TED (15/19) – 3013
(Revision – 2015/19)

A24-6536

Reg.No……………..
Signature…………...

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL – 2024

THEORY OF STRUCTURES-I

[Maximum Marks : 100] [Time : 3 hours]

PART – A

(Maximum Marks : 10)

Marks

I. Answer **all** questions in one or two sentences. Each question carries 2 marks.

1. State Lami's theorem.
2. State Hook's law.
3. Define the term Point Of Contra Flexure.
4. Define the term neutral axis.
5. Define the term couple. (5x2=10)

PART – B

(Maximum Marks : 30)

II. Answer any **five** of the following questions. Each question carries 6 marks.

1. Draw SFD & BMD of a simply supported beam L meter long carrying uniformly distributed load of W/m at its entire span.
2. Find the reaction of a simply supported beam 5m long carrying concentrated loads of 30KN and 25KN at a distance of 2m and 4m respectively from the left end.
3. A rod 3 meter long at a temperature of 10°C finds the expansion of the rod when temperature is raised to 90°C. If the ends are yield by 1mm find the stress induced material of the rod. Take E= $2x10^5$ N/mm^2 and α= $12x10^{-6}$/°C.
4. Determine the Poisson's ratio and bulk modulus of a material for which modulus of elasticity is $1.2x10^4$ N/mm^2 and shear modulus is $4.8x10^4$ N/mm^2.
5. State the assumptions in pure torsion.
6. A rectangular beam 100mm wide and the beam is simply supported of a span of 5 meter if the beam is subjected to a uniformly distributed load of 5KN/m . Find the maximum bending stress induced in the beam.
7. Draw the stress-strain curve of mild steel and explain the salient features.

(5x6=30)

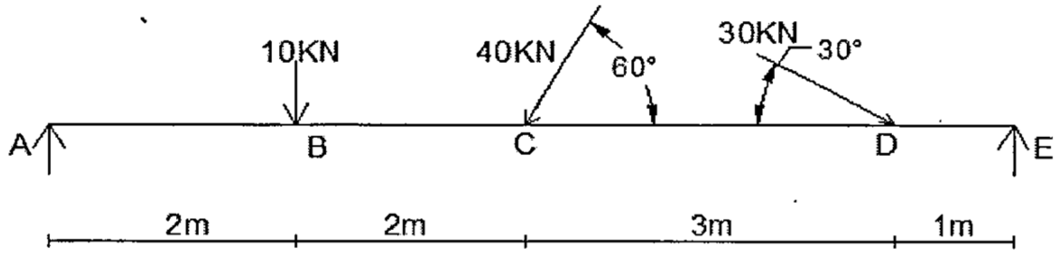
PART – C

(Maximum Marks : 60)

(Answer **one full** question from each unit. Each full question carries 15 marks)

UNIT – I

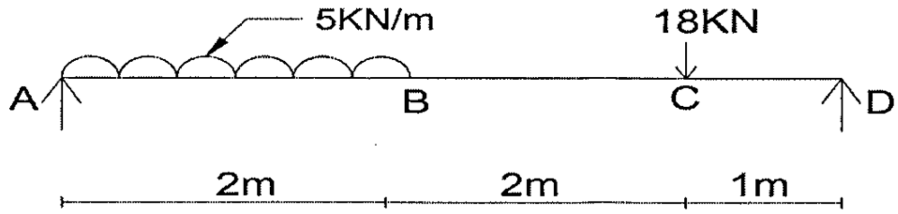
III. (a) Calculate the support reactions of the given figure. (6)



(b) Find the centre of gravity of 100mm x 150mm x 50mm of T-section. (9)

OR

IV. (a) Calculate the support reactions of the given figure. (6)



(b) An I-section with equal flanges has the dimensions, Flanges – 100mm x 20mm, Web- 150mm x 20mm, overall depth of the section is 190mm. Determine moment of inertia of the I-section about two centroidal axes at right angles to each other. (9)

UNIT – II

V. (a) A metallic bar 500mm x 200mm and 2m long is subjected to a load of 200KN applied gradually on it. If the stress at elastic limit of the bar material is 200 N/mm^2. Determine (i) Strain energy at the given load (ii) Proof resilience (iii) modulus of resilience. Take $E = 2x10^5$ N/mm^2. (9)

(b) List any six mechanical properties of materials. (6)

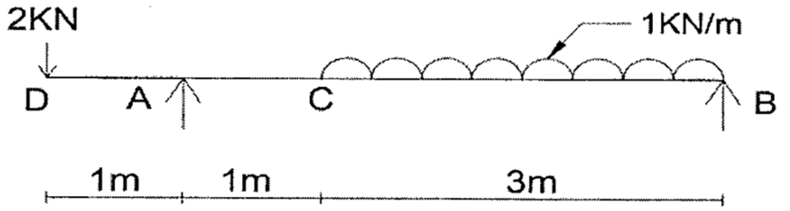
OR

VI. (a) Define the terms (i) Resilience (ii) Proof Resilience (iii) Modulus Of Resilience. (9)

(b) An axial pull of 30KN is suddenly applied on a steel rod 2.5m long and $1000mm^2$ in Cross-section. Calculate the strain energy which can be absorbed in the rod. Take E = 200GPa. (6)

UNIT –III

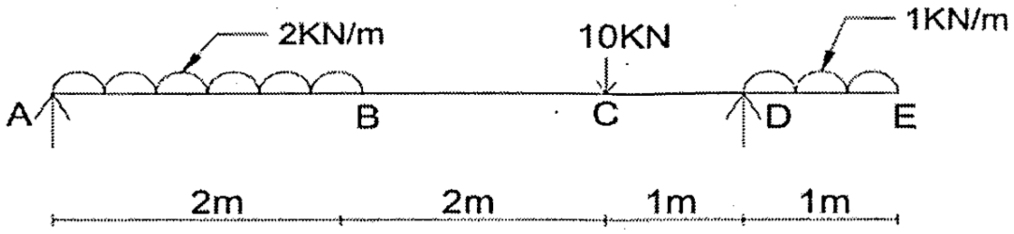
VII. (a) Draw the SFD & BMD of the given overhanging beam and also locate the point of Contra flexure. (10)



(b) Find the power transmitted by a circular shaft 40mm diameter and 120 rpm the maximum stress in the shaft is not to exceed 75 N/mm^2. (5)

OR

VIII. (a) Draw the SFD & BMD of the given overhanging beam and also locate the point of Contra flexure. (10)



(b) A hollow shaft of external diameter 150mm transmits 300KW power at 200 rpm. Determine the maximum internal diameter if maximum stress in the shaft is not to exceed 70 N/mm^2. (5)

UNIT – IV

IX. (a) Derive an expression for simple bending. (9)

(b) A spherical shell of 3m diameter is made up of 20mm thick plate calculate the change in diameter and volume of the shell when it is subjected to an internal pressure 3MPa. Take E = 200GPa and μ= 0.3. (6)

OR

X. (a) List the assumption in the theory of simple bending. (5)

(b) A beam of I-section consists of equal flanges 180mm x 20mm and a web of 300mm x 20mm. Find the magnitude of maximum shear stress when it is subjected to a shear force of 40KN and draw the shear stress distribution diagram over the depth of the section. (10)

****