

Subjective questions on MET-01

1. What do you understand by scalar and vector quantities? Explain addition and subtraction of vector quantities.
2. A boy starts journey in east for 200 mtrs and then moves 90° left and walks 150 mtrs, what will be the final location of the person.
3. A force of 100 Newton is acting an angle of 30° from x-axis, resolve the force in two components acting in direction of x-axis and y-axis.
4. Two forces of 150 Newton and 100 Newton are acting an angle of 30° and 120° with x-axis, resolve these forces in only two components acting in direction of x-axis and y-axis.
5. What is the parallelogram method of addition of two vectors?
6. Two forces of 100N and 120 N are acting along the side of a parallelogram an angle of 60° calculate the resultant of the forces.
7. Three forces of equal magnitude are acting on a body an angle of 120° with each other, prove that the object will be in equilibrium.
8. Two parallel and opposite forces of 50N are acting on a bar at a distance of 2 mtr calculate the moment of the couple of forces.
9. What is a force? What are the various fundamental forces observed in nature, explain their characteristics in brief?
10. What is gravitational force and what is electrostatic force, write about their nature and characteristics.
11. A chain of length "l" is partially hanging partially from side of a table. If the coefficient of friction is μ what is the max length which can be suspended form table so that the remaining portion lying on table remains stationary.
12. A body of 10 kg mass is slipping downward on an inclined surface of 30° if coefficient of friction is 0.5 calculate the acceleration. (take $g=9.8 \text{ m/s}^2$)
13. A mass m_1 kept on flat table is connected to mass m_2 which is hanging free through a mass less string. The system starts moving as mass m_2 going downwards, calculate the acceleration.
14. What is resolution of forces, what are triangle law and polygon law for resultant of forces?
15. A body start from rest and travel with uniform acceleration of 5 m/s for 10 second, calculate the final velocity.
16. A body starts form rest and travel with uniform acceleration of 5 m/s for 10 second, calculate the total distance travelled.
17. A body starts form rest and travel with uniform acceleration of 5 m/s for 10 second, calculate the total distance travelled by body in 10^{th} second.

18. A ball is dropped from a tower of height 500 mtrs calculate the time taken by the ball to hit the ground. (take value of $g=9.8 \text{ m/s}^2$)
19. Derive Lami's theorem for equilibrium of forces.
20. What is the condition for equilibrium of forces?
21. Derive the formula to calculate the magnitude and direction of two forces of magnitude F_1 and F_2 acting at an angle of α with each other.
22. What are the systems of forces as per their type of application on an object?
23. What is couple of forces, what are the properties of couple of forces? How the moment of couple is calculated.
24. What are the laws of rectilinear motion. Derive formula for distance travelled by an object in n^{th} second of motion.
25. What are the Newton's laws of forces, describe in brief.
26. What will the value of force required to move an object of mass 2 kg with acceleration of 10 m/s^2 .
27. If three identical balls of steel, wood and rubber are fallen from a tower of height h show that the time taken by each of them to reach the ground will be the same, consider air resistance negligible.
28. What is energy, what is its unit? Describe potential and kinetic energy.
29. What is friction? Explain following terms:-
 - a) angle of friction
 - b) coefficient of friction
30. What is circular motion? Explain following terms:-
 - a) Linear velocity
 - b) Angular velocity
31. Calculate the degree of banking required for a curved road for safe turning of a car with velocity " v " and radius " r ".
32. Explain the following terms in context to circular motion.
 - a) Centrifugal force
 - b) Centripetal force
33. A bob of mass " m " is being rotated in shape of cone having string length " l " with angular velocity ω . Calculate the time period of oscillations.
34. What is simple harmonic motion? Describe following terms:-
 - a) Amplitude
 - b) Displacement
 - c) Time period
 - d) Frequency
35. Explain various types of simple lifting machines.
36. Define following terms :-
 - a) Limiting friction
 - b) Rolling and sliding friction

37. A body of mass 3 kg is pulled up along an incline through a vertical height of 2 m. calculate the work done.
38. Show that when the momentum of a moving body is doubled the kinetic energy becomes four times of the original value.
39. A block of mass m is attached to two springs of spring constant k_1 and k_2 . The block is displaced by distance x and released calculate the velocity of block at its mean position.
40. A stone of mass 1 Kg is tied with a string and it is whirled in vertical circle of radius 1 m. If tension at highest point is 50N, calculate the velocity at lowest point. (take $g = 10 \text{ m/s}^2$)
41. A body of mass 5 Kg is initially at rest, subjected to force of 40N, calculate kinetic energy acquired at end of 5 second.
42. A lift weighs 3000 Kg. What is the acceleration when tension in its supporting cable is 3300N? (Take $g = 9.8 \text{ m/s}^2$).
43. Two balls of mass 0.05 Kg moving in opposite direction with speed 6 m/s collide and rebound with same speed. What is the impulse imparted to each ball due to each other.
44. A constant retarding force of 50N is applied to body of mass 20 Kg moving with speed of 15 m/s. How long does the body will take to stop?
45. A shell of mass 0.02 Kg is fired by a gun of mass 100 Kg. If the muzzle speed of the shell is 80 m/s, what is the recoil speed of the gun?
46. A stone of mass 0.25 Kg tied to end of a string is whirled around a circle of radius 1.5 m with speed of 40 rev/min. in horizontal plane. Calculate the tension in the string.
47. Two masses of 8 and 12 Kg are connected to two ends of light inextensible string that goes over a pulley. Find the acceleration of the mass system.
48. Compare the properties of potential and kinetic energy.
49. A force of 20N is acting an angle of 60° and the body shifts to a distance of 10 mtr, what will be the work done.
50. An object of mass 5 Kg is imparting circular motion in radius of 8 mtr with liner velocity of 4 m/s. Calculate the centrifugal force exerted on the object.