

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
**(MID SEMESTER EXAMINATION MO/2023)**

CLASS: BTECH  
BRANCH: CS/ECE/AI ML/EEE

SEMESTER : I  
SESSION : MO/2023

SUBJECT: ME101 BASICS OF MECHANICAL ENGINEERING

TIME: 02 Hours

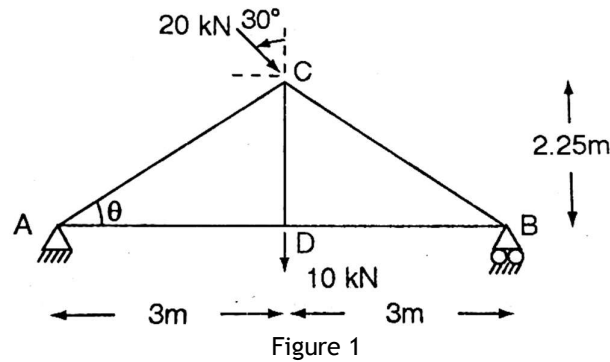
FULL MARKS: 25

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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Q.1 Find the forces in all the members of the truss shown in Figure 1

CO BL  
[5] 1 M



Q.2 A bar of 20 mm diameter is tested in tension. It is observed that when a load of 37.7 KN is applied, the extension measured over a gauge length of 200 mm is 0.12 mm and contraction in diameter is 0.0036 mm. Find Poisson's ratio and elastic constants E, G, K.

[5] 1 M

Q.3 In a reciprocating pump, the lengths of connecting rod and crank is 1125 mm and 250 mm respectively. The crank is rotating at 420 r.p.m. Find the velocity, with which the piston will move, when the crank has turned through an angle of  $40^\circ$  from inner dead centre as shown in Figure 2

[5] 2 M

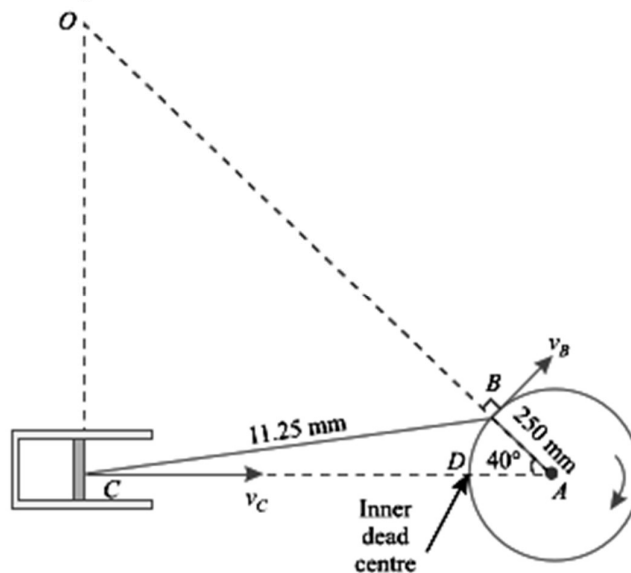


Figure 2

- |     |   |     |   |   |
|-----|---|-----|---|---|
| Q.4 | The ends of a slender beam AB of length 2.5 m are constrained to remain in contact with a horizontal floor and a vertical wall respectively. If the end A of beam, which is touching to the horizontal floor and has a horizontal velocity of 1.5 m/s towards left direction to the wall, determine the angular velocity of the beam and the velocity of its end B when beam is inclined with $60^\circ$ to the horizontal floor. | [5] | 2 | M |
| Q.5 | Explain angle of repose and angle of friction with neat sketches.   | [5] | 3 | L |

:::16/10/2023:::