

TML041/EE/20070812

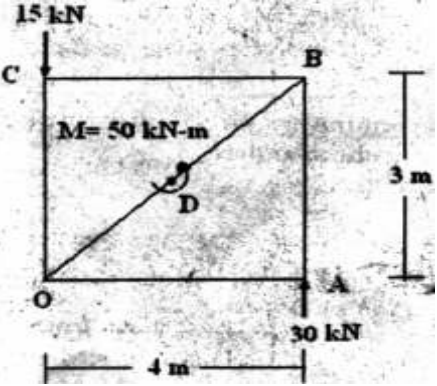
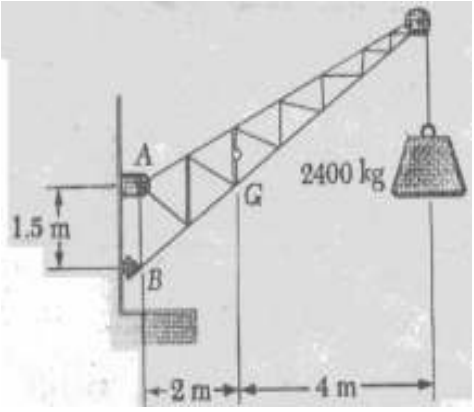
Engineering Mechanics - I

Time : 180 minutes

Marks : 100

Instructions for the students :

1. All questions are compulsory.
2. "Long Answer type Question (LAQ)" is a supply type question of 20 marks, which require typical answer of about 60-80 lines in about 32-40 minutes.
3. "Short Answer type Question (SAQ)" is a supply type question of 5 marks, which require typical answer of about 15-20 lines in about 08-10 minutes.
4. Use of non-programmable type of scientific calculator is allowed.
5. Draw neat diagrams wherever necessary.
6. Assume suitable data if necessary.

| Q. No. | Question (Q) | Question Marks |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| | Long Answer type Questions (LAQ's) | |
| 1. | <p>(a) Find the result of the following system acting on a body <i>OABC</i> shown in fig. 1. Find the points where the resultant cuts the <i>X</i> and <i>Y</i> axes. What is the distance of resultant from <i>O</i> ?</p> <div style="text-align: center;">  <p>Fig : 1</p> </div> | 10 |
| | <p>(b) A fixed crane has a mass of 1000 kg and is used to lift a 2400 kg crate. It is held in place by a pin at <i>A</i> and a rocket at <i>B</i>. The components of the reactions at <i>A</i> and <i>B</i>.</p> <div style="text-align: center;">  <p>Fig : 2</p> </div> | 10 |

2. In the truss shown in fig. 3. Determine the force in members FH , GH and GI .

20

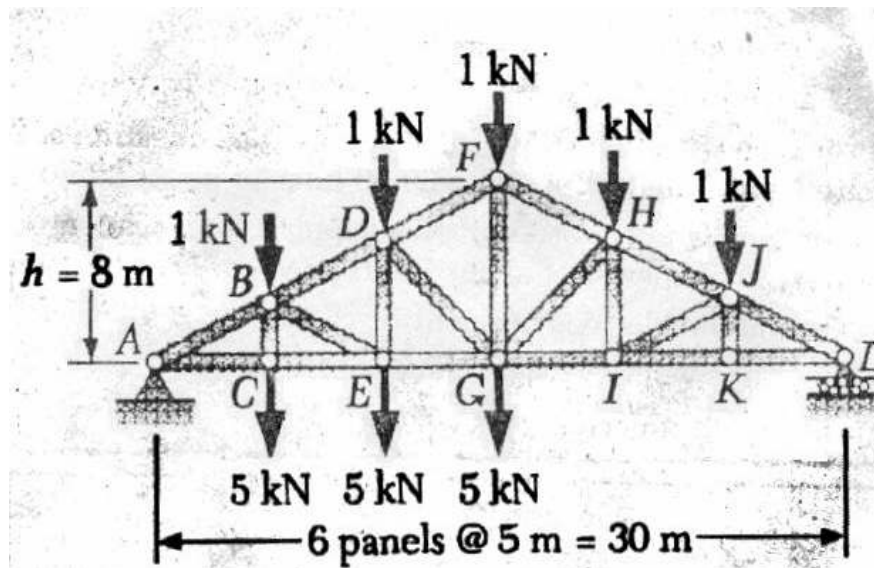


Fig : 3

3. Determine by direct integration the location of the centroid of a parabolic spandrel.

20

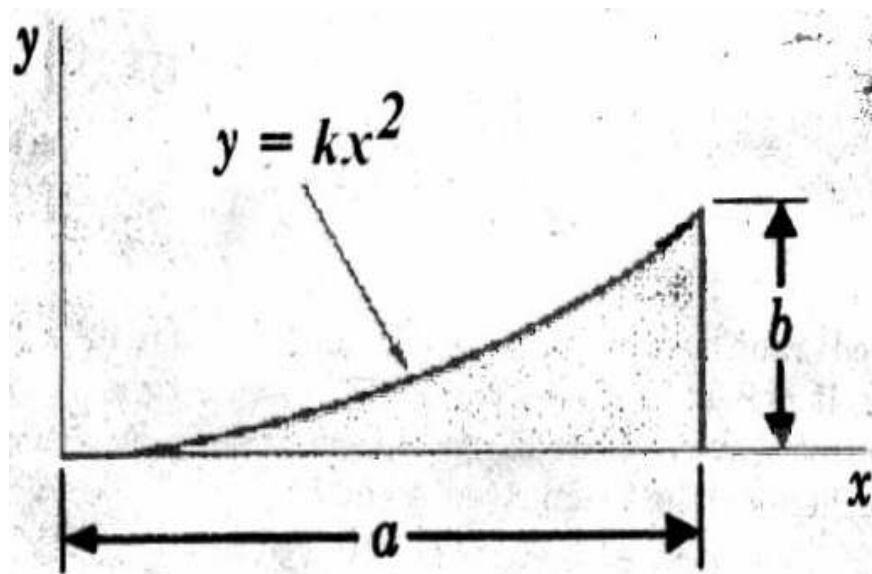
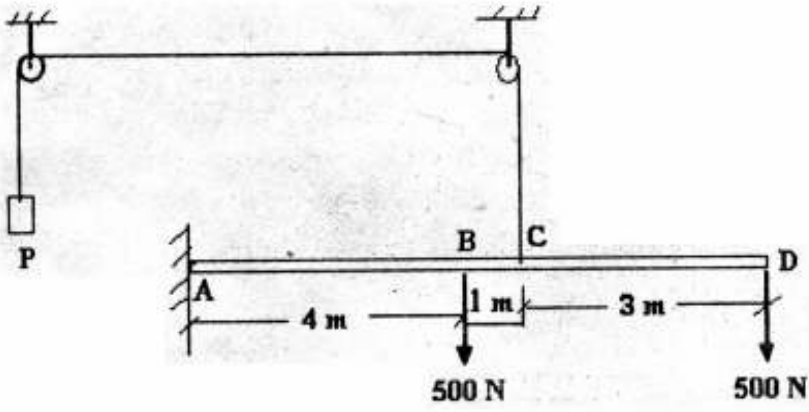


Fig. : 4

| | | |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <p>4.</p> | <p>For the cantilever, determine range of values of load P for which the magnitude of the fixing moment at A does not exceed 400 kN-m. Refer Fig. 5.</p>  <p style="text-align: center;">Fig. : 5</p> | <p>20</p> |
| <p>Short Answer type Questions (SAQ's)</p> | | |
| <p>5.</p> | <p>State and prove the "Law of parallelogram of Forces".</p> | <p>5</p> |
| <p>6.</p> | <p>Distinguish between Moment of force and a couple.</p> | <p>5</p> |
| <p>7.</p> | <p>Explain :</p> <ul style="list-style-type: none"> i) Cone of Friction ii) Angle of Repose | <p>5</p> |
| <p>8.</p> | <p>Distinguish between Perfect truss, Deficient truss and Redundant truss.</p> | <p>5</p> |