Test / Exam Name: Jee Physics Test

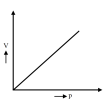
Q1. To break a wire, a force of $10^6 Nm^{-2}$ is required. If the density of the material is 3×10^3 kg-m^{-3}, then the length of the wire which will break by its own weight will be: **1 Mark**

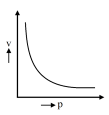
A 34mh. **B** 30m. **C** 31m. **D** 29m..

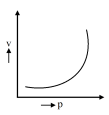
Q2. A mass of 10kg connected at the end of a rod of negligible mass is rotating in a circle of radius 30cm with an angular velocity of 10 rad/ s. If this mass is brought to rest in 10s by a brake, what is the magnitude of the torque applied? **1 Mark**

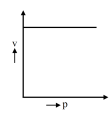
A 0.9N-m. **B** 0.5N-m. **C** 0.2N-m. **D** 0N-m.

Q3. From the following four graphs representing the variation of velocity of sound in a gas with the pressure p at constant temperature, which one is correct? **1 Mark**

A 

B 

C 

D 

Q4. Unit of power is: **1 Mark**

A Watt hour. **B** Joule. **C** Watt. **D** Both (a) and (c).

Q5. The two physical quantities which having same dimensions are: **1 Mark**

A Force and workdone. **B** Torque and energy.
C Pressure and force. **D** Surface tension and stress.

Q6. A body is released from a great height falls freely towards the earth. Another body is released from the same height exactly a second latter. Then the separation between two bodies, 2 s after the release of the second body is, nearly: **1 Mark**

A 15m **B** 20m **C** 25m **D** 30m

Q7. The apparent change in frequency heard by the observer due to relative motion between source and observer is known as: **1 Mark**

A Compton effect. **B** Raman effect. **C** Huygens effect. **D** Doppler effect.

Q8. Which of the following is the practical application of laws of physics? **1 Mark**

A Electrical technology. **B** Mechanical technology. **C** Information technology. **D** All the above.

Q9. In precession of a body: **1 Mark**

A Axis of rotation is fixed. **B** Axis of rotation translates on a curved path.
C Both ends of axis of rotation move around circular paths. **D** One end of rotational axis is fixed.

Q10. For n-particles in a space, the suitable expression for the position vector of centre of mass is: **1 Mark**

A $\frac{\Sigma m_i r_i}{m_i}$ **B** $m_i r_i$
C $\frac{\Sigma m_i r_i}{M}$ **D** $\frac{m_i r_i}{m_i}$

Q11. If work is done on the system in an adiabatic process: **1 Mark**

A $T_i < T_i$ **B** $T_i = T_i$
C $T_i > T_i$ **D** Information is insufficient.

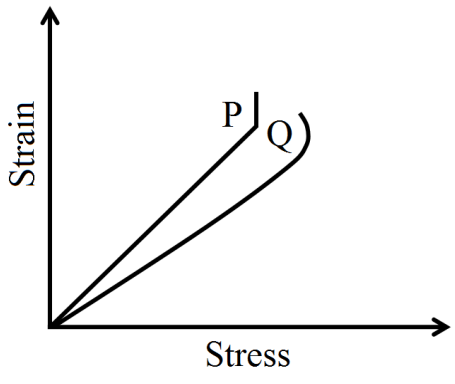
Q12. By sucking through a straw, a student can reduce the pressure in his lungs to 750mm of Hg (density = 13.6gcm^{-3}). Using the straw, he can drink water from a glass upto a maximum depth of: **1 Mark**

A 10cm. **B** 75cm. **C** 13.6cm. **D** 1.36cm.

Q13. What is the torque of a force $7\hat{i} + 3\hat{j} - 5\hat{k}$ about the origin? The force acts on a particle whose position vector is $\hat{i} - \hat{j} + \hat{k}$: **1 Mark**

A $2\hat{i} + 12\hat{j} - 10\hat{k}$.
B $\hat{i} + 12\hat{j} + 10\hat{k}$.
C $\hat{i} + 10\hat{j} + 10\hat{k}$.
D $2\hat{i} + 12\hat{j} + 10\hat{k}$.

Q14. In plotting stress versus strain curves for two materials P and Q, a student by mistake puts strain on the Y-axis and stress on the X-axis as shown in the figure. Then, the correct statement is/ are: **1 Mark**



A P has more tensile strength than Q.
B P is more ductile than Q..
C P is more brittle than Q.
D The Young's modulus of P is more than that of Q

Q15. A unit mass has $\mathrm{r} = 8\hat{i} - 4\hat{j}$ and $8\hat{i} + 4\hat{j}$ Its angular momentum is 64units in: **1 Mark**

A $-\hat{k}$ direction.
B $+\hat{k}$ direction.
C 18×10^7J.
D 9×10^7J.

Q16. The force F on a sphere of radius o moving in a medium with velocity v is given by $\mathrm{F} = 6\pi\eta\mathrm{av}$. The dimension of η is: **1 Mark**

A $[ML^{-3}]$ **B** $[MLT^{-2}]$ **C** $[ML^{-1}]$ **D** $[ML^{-1}T^{-1}]$

Q17. For an ideal gas, internal energy depends on: **1 Mark**

A Only molecular kinetic energy.
B Only potential energy of the molecules.
C Both kinetic and potential energies of the molecules.
D None of the above.

Q18. If 3.8×10^{-6} is added to 4.2×10^{-5} giving due regard to significant figures, then the result will be: **1 Mark**

A 4.58×10^{-5} **B** 4.6×10^{-5} **C** 45×10^{-5} **D** None of these.

Q19. Temperature remaining constant, the pressure of a gas is decreased by 20%. The percentage change in volume: **1 Mark**

A Increases by 20%. **B** Decreases by 20%. **C** Increases by 25%. **D** Decreases by 25%.

Q20. Find the dimensions of a/ b in the equation $\mathrm{F} = \mathrm{a}\sqrt{\mathrm{x}} + \mathrm{bt}^2$, where F is a force, x is distance and t is time: **1 Mark**

A $[L^{-1/2}T^2]$
B $[L^2T^{-3/2}]$
C $[L\,T^{-4}]$
D $[L^{3/2}T^4]$

Q21. If the error in the measurement of momentum of a particle is (+ 100%) then the error in the measurement of kinetic energy is: **1 Mark**

A 100% **B** 200% **C** 300% **D** 400%

Q22. The ratio between the two principal specific heats of a gas C_v, and C_p, is: **1 Mark**

A 1
B R(gas constant)
C γ
D $\frac{\gamma}{R}$

Q23. 5.74 g of a substance occupies $1.2cm^3$. Express its density by keeping the significant figures in view: **1 Mark**

A 4.9 g cm^{-3} **B** 5.2 g cm^{-3} **C** 4.8 g cm^{-3} **D** 4.4 g cm^{-3}

Q24. A container having 1 mol of a gas at a temperature 27°C has movable piston which maintains constant pressure of 1 atm in container. The gas is compressed until temperature becomes 127°C. The work done is (C_p for gas is 7.03 cal/ mol-K) **1 Mark**

A 703J. **B** 814J. **C** 121J. **D** 2035J.

Q25. A cube is subjected to a uniform volume compression. If the side of the cube decreases by 2%, then the bulk strain is: **1 Mark**

A 0.02 **B** 0.06 **C** 0.04 **D** 0.08

Q26. When 1m, 1kg and 1min are taken as the fundamental units, the magnitude of the force is 36 units. What will be the value of this force in CGS system? **1 Mark**

A 10^5 dyne. **B** 10^3 dyne. **C** 10^8 dyne. **D** 10^4 dyne.

Q27. The work per unit volume to stretch the length 1% of a wire with cross-sectional area $1mm^2$ will be [Given, $Y = 9 \times 10^{11} N/m^2$]. **1 Mark**

A 2.25×10^7J. **B** 4.5×10^7J. **C** 1.8×10^7J. **D** 9×10^7J.

Q28. Force (F) and density (d) are related as $\mathrm{F} = \frac{\alpha}{\beta + \sqrt{d}}$. Then, the dimensions $\alpha$of and β are: **1 Mark**

A $[\mathrm{M}^{3/2}\mathrm{L}^{-1/2}\mathrm{T}^{-2}],\ [\mathrm{ML}^{-3}\mathrm{T}^{0}]$
B $[\mathrm{M}^{3/2}\mathrm{L}^{-1/2}\mathrm{T}^{-2}],\ [\mathrm{M}^{1/2}\mathrm{L}^{-3/2}\mathrm{T}^{0}]$
C $[\mathrm{M}^{2}\mathrm{L}^{2}\mathrm{T}^{-1}],\ [\mathrm{ML}^{-1}\mathrm{T}^{-3/2}]$
D $[\mathrm{MLT}^{-2}],\ [\mathrm{ML}^{-2}\mathrm{T}^{-2/3}]$

Q29. For a moving particle (mass m, velocity v) having a momentum p, which one of the following correctly describes the kinetic energy of the particle? **1 Mark**

A $\frac{\mathrm{p}^2}{2\mathrm{m}}$
B $\frac{\mathrm{p}}{2\mathrm{m}}$
C $\frac{\mathrm{v}^2}{2\mathrm{m}}$
D $\frac{\mathrm{v}}{2\mathrm{m}}$

Q30. The sum of all electromagnetic forces between different particles of a system of charged particles is zero: **1 Mark**

1. Only if all the particles are positively charged.
2. Only if all the particles are negatively charged.
3. Only if half the particles are positively charged and half are negatively charged.
4. Irrespective of the signs of the charges.

Q31. If the gravitational force on body 1 due to 2 is given by F_{12} and body 2 due to 1 is given by F_{21}, then: **1 Mark**

A $F_{12} = F_{21}$.
B $F_{12} = -F_{21}$.
C $\mathrm{F}_{12} = \frac{\mathrm{F}_{21}}{4}$.
D None of these.

Q32. Reversibility is not possible because of: **1 Mark**

A Resistive force present everywhere.
B Every process around us is quasi-static.
C Gases are viscous.
D Gases have density.

Q33. Two wave trains $\mathrm{y}_1 = \mathrm{a}\sin(4000\pi\mathrm{t})$ and $\mathrm{y}_2 = \mathrm{a}\sin(4008\pi\mathrm{t})$ are approaching each other. The number of beats heard per second is: **1 Mark**

A 8 **B** 4 **C** 1 **D** 0

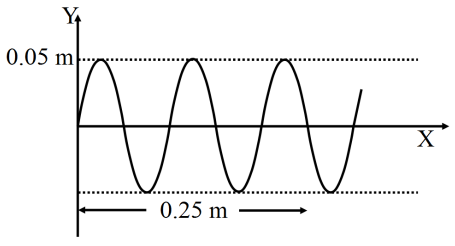
Q34. If work done by a force on displacing a body from one point to another point is different on moving along different paths between the points, then nature of force is: **1 Mark**

A Conservative. **B** Non conservative. **C** Only attraction. **D** Only repulsion.

Q35. When a bullet is fired at a target, its velocity decreases by half after penetrating 30cm into it. The additional thickness it will penetrate before coming to rest is: **1 Mark**

A 30cm. **B** 40cm. **C** 10cm. **D** 50cm.

Q36. If the speed of the wave shown in the figure is 330ms^{-1} in the given medium, then the equation of the wave propagating the positive x-direction will be (All quantities are in MKS units). **1 Mark**



A $\mathrm{y} = 0.05\sin 2\pi(4000\mathrm{t} - 12.5\mathrm{x})$
B $\mathrm{y} = 0.05\sin 2\pi(4000\mathrm{t} - 122.5\mathrm{x})$
C $\mathrm{y} = 0.05\sin 2\pi(3300\mathrm{t} - 10\mathrm{x})$
D $\mathrm{y} = 0.05\sin 2\pi(3300\mathrm{x} - 10\mathrm{t})$

Q37. Least count of a screw gauge is: **1 Mark**

A 1mm. **B** 0.01mm. **C** 0.01cm. **D** 0.1mm.

Q38. A periodic time of a body executing simple harmonic motion is 3s. After how much interval from time t = 0, its displacement will be half of its amplitude? **1 Mark**

A $\frac{1}{8}\mathrm{s}$ **B** $\frac{1}{6}\mathrm{s}$ **C** $\frac{1}{4}\mathrm{s}$ **D** $\frac{1}{3}\mathrm{s}$

Q39. When the temperature of a rod increases from t to $\mathrm{t} + \Delta\mathrm{t}$, its moment of inertia increases from I to $\mathrm{I} + \Delta\mathrm{I}$. If α be the coefficient of linear expansion of the rod, then the value of $\frac{\Delta}{\mathrm{I}}$ is: **1 Mark**

A $2\alpha\Delta\mathrm{t}$
B $\alpha\Delta\mathrm{t}$

C $\frac{\alpha\Delta t}{2}$ **D** $\frac{\Delta t}{\alpha}$

Q40. The unit used for measuring nuclear cross-section is 'barn' which is equal to: **1 Mark**

A $10^{-14}m^2$. **B** $10^{-21}m^2$. **C** $10^{-19}m^2$. **D** $10^{-28}m^2$.

Q41. For a body immersed in a liquid, when the weight of the body is less than the upthrust then the body will: **1 Mark**

A Float partially immersed. **B** Sink.
C Float full immersed. **D** Be of zero weight.

Q42. A shell is fired from a cannon, it explodes in mid air its total: **1 Mark**

A Momentum increases. **B** Momentum decreases. **C** KE increases. **D** KE decreases.

Q43. The value of coefficient of restitution (e) for perfectly elastic collision is: **1 Mark**

A 1. **B** Greater than 1. **C** Less than 1. **D** Between 1 and 2.

Q44. Two identical wires of length L and 2L vibrate with fundamental frequencies 100Hz and 150Hz, respectively. The ratio of their tensions will be: **1 Mark**

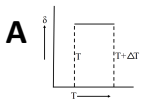
A $\frac{T_2}{T_1} = \frac{8}{1}$ **B** $\frac{T_2}{T_1} = \frac{9}{1}$
C $\frac{T_2}{T_1} = \frac{1}{9}$ **D** $\frac{T_2}{T_1} = \frac{18}{1}$

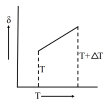
Q45. Choose the correct option regarding the given figure: **1 Mark**

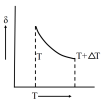
$$\mathrm{A} \rightarrow \\ \xleftarrow{\qquad} \\ -1.5\mathrm{A} = \mathrm{B}$$

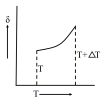
A B = A **B** B = -A
C |B| = |A| **D** $|\mathrm{B}| \neq |\mathrm{A}|$

Q46. An ideal gas is initially at temperature T and volume V. Its volume is increased by ΔV due to an increase in temperature ΔT, pressure remaining constant. The T physical quantity $\delta = \frac{\Delta T}{V\Delta T}$ varies with temperature as: **1 Mark**

A 

B 

C 

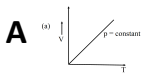
D 

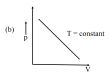
Q47. Choose the correct option regarding the given figure: **1 Mark**

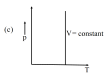
$$\xrightarrow{\qquad \mathrm{A} \qquad} \\ \xleftarrow{\qquad} \\ -1.5\mathrm{A} = \mathrm{B}$$

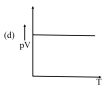
A B = A. **B** B = -A. **C** |BI = |A|. **D** |B| ? |A|.

Q48. Which of the following diagrams (figure) depicts ideal gas behavior? **1 Mark**

A 

B 

C 

D 

Q49. To break a wire, a force of 10^6 Nm^{-2} is required. If the density of the material is $3 \times 10kg\text{-}m^{-3}$, then the length of the wire which will break by its own weight will be: **1 Mark**

A 34m. **B** 30m. **C** 31m. **D** 29m.

Q50. When both the listener and source are moving towards each other, then which of the following is true regarding frequency and wavelength of wave observed by the observer? **1 Mark**

A More frequency, less wavelength. **B** More frequency, more wavelength.
C Less frequency, less wavelength. **D** More frequency, constant wavelength.

Q51. Let E, G and N represent the magnitudes of electromagnetic gravitational and nuclear forces between two electrons at a given separation. Then: **1 Mark**

1. N > E > G
2. E > N > G
3. G > N > E
4. E > G > N

Q52. Choose the wrong option: **1 Mark**

A Energy can neither be created nor be destroyed.
B Mass can neither be created nor be destroyed.
C Mass can be created out of energy and vice-versa.
D Total of mass and energy of a system is constant.

Q53. A source of unknown frequency gives 4 beat/ s when sounded with a source of known frequency 250Hz. The second harmonic of the source of unknown frequency gives 5 beat/ s when sounded with a source of frequency 513Hz. The unknown frequency is: **1 Mark**

A 254Hz. **B** 246Hz. **C** 240Hz. **D** 260Hz.

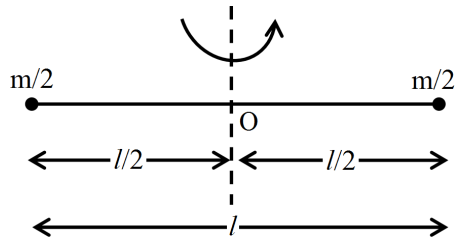
Q54. Two pulses having equal and opposite displacements moving in opposite directions overlap at t = t_1s. The resultant displacement of the wave at t = t_1s is: **1 Mark**

A Twice the displacement of each pulse.
B Half the displacement of each pulse.
C Zero.
D Either (a) or (c).

Q55. The potential energy of a system increase, if work is done: **1 Mark**

A By the system against a conservative force.
B By the system against a non-conservative force.
C Upon the system by a conservative force.
D Upon the system by a non-conservative force.

Q56. Two masses are joined with a light rod and the system is rotating about the fixed axis as shown in figure. The moment of inertia of the system about the axis is: **1 Mark**



A $\frac{Ml^2}{2}$
B $\frac{Ml^2}{4}$
C Ml^2
D $\frac{Ml^2}{6}$

Q57. The period of a planet around the sun is 27 times that of the earth. The ratio of radius of planet's orbit to the radius of the earth's orbit is: **1 Mark**

A 4 **B** 9 **C** 64 **D** 27

Q58. The average kinetic energy of a molecule of an ideal gas depends on: **1 Mark**

A Pressure. **B** Volume. **C** Temperature. **D** Nature of gas.

Q59. A wire of diameter 1mm breaks under a tension of 1000N. Another wire of same material as that of the first one, but of diameter 2mm breaks under a tension of: **1 Mark**

A 500N. **B** 1000N. **C** 10000N. **D** 4000N.

Q60. U is the potential energy, K is the kinetic energy and E is the mechanical energy. Which of the following is not possible for a stable system? **1 Mark**

A U > E **B** U < E **C** E > K **D** K > E