



SAIVA BHANU KSHATRIYA COLLEGE
(Aruppukottai Nadargal Uravinmurai Pothu Abi Viruthi Trustuku Pathiyapattathu)

ARUPPUKOTTAI
QUESTION BANK

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|-------------------------------------|---|----------------|---------|
| Name of the Department : | PHYSICS (Aided) | UG / PG : | UG |
| Semester (UG - III & V; PG - III) : | III | Subject Code : | SPHJA11 |
| Name of the Subject : | Mechanics, Properties of Matter & Sound | | |

Section A (Multiple Choice Questions)

Unit I: (Force, Work, Power & Energy)

- About 20% of the _____ is used in an automobile to counteract friction in the engine
(a) Coconut oil (b) Vaseline (c) Gasoline (d) Wax
- Sum of the kinetic energy and potential energy of a particle at any point remains constant is called
(a) conservation of energy
(b) conservation of momentum
(c) conservation of force
(d) conservative of electric field
- Motion of a body has no meaning unless it is described with respect to some well defined coordinates system known as.
(a) inertial frames (b) non-inertial frames (c) frames of reference (d) accelerated frames
- The ratio between the change in the length to its original length is called
(a) strain (b) stress (c) tensile strain (d) shear strain
- Work done in raising the body against the force due to gravity from the surface of earth is
(a) Potential energy (b) Kinetic energy (c) Conservation of energy
(d) Renewable energy.

Unit II: (Rotational motion)

- In perpendicular axis theorem the M.I of the lamina is given by _____
(a) $I_z + I_y = 0$ (b) $I_x + I_z = 0$ (c) $I_x + I_y = I_z$ (d) None
- Angular momentum is
(a) Moment of momentum (b) product of mass and angular velocity
(c) Product of M.I and velocity (d) none of the above.
- Both the gun and the bullet are at rest and their total momentum is
(a) One (b) Infinity (c) Zero (d) Two
- Greater the mass of the body, greater will be the _____ required to change its state
(a) Forces (b) velocity force (c) inertia (d) momentum
- The dimension for torque is _____
(a) MLT^{-1} (b) ML^2T^{-2} (c) ML^2T^{-1} (d) MLT^{-2}

Unit III: (Gravitation)

- The weight of the body at the centre of the earth is
(a) zero (b) infinite (c) greater than at pole
(d) less than at pole.
- The value of 'g' is maximum at _____
(a) Poles (b) Equator (c) Atmosphere (d) Latitude
- _____ discovered a universal law of gravitation
(a) Newton (b) Planck (c) Curie (d) Kepler
- According to Kepler's law, the relation between period (T) of revolution and radius of the orbit (r) is
(a) $T \propto r$ (b) $T^2 \propto r^2$ (c) $T^3 \propto r^3$ (d) $T \propto r^2$
- The universal gravitational constant in MKS system is of the order of
(a) 10^{-1} (b) 10^{-3} (c) 10^{-11} (d) 10^{-12}



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Unit IV: (Elasticity & Viscosity)

16. The maximum value of Poisson's ratio is
(a) 1/2 (b) 1/4 (c) -1 (d) 1
17. The substance which exhibits practically no elastic after effects is
(a) copper (b) silk (c) rubber (d) quartz
18. For any material the upper limiting value of poisson's ratio is
(a) 0.5 (b) 0.1 (c) -0.5 (d) 2
19. Work done in twisting a wire is stored as _____ energy
(a) kinetic (b) potential (c) rotational (d) translational
20. To save metal, _____ form of girders is used
(a) X (b) U (c) I (d) L

Unit V: (Sound)

21. In SHM, the acceleration of the particle and the displacement is
(a) directly proportional
(b) inversely proportional
(c) independent
(d) all are wrong
22. If the frequency of vibration lies between _____ to _____ is known as audible range
(a) 10 Hz to 10,000 Hz
(b) 20 Hz to 20,000 Hz
(c) 30 Hz to 30,000 Hz
(d) 40 Hz to 40,000 Hz.
23. The distance travelled by a vibrating particle from its mean position is called _____ of the body
(a) velocity (b) acceleration (c) displacement (d) frequency.
24. The viscosity of liquids is _____ with temperature.
(a) decreases (b) increases (c) remains the same (d) reduces to zero
25. A liquid drop breaks into a large number of drops. The temperature of liquid drops will _____
(a) decrease
(b) increase
(c) remains unchanged
(d) neither increase nor decrease

Section B (7 mark Questions)

Unit I: (Force, Work, Power & Energy)

26. Derive an expression for kinetic energy.
27. State and prove parallel and perpendicular axes theorem in moment of inertia.
28. Define torque and derive its expression.
29. Write short notes on
(i) gravitational force and
(ii) electromagnetic force.
30. Derive an expression for work done by varying force

Unit II: (Rotational Motion)

31. Write short notes on:
(i) Centripetal forces
(ii) Centrifugal forces
32. Obtain an expression for moment of Inertia of a circular ring about its own axis.
33. Derive an expression for moment of inertia of disc about its center, diameter and tangent.



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34. A 0.6 kg stone is revolved at the end of 0.6 m long string at the rate of 3 revolutions per second. What is its total angular momentum? If after 30 sec it is making only 1 revolution per second. Find the mean torque.
35. A uniform circular disc of 0.2 m radius oscillator oscillates in its own plane about a point on its circumference. Calculate the period of oscillation.

Unit III: (Gravitation)

36. State and explain Kepler's law of planetary motion.
37. Derive an expression for variation of 'g' with rotation of earth.
38. Define artificial satellite. Explain Orbital velocity.
39. Discuss the variation of g with altitude.
40. Discuss the variation of g with depth.

Unit IV: (Elasticity & Viscosity)

41. What is angle of twist of a rod? Obtain an expression for couple per unit twist.
42. State and prove Bernoulli's theorem.
43. Calculate the $\eta = 8 \times 10^{10} \text{ N/m}$ work done in twisting a steel wire of radius 10^{-3} m and length 0.25 m through an angle of 45° .
44. Explain in detail about Pitot tube.
45. Obtain an expression for work done in twisting wire.

Unit V: (Sound)

46. What are ultrasonics? List out the applications of ultrasonic waves.
47. What are progressive waves? List out its properties.
48. Explain about composition of two SHM at right angles to each other.
49. Write a note on co-efficient of viscosity.
50. What are the stationary waves and list out properties.

Section C (10 mark Questions)

Unit I: (Force, Work, Power & Energy)

51. Discuss about the various types of forces with examples
52. Explain conservative and non-conservative forces with examples.

Unit II: (Rotational Motion)

53. Obtain an expression for M.I. of a hollow cylinder.
 - (a) about an axis passing through the centre and perpendicular to the length of the cylinder
 - (b) about its own axis.
54. Derive an expression for M.I. of hollow sphere
 - (a) about its diameter
 - (b) about a tangent.

Unit III: (Gravitation)

55. By using compound pendulum, find the acceleration due to gravity.
56. Explain Boy's method of find G.

Unit IV: (Elasticity & Viscosity)

57. Determine Young's modulus by non-uniform bending of the beam.



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58. What a torque must be applied to a wire one metre long. 10^{-3} metre in diameter in order to twist one end of it through 90° , the other end remaining fixed? The rigidity of the material of the wire is $2.8 \times 10^{10} \text{ N/m}^2$

Unit V: (Sound)

59. Explain Meldle's experiment to determine the frequency of electrically maintained tuning fork.
60. Brief formation of beats. What are the uses of beats?