IMU-CET
PHYSICS SAMPLE QUESTIONS – VOL.02

1. If a particle tied to the end of string is set in circular motion then the tension in the string is
   (a) Always parallel to the velocity of the particle
   (b) Always perpendicular to the velocity of the particle
   (c) Perpendicular to the velocity of the particle only at one instant
   (d) parallel to the velocity of the particle only at one instant

2. For an electron circulating around the nucleus, the centripetal force is supplied by
   (a) Electromagnetic force (b) electrostatic force
   (b) Gravitational force (d) magnetic force

3. What can be the possible velocity displacement $(v-s)$ graph of a particle moving in a straight line under constant acceleration :
   (a) Straight line (b) parabola
   (b) ellipse (d) circle

4. The branch of Physics which deals with the study of motion of material objects is called.
   (a) Mechanics (b) dynamics
   (c) Optics (d) electronic

5. A branch of mechanics which deals with the study of motion of objects taking into account the factors which cause motion is called.
   (a) optics (b) dynamics
   (c) electronic (d) Mechanics

6. Forces of action and reaction never cancel each other as they are
   (a) Always equal (b) always opposite
   (c) Acting on same body (d) acting on different bodies

7. A particle will leave a vertical circle of radius r, when its velocity at the lowest point of the circle $(v_L)$is

(a) $\sqrt{2gr}$ (b) $\sqrt{5gr}$

(c) $\sqrt{3gr}$ (d) $\sqrt{6gr}$

8. A ball rolling on ice and initial velocity of 6 m/s stops after travelling 8m. If g = 9.8 m/s^2, coefficients of friction is :

(a) 0.1 (b) 0.2

(c) 0.3 (d) 0.4

9. In moving a body of mass m up and down incline of inclination θ, work done is (S is length of the plank, and μ is coefficient of friction).

(a) $mg\sin\theta \times S$ (b) $mg\cos\theta = S$

(c) $2\mu mg\cos\theta \times S$ (d) Zero

10. Angle of repose for a rough inclined plane is 60^o. The coefficient of friction is

(a) $\sqrt{3}$ (b) $1/\sqrt{3}$

(c) 1 (d) zero

11. An elastic material of Young's modulus Y is subjected to a stress S. The elastic energy stored per unit volume of the material is

(a) $\frac{2Y}{S^2}$ (b) $\frac{S^2}{2Y}$ (c) $\frac{S}{2Y}$ (d) $\frac{S^2}{Y}$

12. A large ship can float but a steel needle sinks because of

(a) viscosity (b) surface tension

(c) density (d) none of these

13. Two droplets merge with each other and forms a large droplet. In this process
(a) Energy is liberated
(b) Energy is absorbed
(c) Neither liberated nor absorbed
(d) Some mass is converted into energy

14. Young's modulus of a substance depends on
(a) its length (b) its area
(c) acceleration due to gravity (d) none of the above

15. The effect of temperature on the value of modulus of elasticity for various substances in general
(a) it increases with increase in temperature
(b) remains constant
(c) decreases with rise in temperature
(d) sometimes increases and sometimes decreases

16. On the Celsius scale the absolute zero of temperature is at
(a) $0^{\circ}C$ (b) $-32^{\circ}C$
(c) $100\ ^{\circ}C$ (d) $-273.15^{\circ}C$

17. Mode of transmission of heat, in which heat is carried by the moving particles, is
(a) Radiation (b) Conduction
(c) Convection (d) wave motion

18. In heater transfer, which method is based on gravitation?
(a) Natural convention (b) Conduction
(b) Radiation (d) Stringing of liquids

19. The rate of loss of heat from a body cooling under conditions of forced convection is proportional to its
(a) Heat capacity
(b) Surface area
(c) Absolute temperature
(d) Excess of temperature over that of surrounding : state if

(A) A,B,C are correct
(B) Only A and C are correct
(C) Only B and D are correct
(d) Only D is correct

20. Which of the following is the correct device for the detection of thermal radiation?
(a) Constant volume thermometer
(b) Liquid in glass thermometer
(c) Six's maximum and minimum thermometer
(d) thermopile

21. The equation $y = A\cos^2\left(2\pi nt - 2\pi\frac{x}{\lambda}\right)$ represents a wave with
(a) Amplitude A/2, frequency 2n and wavelength $\lambda/2$
(b) Amplitude A/2, frequency 2n and wavelength λ
(c) Amplitude A, frequency 2n and wavelength 2λ
(d) Amplitude A, frequency n and wavelength λ

22. A wave is reflected from a rigid support. The change in phase of reflection will be
(a) $\pi/4$
(b) $\pi/2$
(c) π
(d) 2π

23. The equation of wave traveling in a string can be written as $y = 3\cos\pi(100t - x)$. Its wavelength is
(a) 100 cm
(b)2 cm
(c) 5 cm
(d)None

24. A particle executes SHM. Then the graph of velocity as a function of displacement is
(a) A straight line
(b) a circle
(c) An ellipse
(d) a hyperbola

25. If a graph is drawn for acceleration versus displacement of SHM. It is a
(a) Straight line
(b) circle
(b) Ellipse
(d) hyperbola

26. If a radioactive substance reduces to $\frac{1}{16}$ of its original mass in 40 days, what is its half life?
(a) 10 days (b) 20 days
(c) 40 days (d) none of these

27. The ratio of size of a hydrogen atom to the size of its nucleus is
(a) 10^5 (b) 10^{-5}
(c) 10^4 (d) 10^{-4}

28. Two elementary particles which have almost infinite life time are
(a) Electron and neutron (b) neutron and proton
(c)Electron and proton (d) none of the above

29. A radioactive element has half life of 30 seconds. If one of the nuclei decays now, the next one will decay now, the next one will decay
(a) Any time (b) After 30 s
(c) After 60 s (d) After 30 h

30. A nucleus ${}_nX^m$ emits one α particle and one β particle. The mass number and atomic number of product nucleus, are
(a) $(m-4), n$ (b) $(m-4), (n-1)$
(b) $(m-3), n+1$ (d) $(m-3), (n-1)$

31. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon p-n junction are
(a) drift in forward biased, diffusion in reverse bias
(b) diffusion in forward biased, drift in reverse bias
(c) diffusion in both forward and reverse bias
(d) drift in both forward lengths of carriers

32. In the middle of depletion layer of a reverse biased p-n junction, the
(a) electric field is zero (b) potential is zero
(c) electric field is maximum (d) potential is maximum

33. A common emitter amplifier has a voltage gain of 50, an input impedance of 100 Ω and an output impedance 200 Ω. The power gain of the amplifier is
(a) 1000 (b) 1250
(a) 100 (d) 5000

34. In an *npn* transistor the collector current is 24 mA. If 80% of electrons reach collector, its base current in mA is
(a) 36 (b) 26
(c) 16 (d) 6

35. A built in potential of p-n junction diode is a function of
(a) temperature (b) biased voltage
(b) doping density (d) all of the above

36. A particle is projected vertically upward with a velocity of 10 m s^{-1}. The velocity of the particle when it again reaches the point of projection after 2 seconds is (neglecting air resistance).
(a) 0 (b) 10 m s^{-1}
(c) 20 m s^{-1} (d) 5 m s^{-1}

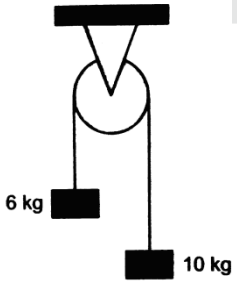
37. A projectile is projected so that it attains maximum height of 25 m. What is the maximum range of the projectile?
(a) 100 m (b) 80 m
(c) 50 m (d) 25 m

38. A projectile is projected at an angle θ with the horizontal. If the maximum height attained by the projectile is 25 m and the range of the projectile is 100 m, then the value of θ is
(a) 30° (b) 45°
(c) 60° (d) 90°

39. A projectile is projected at an angle of 60° with the horizontal and with a velocity of 30 ms^{-1}. The velocity of the projectile at the highest point of its trajectory is
(a) 0 (b) 15 m s^{-1}
(c) 20 m s^{-1} (d) 30 m s^{-1}

40. Which of the following is a vector quantity?
(a) Density (b) Momentum
(c) Power (d) work.

41. The tension in the string in the pulley system in figure I is



(a) 5.7 N (b) 7 N
(c) 7.5 N (d) 74 N

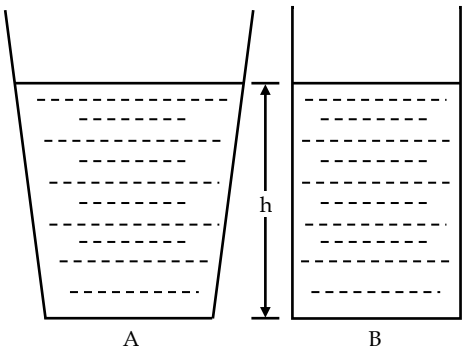
42. A body is moving with a velocity of 72 km/h on a rough horizontal surface of coefficient of friction 0.5. If the acceleration due to gravity is 10 m/s^2, find the minimum dance it can be stopped.
(a) 10 m (b) 20 m
(c) 30 m (d) 40 m

43. A 100 g ball moving with a velocity of 20 ms^{-1} returns in opposite direction with a velocity of 30 ms^{-1} after striking a bat. The impulse is
(a) 5 N s (b) 10 N s
(c) 15 N s (d) 20 N s

44. A force of 5N acts on a body of weight 9.8 N. The acceleration of the body is
(a) 0.5 ms^{-2} (b) 1.0 ms^{-2}
(c) 5 ms^{-2} (d) 49 ms^{-2}

45. A car of mass 1000 kg moves on a horizontal circular road of radius 20 m. If the coefficient of friction is 0.6, then the maximum velocity with which the car can move is
(a) 10.8 ms^{-1} (b) 15 ms^{-1}
(c) 18 ms^{-1} (d) 20 ms^{-1}

46. Two vessels A and B of different shapes have the same base area and are filled with water up to the same height h(see Fig). The force exerted by water on the base is F_A for vessel A and F_B for vessel B. The respective weight of the vessels are W_A and W_B. Then



(a) $F_A > F_B$; $W_A > W_B$ (b) $F_A = F_B$; $W_A > W_B$
(c) $F_A = F_B$; $W_A < W_B$ (d) $F_A > F_B$; $W_A = W_B$

47. An ice cube floats on water in a breaker with $\frac{9}{10}^{th}$ of its volume submerged under water. What fraction of its volume will be submerged if the beaker of water is taken to the moon where the gravity is $1/6^{th}$ that on the earth?

(a) $\frac{9}{10}$ (b) $\frac{27}{50}$

(c) $\frac{2}{3}$ (d) Zero

48. A block of wood floats in a liquid in a beaker with $3/4^{th}$ of its volume submerged under the liquid. If the beaker is placed in an enclosure that is falling freely under gravity, the block will

(a) float with $3/4^{th}$ of its volume submerged
(b) float completely submerged
(c) float with any fraction of its volume submerged
(d) sink to the bottom.

49. A cube of ice is floating in water contained in a vessel. When the ice melts, the level of water in the vessel

(a) rises
(b) falls
(c) remains unchanged
(d) falls at first and then rises to the same height as before.

50. A cube of ice is floating in a liquid of relative density 1.25 contained in a beaker. When the ice melts, the level of the liquid in the beaker

(a) rises
(b) falls
(c) remains unchanged
(d) falls at first and then rises to the same height as before.

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KEY ANSWERS:

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