**TED (21)3014**
**(Revision – 2021)**

**2110220091A**

**Reg. No……**
**Signature…….**

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2025**

# THEORY OF STRUCTURES

[Maximum Marks: **75**] [Time: **3** Hours]

## PART-A

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

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

| | | Module Outcome | Cognitive level |
|---|---|---|---|
| 1. | Algebraic sum of all moments to the right or left of a section is called---------- | M1.01 | R |
| 2. | Bending occurs in a beam due to bending moment only is called------- | M1.02 | R |
| 3. | The layer at which there is neither tensile force nor compressive force acting is---------- | M1.03 | R |
| 4. | For short column, the effective length to least lateral dimension is less than---------- | M2.01 | R |
| 5. | For no tension to develop in a dam section, the resultant force should lie within----------of base. | M2.05 | R |
| 6. | For maximum deflection, slope should be---------- | M3.01 | R |
| 7. | State the equation for power transmitted by a shaft. | M3.03 | R |
| 8. | The ratio of stiffness factor of a member at a joint to the total stiffness factor of the member meeting at the joint is called--------- | M4.03 | R |
| 9. | A beam with more than two span is called---------- | M4.01 | R |

## PART-B

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

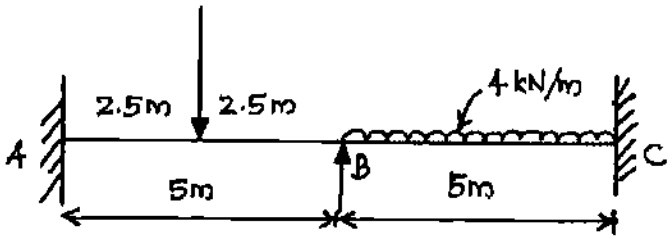
**(8 x 3 = 24 Marks)**

| | | Module Outcome | Cognitive level |
|---|---|---|---|
| 1. | Define point of contraflexure. | M1.01 | U |
| 2. | State the assumptions in theory of simple bending. | M1.03 | R |
| 3. | Write any three points considered for drawing SFD and BMD. | M1.02 | U |
| 4. | Define core of a section. | M2.03 | U |
| 5. | Differentiate short column and long column. | M2.01 | U |
| 6. | Distinguish the relation between bending moment, deflection, slope and radius of curvature. | M3.02 | U |
| 7. | Write the equations for slope and deflection for a simply supported beam with point load at centre. | M3.02 | R |
| 8. | State any three disadvantages of fixed beam. | M3.01 | R |
| 9. | Define the terms:<br>a. Stiffness factor b. Carryover factor | M4.03 | U |
| 10. | Explain Clapeyron's three moment theorem for continuous beams. | M4.02 | U |

## PART-C

**Answer '*all*' questions from the following. Each question carries *'seven'* marks.**

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

| | | Module Outcome | Cognitive level |
|---|---|---|---|
| III. | A cantilever beam of span 4m is fixed at A and free at B. It carries a UDL of 60N/m for the entire span and two point loads of 200N and 100N at the centre and free end respectively. Draw SFD and BMD. | M1.03 | A |
| | **OR** | | |
| IV. | A steel plate of width 120mm and thickness 20mm is bent into a circular arc of radius 10m. Determine the maximum stress induced and bending moment which will produce the maximum stress. Take E=2 x $10^5$ N/mm$^2$. | M1.03 | U |
| V. | Explain briefly the relationship between Bending Moment and shear force at a section. | M1.01 | R |
| | **OR** | | |
| VI. | A masonry dam 4.5m high, 1m wide at top and 3.5m wide at base retains water to the full height. The water face of the dam is vertical. Determine the maximum pressure intensity at base. Unit weight of water and masonry is 9810N/m$^3$ and 22500N/m$^3$ respectively. | M2.05 | U |
| VII. | List out the crippling load and effective length of a column with different end conditions. | M2.02 | R |
| | **OR** | | |
| VIII. | Write down the assumptions made in Euler's theory. | M2.02 | R |
| IX. | A rolled steel joist 150mm x 450mm is simply supported at ends and 5.3m span, carries a concentrated load of 100kN at mid span. Calculate the deflection at centre. E= 2 x $10^5$ N/mm$^2$. | M3.01 | U |
| | **OR** | | |
| X. | A beam 8m long is fixed at its ends. It carries a UDL of 4500N/m over the whole span. Find the maximum bending moment and maximum deflection. Take E = 200kN/mm$^2$ and I=5x$10^7$ mm$^4$. | M3.01 | U |
| XI. | Find the maximum torque transmitted by a hollow circular shaft of outer and inner diameter 200mm and 100mm respectively if the shear stress is not to exceed 40N/mm$^2$. | M3.03 | U |
| | **OR** | | |
| XII. | A continuous beam ABC of uniform section, with span AB and BC as 4 m each, is fixed at A and simply supported at B and C. The beam is carrying a UDL of 6 kN/m run throughout its length. Find the support moments and the reactions. | M4.02 | U |
| XIII. | A continuous beam ABC with AB=BC=3m and UDL=8kN/m acting throughout the span. Calculate the support moments using three moment equation and draw BMD. | M4.02 | A |
| | **OR** | | |
| XIV. | Using moment distribution method, analyse the beam shown in figure and find fixed end moments.   | M4.03 | A |

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