IMU-CET
PHYSICS SAMPLE QUESTIONS – VOL.02

1. A motion in which the distance of the moving particle from a fixed point is always constant during motion is called.
   (a) one dimensional (b) two dimensional
   (c) linear motion (d) circular motion

2. If distance covered by a particle is zero, what can be its displacement?
   (a) It may or may not be zero (b) It cannot be zero
   (c) It must be zero (d) It is negative

3. A train 100 m long is moving with a velocity of 60 $km\,h^{-1}$. The time it takes to cross the bridge 1 km long is
   (a) 60s (b) 66 s
   (c) 30s (d) 33 s

4. A body of mass 2 kg has an initial velocity of 3 ms^{-1} along OE and it is subjected to a force of 4 N in OF direction perpendicular to OE. The distance of the body from O after 4 second will be
   (a) 12m (b) 28 m
   (c) 20m (d) 48 m

5. The velocity of a body depends on time according to equation, $v = 20 + 0.1\,t^2$. The body is undergoing
   (a)uniform acceleration (b) uniform retardation
   (c) non-uniform acceleration (d) zero acceleration

6. When the surface in contact are made too smooth by polishing, force of friction
   (a) Decreases (b) Increases
   (c) becomes zero (d) becomes infinite

7. The minimum force required just to move a block on a rough horizontal surface is 5 N. The block fails to move when a force of 3N is applied on it. Static friction is
   (a) 5N (b)3N
   (c) 4N (d)zero

8. In the above question, the force of limiting friction is
(a)3N (b)5N
(c)4N (d)Zero

9. In question 22, The force of dynamic friction is
(a) 5N (b)3N
(c) <5N (d) > 5N

10. Which of the following is a self adjusting force?
(a)kinetic friction (b) limiting friction
(c) static friction (d) all of the three

11. A wire of length L and radius a rigidly fixed at one end. On stretching the other end of the wire with a force F, the increase in its length is L. If another wire of same material but of length 2L and radius 2 a is stretched with a force 2 F, the increase in its length will be
(a) L/4 (b) L
(c) L/2 (d) 2L

12. The pressure of a medium is changed from 1.01×10^5 Pa to 1.165×10^5 Pa and change in volume is 10% keeping temperature constant. The bulk modulus of the medium is
(a) 204.8×10^5 Pa (b) 102.4×10^5 Pa
(c) 51.2×10^5 Pa (d) 1.55×10^5 Pa

13. An aluminium and steel wires of same length and cross-section are attached end to end. The compound wire is hung from a rigid support and a load is suspended from the free end. Y of steel is $(20/7)$ times of aluminium. The ratio of increase of length of steel wire to aluminium wire is
(a) 20:3 (b)10:7
(c)7:20 (d) 1:7

14. Two wires A and B of same material have radii in the ratio 2 : 1 and lengths in the ratio 4 : 1. The ratio of the normal forces required to produce the same change in the lengths of these two wires is
(a) 1:1 (b) 2:1
(c)1:2 (d) 1:4

15. The Young's modulus of the material of a wire is $2\times10^{10}\ Nm^{-2}$. If the elongation strain is 1%, then the energy stored in the wire per unit volume in Jm^{-3} is

(a) 10^6 (b) 10^8

(c) 2×10^6 (d) 2×10^8

16. A particle performing SHM starts from mean position. The phase of that particle is $\pi/2$ when he has

(a) Maximum displacement (b) maximum velocity

(b) Maximum energy (d) maximum kinetic energy

17. A spring-mass system oscillates with a frequency v. If it takes in an elevator slowly accelerating upwards, the frequency will

(a) increase (b) decrease

(c) remain same (d) become zero

18. The tension in the string of a simple pendulum is

(a) constant (b) maximum in the extreme position

(c) zero in the mean position (d)none

19. The kinetic energy of a particle executing SHM is 16 J. when it is in its mean position. If the amplitude of oscillation is 25 cm and the mass of the particle is 5.12 kg, the time period of its oscillation is second is

(a) $\pi/5$ (b) 2π

(c) 5π (d) 20π

20. Two simple pendulums of length 5m and 10 m respectively are given small linear displacement in one direction at the same time. They will be again in the same phase when the pendulum of shorter length has completed oscillations

(a) 1 (b)2

(b) 3 (d)4

21. If m_e is mass of an electron, then mass of pion plus (π^+) particle is

(a) $207\,m_e$ (b) $273\,m_e$

(c) $\frac{m_e}{207}$ (d) $\frac{m_e}{273}$

22. 1 curie = k disintegration/sec, where k is
(a) 3.7×10^{10} (b) 3.7×10^{-10}
(c) 7.3×10^{-10} (d) 7.3×10^{10}

23. The simple Bohr model cannot be directly applied to calculate the energy levels of an atom with many electrons. This is because
(a) Of the electrons not being subject to a central force
(b) Of the electrons colliding with each other
(c) Of screening effects
(d) The force between the nucleus and an electron will no longer be given by Coulomb's law

24. Two H atoms in the ground state collide in elastically. The maximum amount by which their combined kinetic energy is reduced is
(a) 10.20 eV (b) 20.40 eV
(b) 13.6 eV (d) 27.2 eV

25. Which of the following quantities has the same dimensions as those of Planck's constant?
(a) Angular momentum (b) torque
(c) Energy (d) momentum

26. Magnitude of the resultant vector which comes on the addition of two vector $6\hat{i}+7\hat{j}$ and $3\hat{i}+4\hat{j}$ is
(a) $\sqrt{160}$ (b) $\sqrt{13.6}$
(c) $\sqrt{136}$ (d) $\sqrt{202}$

27. Which of the following quantities is vector?
(a) Work (b) kinetic energy
(c) power (d) angular momentum

28. Which of the following is a scalar quantity?
(a) Electric field (b) Velocity
(c) Angular momentum (d) Electric potential

29. Out of the following, which is not a scalar quantity?
(a) time (b) momentum
(c) volume (d) density

30. A projectile is fired at an angle θ with the horizontal. The angle between the velocity and acceleration of the projectile at the highest point is:
(a) 0° (b) 45°
(c) 90° (d) 180°

31. A lady weighing 60 kg is standing on a weighing machine is an elevator. If the elevator moves upward with an acceleration of 2 ms^{-2}, what is the reading of the weighing machine? (g = 10 ms^{-2})
(a) 480 N (b) 600 N
(c) 720 N (d) 0

32. The working of a rocket is based on the principle of
(a) Elasticity
(b) Kepler's law
(c) Newton's law of gravitation
(d) Conservation of momentum.

33. Change in momentum is given by
(a) Force × Mass (b) Force × Time
(c) Force × Velocity (d) Force × Distance

34. The units of Impulse are same as that of
(a) Energy (b) Linear momentum
(c) Velocity (d) Power

35. Acceleration of a body moving with constant speed in a circle is
(a) zero (b) r ω
(c) ω^2/r (d) r ω^2

36. A piece of ice, with a stone frozen inside it, is floating in water contained in a beaker. When the ice melts, the level of water in the beaker
(a) rises
(b) falls
(c) remains unchanged
(d) falls at first and then rises to the same height as before.

37. Eight spherical rain drops of the same mass and radius are falling down with a terminal speed of 6 cms^{-1}. If they coalesce to form one big drop, what will be its terminal speed? Neglect the buoyancy due to air.
(a) 1.5 cms^{-1} (b) 6 cms^{-1}
(c) 24 cms^{-1} (d) 32 cms^{-1}

38. Water flows steadily through a horizontal pipe of a variable cross – section. If the pressure of water is p at a point where the velocity of flow is v, what is the pressure at another point where the velocity of flow is 2v; ρ being the density of water?
(a) $p-\frac{3}{2}\rho v^2$ (b) $p+\frac{3}{2}\rho v^2$
(c) $p-2\rho v^2$ (d) $p+2\rho v^2$

39. In a test experiment on a model aeroplane in a wind tunnel, the flow speeds on the lower and upper surfaces of the wing are v and $\sqrt{2}\,v$ respectively. If the density of air is ρ and the surface area of wing is A, the dynamic lift on the wing is given by
(a) $\frac{1}{\sqrt{2}}\rho v^2 A$ (b) $\frac{1}{2}\rho v^2 A$
(c) $\sqrt{2}\rho v^2 A$ (d) $2\rho v^2 A$

40. A steel scale measures the length of a copper rod as L cm when both are at 20°C, the calibration temperature for the scale. If the coefficients of linear expansion for steel and copper are α_s and α_c respectively, what would be the scale reading (in cm) when both are at 21°C?

(a) $L\frac{(1+\alpha_c)}{(1+\alpha_s)}$ (b) $L\frac{\alpha_c}{\alpha_s}$

(c) $L\frac{\alpha_s}{\alpha_c}$ (d) L

41. A wire of cross – sectional area A at temperature t is held taut with negligible tension between two rigid supports. If the wire is cooled to a temperature (t - Δt), what tension is developed in the wire? The coefficient of linear expansion is α and the Young's modulus of the wire is Y.

(a) Ya αΔt (b) $\frac{Y\alpha\Delta t}{A}$

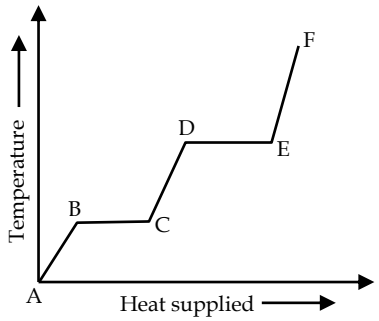
(c) $\frac{A\alpha\Delta t}{Y}$ (d) $\frac{YA}{\alpha\Delta t}$

42. Two rods of different materials having coefficients of thermal expansion α_1 and α_2 and Young's modulii Y_1 and Y_2 are fixed between two rigid and massive walls. The rods are heated to the same temperature. If there is no bending of the rods, the thermal stresses developed in them are equal provided

(a) $\frac{Y_1}{Y_2}=\sqrt{\frac{\alpha_1}{\alpha_2}}$ (b) $\frac{Y_1}{Y_2}=\sqrt{\frac{\alpha_2}{\alpha_1}}$

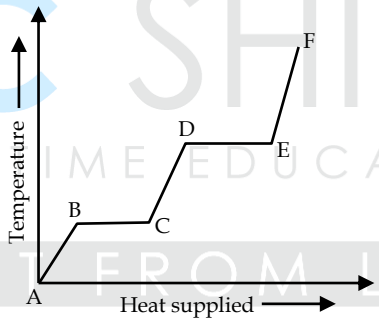
(c) $\frac{Y_1}{Y_2}=\frac{\alpha_1}{\alpha_2}$ (d) $\frac{Y_1}{Y_2}=\frac{\alpha_2}{\alpha_1}$

43. A source of heat supplies heat at a constant rate to a solid cube. The variation of the temperature of the cube with heat supplied is shown in Fig. The portion DE of the graph represents conversion of



(a) solid into liquid (b) liquid into vapour
(c) solid into vapour (d) vapour into liquid

44. The reciprocal of the slope of the portion EF of the graph shown in Fig. represents



(a) latent heat of fusion
(b) latent heat of vaporisation
(c) thermal capacity of the liquid
(d) thermal capacity of the vapour

45. The acceleration due to gravity g on earth is 9.8 ms^{-2}. What would the value of g for a planet whose size is the same as that of earth but the density in twice that of earth?
(a) 19.6 ms^{-2} (b) 9.8 ms^{-2}
(c) 4.9 ms^{-2} (d) 2.45 ms^{-2}

46. If the radius of the earth suddenly decreases to 80% of its present value, the mass of the earth remaining the same, the value of the acceleration due to gravity will
(a) remain unchanged (b) become (9.8×0.8) ms^{-2}
(c) increase by 36% (d) increase by about 56%

47. The mass of a planet is $1/10^{th}$ that of earth and its diameter is half that of earth. The acceleration due to gravity at the planet will be
(a) 1.96 ms^{-2} (b) 3.92 ms^{-2}
(c) 9.8 ms^{-2} (d) 19.6 ms^{-2}

48. The escape velocity of a body projected vertically upwards from the surface of the earth is v. If the body is projected in a direction making an angle θ with the vertical, the escape velocity would be
(a) v (b) v cos θ
(c) v sin θ (d) v tan θ

49. A small planet is revolving around a very massive star in a circular orbit of radius R with a period of revolution T. If the gravitational force between the planet and the star were proportional to $R^{-5/2}$, then T would be proportional to
(a) $R^{3/2}$ (b) $R^{3/5}$
(c) $R^{7/2}$ (d) $R^{7/4}$

50. A person measures the time period of a simple pendulum inside a stationary lift and finds it to be T. If the lift starts accelerating upwards with an acceleration of g/3, the time period of the pendulum will be
(a) $\sqrt{3}\,T$ (b) $\frac{\sqrt{3}T}{2}$
(c) $T/\sqrt{3}$ (d) T/3

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KEY ANSWERS:

1	D	11	B	21	B	31	C	41	A
2	C	12	D	22	A	32	D	42	D
3	B	13	C	23	A	33	B	43	B
4	C	14	A	24	A	34	B	44	D
5	C	15	A	25	A	35	D	45	A
6	B	16	A	26	D	36	B	46	D
7	B	17	C	27	D	37	C	47	B
8	B	18	D	28	D	38	A	48	A
9	C	19	A	29	B	39	B	49	D
10	C	20	B	30	C	40	A	50	B