

## GE 1

### I. One mark questions.

1. What is damped harmonic motion ?
2. The moment of inertia of a body rotating with unit angular velocity is equal to \_\_\_\_\_ .
3. The value of gravitational field at the centre of the sphere is \_\_\_\_\_ .
4. A steel wire of length 'l' is elongated by 'δl' under its own weight. The fractional change in its volume is \_\_\_\_\_ .
5. In simple harmonic motion the displacement of a particle in one time period is \_\_\_\_\_ .
6. A particles moves such that its acceleration is given by  $a = -\mu^2 x$ . The period of oscillation is \_\_\_\_\_ .
7. Sharper the resonance the band width is \_\_\_\_\_ .
8. If the damping of oscillating motion is zero, then its relaxation time will be \_\_\_\_\_ .
9. The efficiency of a carnot engine working between steam point and ice point is \_\_\_\_\_ .
10. If a particle moves in X-Y plane only then the angular momentum has \_\_\_\_\_ component.
11. \_\_\_\_\_ plays the same role in rotational motion as mass plays in translational motion.
12. Moment of inertia of a body about on axis is numerically equal to the \_\_\_\_\_ to produce unit angular acceleration in the body.
13. Poiseuille's equation holds only for liquids having \_\_\_\_\_ flow.
14. What happens to surface tension when detergent is added to water ?
15. What do you mean by surface energy ?
16. Does the Gravitational potential at the centre of solid sphere become maximum ? (negative). If yes, then what is its value ?
17. The intensity of Gravitational field due to a solid sphere is directly proportional to the distance of the point from the centre, for an internal point. Write yes or no.
18. Motion of a particle represented by equation  $x = A \cos (wt + \phi)$  is :
  - (a) periodic
  - (b) uniform circular motion
  - (c) oscillatory
  - (d) both oscillatory and SHM
19. A particle is subjected to two mutually perpendicular S.H.Ms. such that  $x = 2 \sin wt$  and  $y = 3 \sin (wt + \frac{\pi}{4})$ .  
The path of the particle will be :
  - (a) ellipse (b) straight line (c) parabola (d) circle
20. A particle is subjected to two mutually perpendicular S.H.Ms. such that  $x = 3 \cos wt$  and  $y = 4 \cos (wt + \pi)$   
The path of the particle will be :
  - (a) ellipse (b) straight line (c) parabola (d) circle
21. The displacement of a particle performing S.H.M. is related to time t as  $x = 0.05 \cos (4\pi t + \pi/4)$  where x is displacement in meter and t in seconds. The frequency of motion will be : (a) 1 Hz (b) 2 Hz (c) 0.5 Hz (d) 1.5 Hz

22. Which of the following laws of thermodynamics leads to inference that it is not possible to convert whole of heat into work continuously ?  
(a) zeroth (b) First (c) Second (d) third
23. The efficiency of Carnot's engine depends on the temperature of  
(a) source only (b) sink only (c) source and sink (d) working substance.
24. If the temperature of source is increased, the efficiency of a Carnot engine (a) increases (b) decreases (c) remains constant (d) first increases and then remains constant
25. Second law of thermodynamics implies  
(a) whole of heat can be converted into mechanical energy  
(b) no heat engine can have efficiency 100%  
(c) some heat engines working in reversible process can have efficiency 100%  
(d) a refrigerator can reduce temperature to absolute zero.
26. If temperature of sink is decreased, the efficiency of a Carnot engine  
(a) decreases (b) increases (c) remains the same (d) None of these
27. Electric lines of force start from \_\_\_\_\_ charge and end at \_\_\_\_\_ Charge.
28. Two equipotential surfaces never \_\_\_\_\_ each other.
29. The intensity of electrostatic field inside a charged hollow sphere is \_\_\_\_\_ at all the points.
30. The electrostatic potential inside a charged hollow sphere is \_\_\_\_\_ at all points.

## II. 1.5 mark questions.

1. What is JFET ?
2. Define moment of Inertia.
3. What is rectifier ?
4. What are transistors ?
5. Two solid balls, one of iron and other of marble are allowed to roll down on an inclined plane from rest and same height, which ball reach first ?
6. Why the gravitational potential energy has negative value ?
7. What is the ratio of gravitational potential at the centre and surface of a spherical shell?
8. What are Lissajous figures and what are their uses?
9. What is logarithmic decrement ?
10. State second law of thermodynamics.
11. What do you mean by entropy of a system ?
12. In case of magnetic material, what is the relation between **B**, **H** and **M** ?
13. What is meant by resonance in an electrical circuit ?
14. Why is filter circuit used after rectifier circuit ?
15. Define Gravitational potential at a point.
16. The high blood pressure of a person is indicative of the fact that the heart is working harder. Explain.
17. At what distance from mean position of a particle vibrating in SHM kinetic energy will be equal to potential energy ?
18. At what temperature will the velocity of sound in air be double its value at  $0^{\circ}\text{C}$  ?
19. Find the efficiency of Carnot engine working between temperatures  $27^{\circ}\text{C}$  and  $227^{\circ}\text{C}$ .
20. Define time constant of RC circuit.

21. State Gauss Law of electrostatics.
22. What is meant by Q of an oscillator ?
23. What is ripple factor ? What is its value for full wave Rectifier ?
24. Why in a river deeper water appears to be still ?

### III. 2.5 mark questions.

1. What is viscous flow ?
2. Explain about under damped, over damped & critically damped condition.
3. Write Maxwell's four thermodynamical relations.
4. State & explain Biot-Savart law.
5. Deduce the relationship between  $\alpha$  &  $\beta$ .
6. Define and explain surface tension.
7. Define and explain Entropy.
8. Explain about black body radiation.
9. State and prove theorem of parallel axes related to the moment of inertia.
10. Show that the gravitational field can be expressed as  $\mathbf{E} = -\text{grad } V$ , where  $V$  is the gravitational potential.
11. In S.H.M. when the displacement is one-half the amplitude, what fractions of the total energy are kinetic and potential ?
12. Define Damping Constant and relaxation time.
13. Show that in case of the differential equation of S.H.M. the sum of any two solutions of it is itself a solution.
14. Prove the differential form of Gauss's law.
15. Define time constant for LR Circuit. Write its value.
16. How in change in entropy of a system connected to the heat supplied to the system ?
17. State Planck's law of radiation in terms of (i) Wave length (ii) Frequency of the radiation.

### IV. 5 mark questions.

1. Derive the expression for moment of Inertia of a solid sphere about an axis passing through its center.
2. Derive the expression for moment of Inertia of a solid sphere about an axis along the tangent of the sphere.
3. Derive the poiseulles formula for a viscous flow.
4. Derive the expression for displacement of a damped harmonic motion.
5. Give the necessary theory of construction of Lissajous figure when two orthogonal simple harmonic vibration of frequency ratio 2 : 1 are superposed.
6. Explain the construction & working of a carnot engine.
7. Derive classius Clapeyron equation.
8. Derive the expression for magnetic induction due to a long straight current carrying Conductor.
9. Derive the expression for current and impedance of a series LCR circuit when AC is flowing through it.
10. With neat circuit diagram explain the construction & working of a full wave (bridge type) rectifier.
11. Derive the expression for moment of inertia of a spherical shell.

12. Derive the expression for relation among elastic constants.
13. Derive the expression for displacement for damped harmonic motion.
14. Two orthogonal simple harmonic vibration of same frequency are superimposed. Give the analytical treatment for finding the formation of Lissajous figures.
15. State Planck's formula for Black body radiation.