

Navrachana University
School of Engineering and Technology and B. Tech CME
End-Semester Examination November 2023
First year and I-Semester
Applied Mechanics (CME 102)

Date: 23/11/2023

Marks: 40

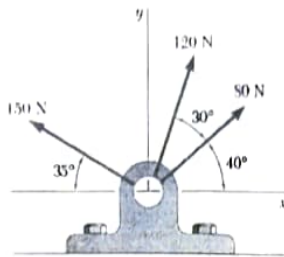
Time: 10:00 am to 12:00 pm

Instructions:

- Write each answer on a new page
- Use of a calculator is permitted

Questions	Marks	CO	BTL
<p>Q1. Short questions (Any 10)</p> <p>1. The forces, whose lines of action lie on the same line, are known as _____ forces.</p> <p>(a) Coplanar (b) Collinear (c) Non-coplanar concurrent (d) Concurrent</p> <p>$\vec{P} + \vec{Q} + \vec{S} = (\vec{P} + \vec{Q}) + \vec{S}$</p> <p>2. _____ . (True/ False)</p> <p>3. State the law of parallelogram of forces.</p> <p>4. Describe all the conditions of equilibrium for three-dimensional (3D) system.</p> <p>5. Mention the number and type of reactions for fixed support in 2D system.</p> <p>6. Specify the difference between center of gravity and centroid.</p> <p>7. State first theorem of Pappus-Guldinus.</p> <p>8. Specify the centroid of right angle Triangle</p> <p>9. A truss has number of members (n) = 5 and number of joints (j) = 3. The truss is a _____ type of frame.</p> <p>(a) Simple frame (b) Perfect Frame (c) Imperfect frame (d) complex frame</p> <p>10. Define a couple of force</p> <p>11. In a perfect frame (or truss) all the members are pin-jointed. (True/ False)</p>	10	1,2,3,4,5	1,2,3

Q2. Determine the x and y components of each force shown in the figure below. Also, determine the magnitude and direction of the resultant force.

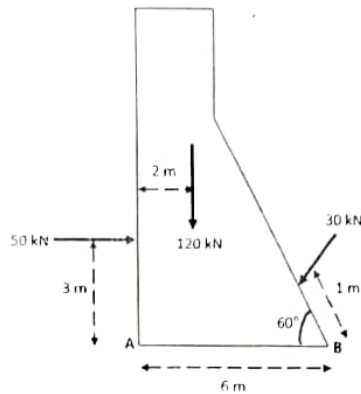


06

1

2,3

Q3. Determine the resultant of the three forces acting on the dam section shown in the figure below. Also locate its intersection with the base AB. For a safe design this intersection should be within the middle third. Specify if the design is safe or not.



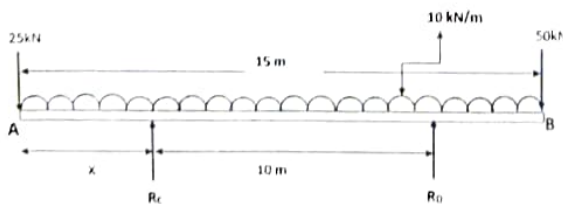
08

2

2,3,5

OR

Q3.A beam 15 m long supported on two intermediate supports, 10 m apart carries a UDL of 10 kN/m and two concentrated loads of 25 kN at the left end A and 50 kN at the right end B as shown in the figure. Determine the value of x such that the reactions at both supports are equal ($R_c = R_D$).

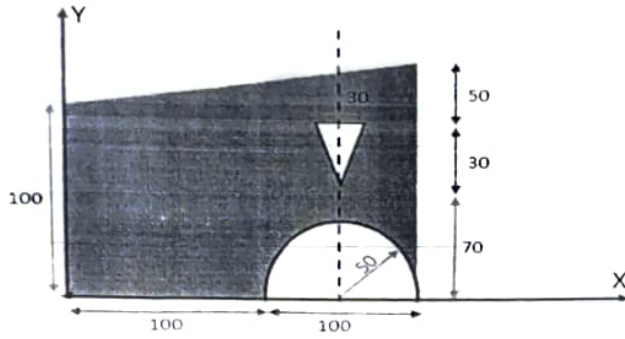


08

2

2,3,5

J. Determine the centroid of the solid area shown in the figure below. Express the coordinates of the centroid w.r.t X and Y axis as object is not symmetrical about any axis. All dimensions are in mm.



08

3

2,3,5

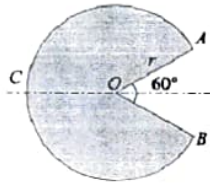
OR

Q4. A circular sector of angle 60° is cut from the circle of radius r as shown in Figure. Determine the centre of gravity of the remainder. The object is not symmetrical about any axis.

08

3

2,3,5

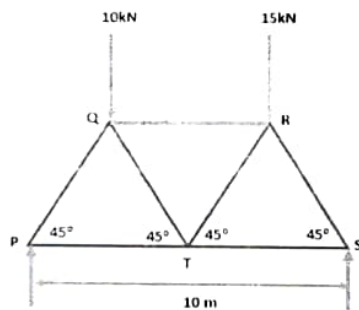


Q5. A frame of 10 m span is loaded as shown in the figure below. Find the forces in all the members of the frame.

08

4

2,3,5



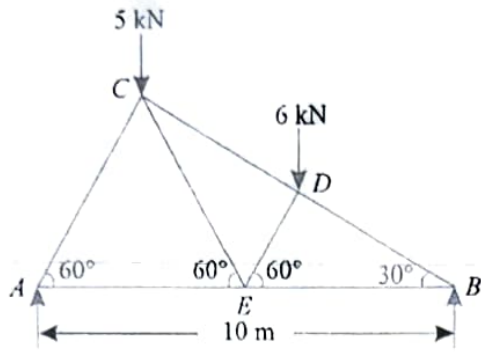
OR

Q5. A truss of span 10 meters is loaded as shown in Figure below. Find the forces in all the members of the truss.

08

4

2,3,5



-----End of Question Paper-----