

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE, APRIL - 2025**

**ENGINEERING MECHANICS**

[Maximum marks: 75]

[Time: 3 Hours]

**PART A**

**I. Answer all the following questions in one word or one sentence. Each question carries 1 mark**

**(9 x 1 = 9 Marks)**

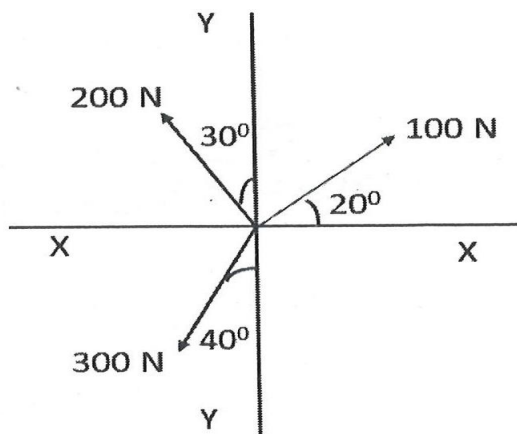
|   |                                                                                                       | Module outcome | Cognitive level |
|---|-------------------------------------------------------------------------------------------------------|----------------|-----------------|
| 1 | The forces acting in a same plane and have a common line of action, are called.....                   | M1.01          | R               |
| 2 | Write any two fundamental units.                                                                      | M1.02          | U               |
| 3 | Define concentrated load.                                                                             | M2.01          | U               |
| 4 | What is perfect frame?                                                                                | M2.05          | U               |
| 5 | The centroid of a quarter circle from the diameter is.....                                            | M3.01          | R               |
| 6 | Moment of inertia of centrally situated hollow rectangular lamina with sides B x D and b x d is ..... | M3.03          | U               |
| 7 | The stress which cause decrease in length is.....                                                     | M4.01          | U               |
| 8 | Define shear stress.                                                                                  | M4.02          | U               |
| 9 | What is bulk modulus?                                                                                 | M4.05          | U               |

**PART B**

**II. Answer any eight questions from the following. Each question carries 3 marks.**

**(8 x 3 = 24 Marks)**

|   |                                                          | Module outcome | Cognitive level |
|---|----------------------------------------------------------|----------------|-----------------|
| 1 | Explain the principle of transmissibility of forces.     | M1.03          | R               |
| 2 | Determine the resultant of the force system shown below. | M1.04          | U               |



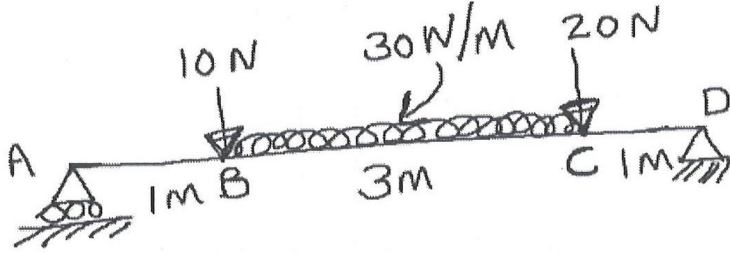
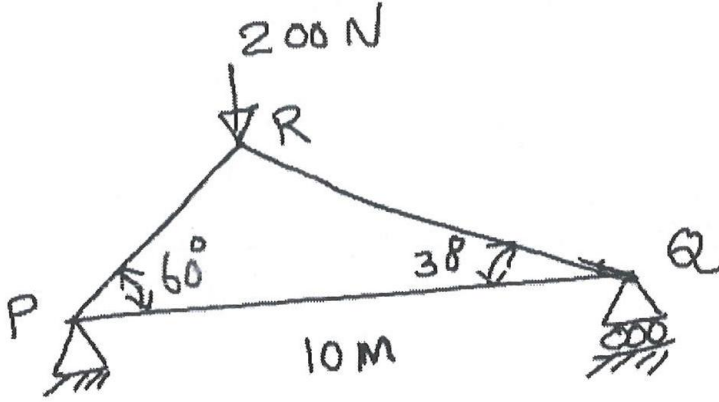
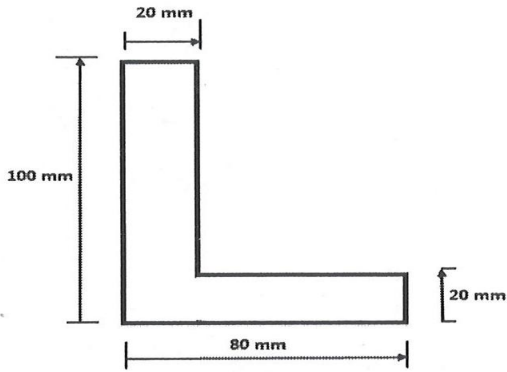
|    |                                                                                                                                                |       |   |
|----|------------------------------------------------------------------------------------------------------------------------------------------------|-------|---|
| 3  | What are the assumptions in finding the forces acting on a truss?                                                                              | M2.05 | R |
| 4  | Define simple support and hinged support.                                                                                                      | M2.01 | U |
| 5  | Discuss the laws of friction.                                                                                                                  | M2.05 | R |
| 6  | Illustrate the center of gravity of a sphere and a semicircular cylinder.                                                                      | M3.01 | R |
| 7  | State parallel axis theorem.                                                                                                                   | M3.04 | R |
| 8  | Draw stress strain curve for mild steel and mark any 3 points.                                                                                 | M4.02 | U |
| 9  | Explain stiffness and hardness.                                                                                                                | M4.04 | R |
| 10 | A copper bar of 30 mm diameter extended to 0.06 mm due to a pull of 900N over a gauge length of 500 mm. Find the strain and stress in the bar. | M4.03 | A |

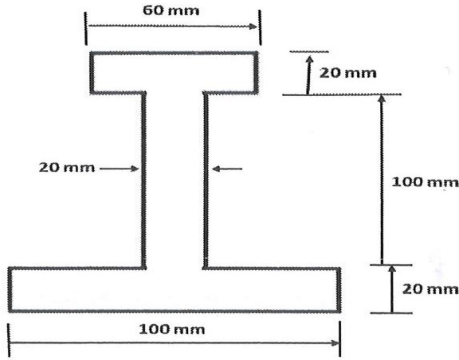
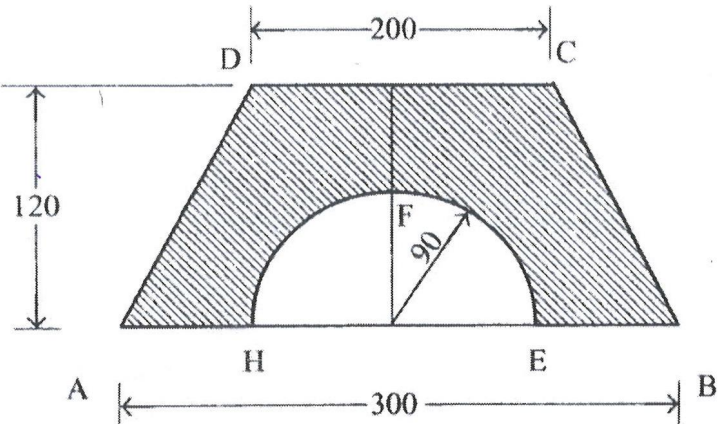
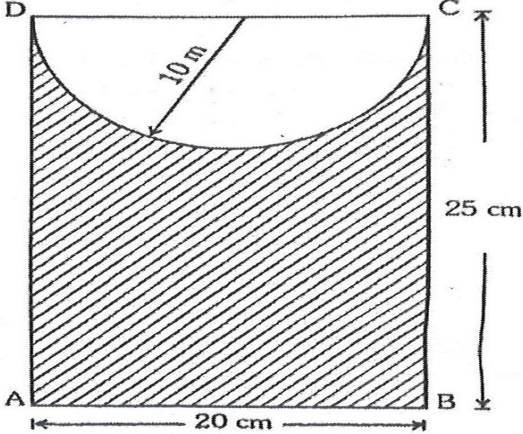
### PART C

Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

|     |                                                                                                                                                                                                              | Module outcome | Cognitive level |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|
| III | <p>Draw free body diagram of the given cylinders resting in a channel. The biggest cylinder have a weight of <math>W</math>, small one have weight of <math>W/2</math>. The contact surfaces are smooth.</p> | M1.01          | R               |
| IV  | <p>OR</p> <p>Find the resultant and the distance of resultant from point S of the force system shown below.</p>                                                                                              | M1.04          | U               |

|                                                                                      |                                                                                                                                                                                           |       |   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---|
| V                                                                                    | Find the support reactions of the beam shown below.                                                                                                                                       | M2.02 | A |
|    |                                                                                                                                                                                           |       |   |
| <b>OR</b>                                                                            |                                                                                                                                                                                           |       |   |
| VI                                                                                   | A body of weight 200 N is placed on a rough horizontal plane. Determine the coefficient of friction if a horizontal force of 80 N just cause the body to slide over the horizontal plane. | M2.05 | U |
| VII                                                                                  | Find the forces in all members of the truss shown below.                                                                                                                                  | M2.03 | A |
|   |                                                                                                                                                                                           |       |   |
| <b>OR</b>                                                                            |                                                                                                                                                                                           |       |   |
| VIII                                                                                 | Explain different types of friction.                                                                                                                                                      | M2.05 | R |
| IX                                                                                   | Find the centroid of the given section.                                                                                                                                                   | M3.02 | U |
|  |                                                                                                                                                                                           |       |   |
| <b>OR</b>                                                                            |                                                                                                                                                                                           |       |   |
| X                                                                                    | Find the moment of inertia of the given section about horizontal axis passing through the center of gravity.                                                                              | M3.04 | U |

|      |                                                                                                                                                                                                                                                                                                  |       |   |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---|
|      |                                                                                                                                                                                                                 |       |   |
| XI   | Find the centroid of the section, all dimensions are in mm.                                                                                                                                                                                                                                      | M3.02 | U |
| XII  | <p>  </p> <p style="text-align: center;"><b>OR</b></p> <p>  </p>                                                           | M3.04 | U |
| XIII | A brass rod of 2000 mm long and diameter 30 mm is subjected to an axial pull of 40 kN. If the modulus of elasticity of the material of the rod is $3 \times 10^5 \text{ N/mm}^2$ . Determine stress, strain and elongation of the rod.                                                           | M4.03 | A |
| XIV  | <p style="text-align: center;"><b>OR</b></p> A steel bar is subjected to axial compressive load of 5000 kN, having 200 cm length, 30 cm breadth, 40 cm depth. The decrease in length is 0.09 cm and increase in breadth is 0.005. Find the value of Young's modulus, Poisson's ratio of the bar. | M4.05 | U |

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