Which law states that the magnitude of pressure within fluid is equal in all parts?
(1) Pascal's law (2) Gay-Lusac's law
(3) Dalton's law (4) Boyle's law

17. Acceleration due to gravity at centre of the earth is:
(1) g (2) $\frac{g}{2}$
(3) zero (4) Infinite

18. Velocity-position graph is shown in figure. Magnitudes of acceleration of particles at 20 m from origin is

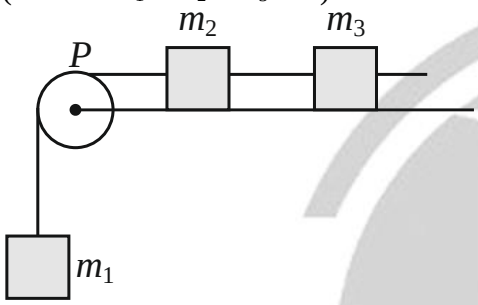


(1) 30 m/sec^2
(2) 40 m/sec^2
(3) 15 m/sec^2
(4) 0 m/sec^2

19. Variation of force with position given as $F = 8 - 4x + 6x^2$. This force act on a body of mass 3 kg and displaces the body from $x = 0$ to $x = 2$ m. Amount of work done is:

(1) + 8 Joule
(2) + 24 Joule
(3) 16 Joule
(4) – 16 Joule

20. A system consists of three masses m_1, m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m is: (Assume $m_1 = m_2 = m_3 = m$)



(1) $\frac{g(1-gu)}{9}$ (2) $\frac{g\mu}{3}$
(3) $\frac{g(1-2\mu)}{3}$ (4) $\frac{g(1-2\mu)}{2}$

21. If there is a change of angular momentum from 1kg m^2/s to 4 kg m^2/s in 4s, then the average torque is:

(1) 1/4 J (2) 3/4 J
(3) 5/4 J (4) 4/3 J

22. **Assertion (A):** Work done in uniform circular motion is zero.
Reason (R): Force is always directed along displacement.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are 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.

23. **Assertion (A):** Stress is the internal force per unit area of a body.
Reason (R): Rubber is more elastic than steel.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are 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.

24. **Assertion (A):** Two physical quantities may have same dimensions but different units.
Reason (R): Dimensionally correct equation is always correct.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are 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.

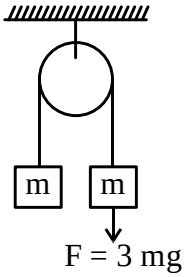
25. **Assertion (A):** Molar heat capacity of the gas can have any value from $-\infty$ to $+\infty$.
Reason (R): Molar heat capacity of the gas for an isothermal process is ∞.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are 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.

26. In which set, all physical quantities are dimensionless?
Set A → Strain, Stress, Coefficient of friction.
Set B → Relative permeability, Reynold number, Refractive Index.
Set C → Angular displacement, Angular frequency, Boltzmann constant.
Set D → Relative permittivity, Bulk modulus of elasticity, strain.

(1) Set A (2) Set B
(3) Set C (4) Set D

27. Pulley – block arrangement is shown in figure. If right block is pulled by 3 mg force, acceleration of left block is; (Assume frictionless, fixed pulley)



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

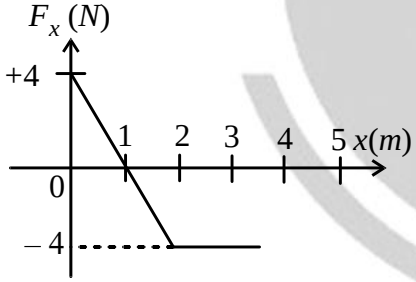
(3) $\frac{3g}{2}$ (4) $\frac{5g}{6}$

28. A gas is filled in a vessel at 27°C To what temperature should it be heated in order that 1/3rd of mass of the gas may escape out?

(1) 350 K (2) 400 K

(3) 450 K (4) 200 K

29. The only force F_x acting on a 2.0 kg body as it moves along the x-axis varies as shown in the figure. The velocity of the body moving along positive x-axis at $x = 0$ is 4 m/s. The kinetic energy of the body at $x = 3.0$ m is:



(1) 4 J (2) 8 J

(3) 12 J (4) 16 J

30. On a cold morning, a metal surface will feel colder to touch than a wooden surfaces, because:

(1) Metal has low specific heat.

(2) Metal has high thermal conductivity.

(3) Metal has high specific heat.

(4) Metal has low thermal conductivity.

31. An ice cube is kept in a gravity free fall. What will be its shape when it melts?

(1) Cubical

(2) Spherical

(3) Plane sheet

(4) It can be of any random shape

32. The latent heat of vaporization of water is 2240 J/g. If the work done in the process of vaporization of 1 g of water is 168 J, then increase in internal energy is:

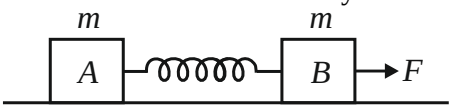
(1) 2408 J

(2) 2072 J

(3) 2240 J

(4) 1904 J

33. Two identical blocks A and B each of mass m joined together with a mass less spring as shown in the figure are placed on a smooth surface. The acceleration of the COM of system of blocks is:



(1) $\frac{F}{m}$

(2) $\frac{F}{2m}$

(3) $\frac{2F}{m}$

(4) 0

34. When the radius of earth is reduced by 1% without changing the mass, then the acceleration due to gravity will:

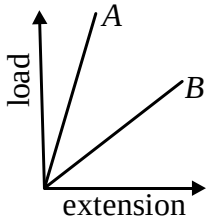
(1) increase by 2%

(2) decrease by 1.5%

(3) increase by 1%

(4) decrease by 1%

35. The dimensions of two wires A and B made of different material are the same. Their load-extension graph is shown below. If Y_A and Y_B are the values of Young's modulus of elasticity of A and B respectively then.



(1) $Y_A > Y_B$

(2) $Y_A < Y_B$

(3) $Y_A = Y_B$

(4) $Y_B = 2Y_A$

SECTION-B

36. The ratio of the radii of gyration of a circular disc about a tangential axis in the plane of the disc and of a circular ring of the same radius about a tangential axis in the plane of the ring is:

(1) 2 : 1 (2) $\sqrt{5}:\sqrt{6}$

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

37. Two drops of equal radius are falling through air with a steady velocity of 5 cm/s. If the two drops coalesce, then its terminal velocity will be.

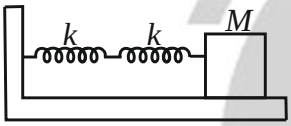
(1) $5\times 4^{1/3}$ cm/sec

(2) $4^{1/3}$cm/sec

(3) $4 \times 5^{1/3}$ cm/sec

(4) $5 \times 4^{2/3}$ cm/sec

38. Two springs are connected to a block of mass M placed on a frictionless surface as shown below. If both the springs have a spring constant k, the frequency of oscillation of the block is:



(1) $\frac{1}{2\pi}\sqrt{\frac{k}{M}}$ (2) $\frac{1}{2\pi}\sqrt{\frac{k}{2M}}$

(3) $\frac{1}{2\pi}\sqrt{\frac{2k}{M}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{M}{k}}$

39. For a particle moving in a circle, a_r and a_t represent radial and tangential acceleration respectively. The motion of a particle will be uniform circular motion, if:

(1) $a_r = 0$ and $a_t = 0$

(2) $a_r = 0$ and $a_t \neq 0$

(3) $a_r \neq 0$ and $a_t = 0$

(4) $a_r \neq 0$ and $a_t \neq 0$

40. A disc rolls down a plane of length L and inclined at angle θ, without slipping. Its velocity on reaching the bottom of the plane will be:

(1) $\sqrt{\frac{4gL\sin\theta}{3}}$ (2) $\sqrt{\frac{2gL\sin\theta}{3}}$

(3) $\sqrt{\frac{10gL\sin\theta}{7}}$ (4) $\sqrt{4gL\sin\theta}$

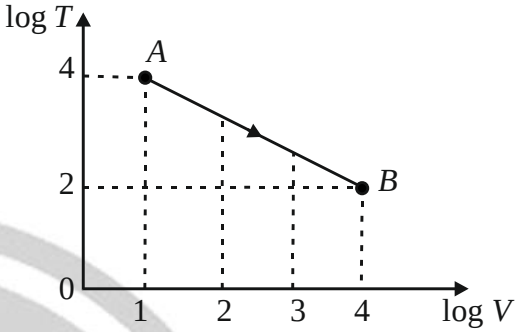
41. Consider a closed organ pipe of length 85 cm. Number of possible natural oscillation of air column in the pipe where frequencies is below 1250 Hz is:

(Take velocity of sound in air is 340 m/sec)

(1) 8 (2) 11

(3) 10 (4) 6

42. Figure shows the adiabatic on log T and log V scale performed on ideal gas. The gas is:



(1) Monatomic

(2) Diatomic

(3) Triatomic

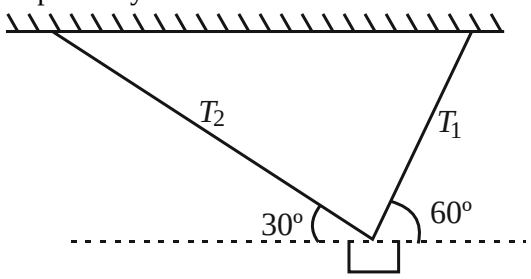
(4) Mixture of monatomic and diatomic

43. A tuning fork 'A' produces 4 beats/sec with another tuning fork B of frequency 288 Hz. If fork A is loaded with little wax, the number of beats per second decreases. The frequency of the fork A, before loading is:

(1) 290 Hz (2) 288 Hz

(3) 292 Hz (4) 284 Hz

44. A block of mass m = 6 kg is suspended by two strings making angle 30° and 60° with the horizontal. The tensions T_1 and T_2 are respectively.



(1) 30 N, 30 N

(2) $30\sqrt{3}\,N$, $30\sqrt{3}N$

(3) $30\sqrt{3}\,N$, $30N$

(4) $30\,N$, $30\sqrt{3}N$

45. Match **List-I** with **List-II** to find out the **correct** option.

List – I		List – II	
(A)	Longitudinal waves	(I)	Particles of the medium vibrate perpendicular to the direction of wave propagation.
(B)	Transverse waves	(II)	Two progressive waves of slightly different frequencies superimpose in the same direction
(C)	Beats	(III)	Two progressive waves of same frequency and same amplitude superimpose in the opposite directions
(D)	Stationary waves	(IV)	Particles of the medium vibrate along the direction of wave propagation.

(1) (A) – (II), (B) – (III), (C) – (IV), (D) – (I)
(2) (A) – (IV), (B) – (I), (C) – (II), (D) – (III)
(3) (A) – (II), (B) – (IV), (C) – (I), (D) – (III)
(4) (A) – (I), (B) – (II), (C) – (IV), (D) – (III)

46. Water is filled in a vessel upto a height of 20 cm. The bottom of vessel is circular with radius 10 cm. If atmospheric pressure is 1.01×10^5 Pa, what is force exerted by water on the bottom? (density of water = 1000 kg m^{-3})

(1) 1620 N (2) 2820 N
(3) 3230N (4) 4115 N

47. **Assertion (A):** At the centre of earth, a body has centre of mass, but no centre of gravity.
Reason (R): $g = 0$ at the centre of earth.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are 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.

48. Infinite number of bodies, each of mass 1 kg are situated on x-axis at distance 1 m, 2 m, 4 m, 8 m, ..., respectively, from the origin. The resulting gravitational potential due to this system at the origin will be:

(1) –G (2) –2G
(3) –3G (4) –4G

49. The potential energy of a particle oscillating along x-axis is given as $U = 20 + (x - 2)^2$ where U is in joules and x in meters. Total mechanical energy of the particle is 36 J. Maximum kinetic energy of the particle is:

(1) 24 J (2) 36 J
(3) 16 J (4) 20 J

50. **Assertion (A):** Frictional forces are conservative forces.
Reason (R): Potential energy can be associated with frictional forces.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are 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.