

Vasavi College of Engineering, Mechanical Engineering Department
BASIC ENGINEERING MECHANICS-SHORT ANSWER QUESTIONS

1.	State and explain parallelogram law.
2.	Explain various types of forces.
3.	Define Force and explain its characteristics & types with suitable diagrams.
4.	Explain the terms resultant force and moment of a force.
5.	State and explain the Varignon's theorem.
6.	State the principle of transmissibility of forces with a neat sketch.
7.	Express the force vector of a 100kN force, passing from point A(2,4,1) to point B(6,7,8) and also write its unit vector.
8.	Determine X, Y and Z component of 100 N force passing from origin to a point (1,2,3).
9.	Following forces act a point P, $F_1 = 50i$, $F_2 = 30i - 15j$ and $F_3 = -20i + 10j - 5k$. Determine the resultant.
10.	Determine magnitude and direction of the resultant of two forces 100 N and 150N at an angle of 45° .
11.	The resultant of two forces is 20 kN when they act at 50° . The same forces when they act at 90° produce a resultant of 15 kN. Determine the magnitude of the two forces.
12.	A force of 20 kN is passing through the points (1, 2) and (2, 5) with reference to Cartesian coordinate system. What is the component of the force in X direction?
13.	The resultant force of a general system of forces acting on a body in a plane is zero. What would the state of the body? Comment.
14.	Define Coplanar & Concurrent forces.
15.	Draw the sketch showing non-coplanar concurrent force system.
16.	State properties of a couple.
17.	Differentiate between Moment and a Couple.
18.	What are the characteristics of a moment?
19.	What is unit vector?
20.	State the necessary and sufficient conditions for static equilibrium of a particle in two dimensions.
21.	How do you represent a spatial force of magnitude $F = 200$ N between the points A (-4,2,4) and B (2,5,-3) in vector form.
22.	Can a coplanar non concurrent system with zero resultant force necessarily be in equilibrium?
23.	Three forces $F: 10(2i + 8j - 6k)$, $P = 20(-8i - 2j + 5k)$ and T acting on a body maintains its equilibrium. Find the magnitude and direction of missing force T.
24.	State Lami's theorem with neat diagram.
25.	Write the equilibrium equation of system of parallel forces in plane.
26.	Write the equilibrium equations for a concurrent force system in space.
27.	State triangle law of forces?
28.	Explain various supports and support reactions.
29.	Discuss the significance of free body diagram.
30.	Define Free Body Diagram. Illustrate with an example.
31.	State the necessary and sufficient conditions of equilibrium for a coplanar system.
32.	State the disadvantage of method of joints.
33.	Distinguish between perfect frame and redundant frame.
34.	Differentiate between a perfect truss and a deficient truss
35.	Explain the terms: Perfect frame, imperfect frame and deficient frame.
36.	In a simply supported truss the members are 5 and joints are 4. Comment on the nature of the structure.

37.	What do you mean by a truss structure? Explain.
38.	What is a truss? Explain with suitable example how its indeterminacy can be determined.
39.	What is truss and state its applications.
40.	Describe the relationship between the number of joints and number of members in a perfect truss.
41.	Differentiate between method of joints and method of sections
42.	What are the assumptions made in the analysis of trusses?
43.	What are the steps involved in the analysis of a truss?
44.	What are the assumptions made in the analysis of a perfect frame?
45.	How do you use method of sections in finding forces in the members of a truss?
46.	Explain step-by-step procedure of performing analysis of a truss using method of sections.
47.	What are the advantages of method of sections over method of joints?
48.	Define angle of friction and cone of friction.
49.	Enumerate types of friction with examples.
50.	Differentiate between static, limiting and kinetic friction by means of a sketch.
51.	A body is on the point of sliding down an inclined plane under its own weight. If the inclination of the plane to the horizon is 30° , what will be the angle of friction?
52.	Define limiting friction
53.	State the Coulomb's laws of dry friction.
54.	Distinguish between coefficient of friction and angle of friction.
55.	What is the importance of belt friction? Explain.
56.	Explain belt friction with suitable example. Give the applications.
57.	A belt embraces an angle of 200° over the surface of a pulley of 500 mm dia. If the tight side tension of the belt is 2.5 kN, find out the slack side tension of the belt. The coefficient of friction between the belt and pulley is 0.3.
58.	Explain Wedge friction with an example.
59.	What are the laws of friction?
60.	From first principles deduce an expression to determine the centroid of a triangle of base 'b' and height 'h'.
61.	Determine radius of gyration of a right-angled triangle having base b and height h.
62.	Determine centroid of an arc of a circle.
63.	What is the significance of centroid in engineering mechanics?
64.	State Parallel axis theorem and Perpendicular axes theorem.
65.	Define centroid. Write the expression for centroid of a semicircle of radius 'R'.
66.	State and prove parallel axis theorem.
67.	Define the terms Moment of Inertia and polar moment of inertia.
68.	From the first principles, locate the centroid of a triangle.
69.	Find the centroid of a semicircular arc of radius 'R'.
70.	State the location of centroid of semi-circle, whose radius is R, with a sketch.
71.	What is the radius of gyration of a circular section of diameter 'D'?
72.	Differentiate between centroid and centre of gravity.
73.	Define Radius of Gyration. Express its relation with second moment of area.
74.	Write the expression for mass moment of inertia for a rectangular plate (b x d x t).
75.	Determine the radius of gyration of a square of side 150 mm about one of its sides.