TED (21) 2021

(Revision-2021)

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## DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL - 2023

### 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 | Define force | M1.01 | R |
| 2 | State Varignon's theorem | M1.04 | U |
| 3 | No. of restraints in a fixed support is ......... | M2.01 | R |
| 4 | Define a truss | M2.03 | R |
| 5 | The maximum value of static friction comes into play when a body just starts to slide over another is........... | M2.05 | R |
| 6 | Define moment of inertia | M3.03 | U |
| 7 | The position of centroid of a right-angled triangle from the base is ......... | M3.03 | R |
| 8 | Change in shape of an object in response to an applied force is called........... | M4.01 | R |
| 9 | Ratio of linear to linear strain is.............. | M4.05 | R |

## PART B

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

(8 x 3 = 24 Marks)

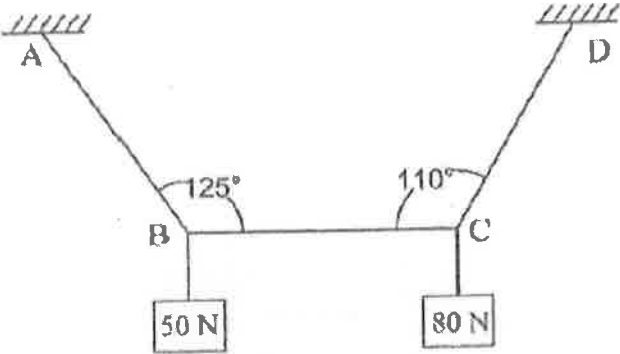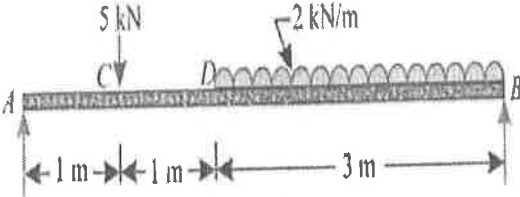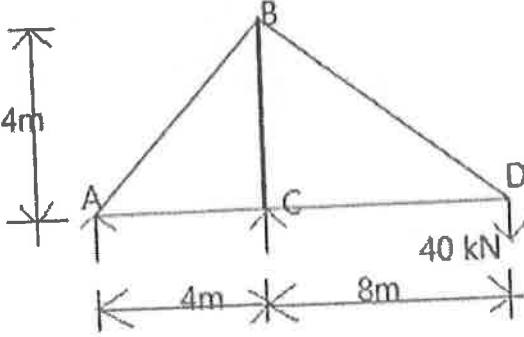|   |   | Module outcome | Cognitive level |
|---|---|---|---|
| 1 | Explain the following terms (a)Resultant (b) Equilibrant (c) Moment of a force | M1.03 M1.4 | U |
| 2 | An electric light fixture of weight Q(40N) is supported as shown in figure. Determine the tensile forces in the wires BA and BC if their angles of inclination are as shown  | M1.05 | U |

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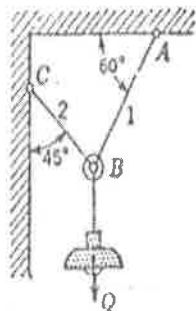
| 3 | Draw free body diagram of the given figure  | M1.05 | U |
|---|---|---|---|
| 4 | Define simply supported and cantilever beam | M2.01 | R |
| 5 | Explain the different types of friction | M2.05 | R |
| 6 | Define radius of gyration and polar moment of inertia | M3.04 | R |
| 7 | State parallel axis theorem | M3.04 | R |
| 8 | Define the following terms<br>(a) Poisson's ratio<br>(b) Rigidity modulus<br>(c) Bulk modulus | M4.05 | R |
| 9 | Explain the following properties<br>(a) Elasticity<br>(b) Hardness<br>(c) Toughness | M4.04 | R |
| 10 | Determine the Poisson's ratio and bulk modulus of a material whose modulus of elasticity is 200GPa and modulus of rigidity is 80GPa | M4.05 | U |

## PART C
**Answer all questions. Each question carries seven marks**

**(6 x 7 = 42 Marks)**

| | | Module outcome | Cognitive level |
|---|---|---|---|
| III | Determine the resultant and direction of resultant of the concurrent force system shown in figure.  | M1.01 | U |

| IV | **OR**<br>Find out the tension in all the strings AB, BC and CD<br><br> | M1.05 | U |
|----|----|----|----|
| V | Find the support reactions of the following beam<br><br><br><br>**OR** | M2.02 | A |
| VI | Define friction. What are the different laws of friction. | M2.05 | R |
| VII | Compute the forces in members of the given truss.<br><br><br><br>**OR** | M2.03 | A |
| VIII | Explain the terms<br>(a) Coefficient of friction<br>(b) Angle of friction<br>(c) Angle of repose<br>(d) Cone of friction | M2.05 | U |

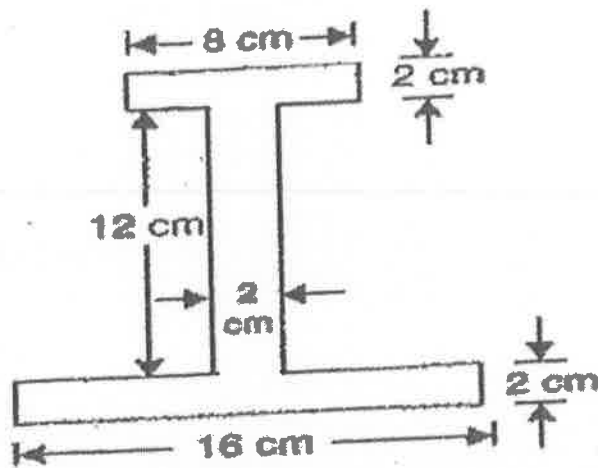| IX | Locate the centroid of the given figure | M3.02 | U |
|----|------------------------------------------|-------|---|
|    |  |       |   |
|    | **OR** |       |   |
| X  | Determine the moment of inertia about the centroidal axes of the 1 section given below. | M3.04 | U |
|    |  |       |   |
| XI | Determine the centroid of given section | M3.02 | U |
|    |  |       |   |

| XII | **OR**<br>Determine the moment of inertia about the centroidal axes of given T section given below.<br><br> | M3.04 | A |
|------|------|------|------|
| XIII | A circular steel rod of 2cm diameter and 150cm long is subjected to an axial pull of 20kN. If the modulus of elasticity of the material of the rod is $2 \times 10^5 N/mm^2$, determine:<br><br>(i)     Stress<br>(ii)    Strain<br>(iii)   Elongation of the rod<br><br>**OR** | M4.03 | A |
| XIV | Draw the stress strain curve of mild steel. Explain its salient features. | M4.02 | U |
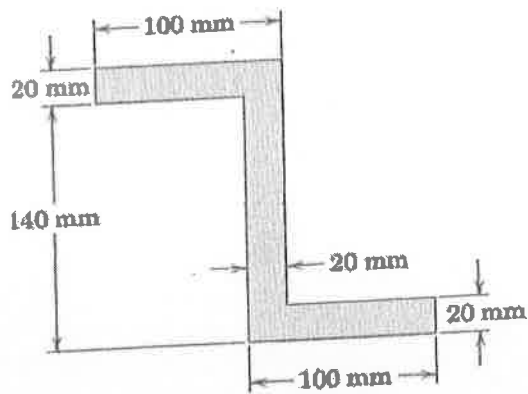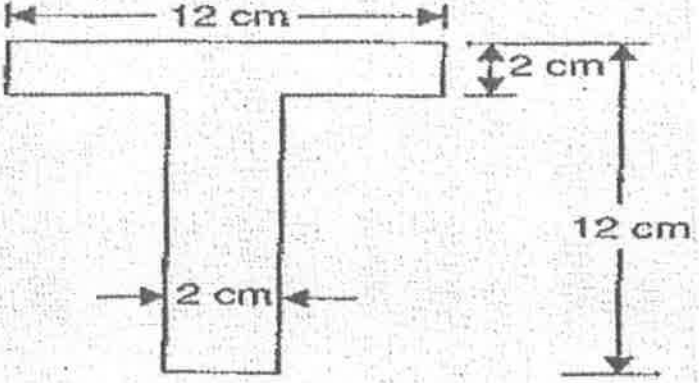
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