

UTTARAKHAND TECHNICAL UNIVERSITY, DEHRADUN

MINISTRY OF HIGHER EDUCATION
 Government of Uttarakhand
 (ESTD. 1987)

Page No. _____
 Date: _____

Subject: _____
 Roll No. _____
 Name of Candidate: _____
 Name of Institute: _____

Part A

Part B

Sl. No.	Question	Answer	Mark	Total
1	1. Define the following terms: (a) Stress, (b) Strain, (c) Modulus of Elasticity.	Stress is the internal force per unit area. Strain is the deformation per unit length. Modulus of Elasticity is the ratio of stress to strain.	10	10
2	2. A bar of length 2m and diameter 20mm is subjected to a tensile load of 10kN. Calculate the elongation if the modulus of elasticity is 200kN/mm ² .	Elongation = (Load * Length) / (Area * Modulus of Elasticity) = (10000 * 2) / ((pi/4 * 20^2) * 200000) = 0.157mm	10	20
3	3. A cantilever beam of length 3m is fixed at one end and free at the other. It is subjected to a uniformly distributed load of 1kN/m. Calculate the maximum deflection.	Maximum deflection = (w * L^4) / (8 * EI) = (1 * 3^4) / (8 * EI) = 10.125 / EI	10	30
4	4. A simply supported beam of length 4m is subjected to a point load of 10kN at the center. Calculate the maximum bending moment.	Maximum bending moment = (Load * Length) / 4 = (10 * 4) / 4 = 10kNm	10	40
5	5. A rectangular plate of length 100mm and width 50mm is subjected to a shear stress of 10N/mm ² . Calculate the shear strain.	Shear strain = Shear stress / Modulus of Rigidity = 10 / G	10	50
6	6. A circular shaft of diameter 50mm is subjected to a torque of 10kNm. Calculate the maximum shear stress.	Maximum shear stress = (16 * Torque) / (pi * D^3) = (16 * 10000) / (pi * 50^3) = 16.38N/mm ²	10	60
7	7. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the hoop stress.	Hoop stress = (Pressure * Diameter) / (2 * Thickness) = (10 * 100) / (2 * t) = 500/t	10	70
8	8. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the longitudinal stress.	Longitudinal stress = (Pressure * Diameter) / (4 * Thickness) = (10 * 100) / (4 * t) = 250/t	10	80
9	9. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in volume.	Change in volume = (Volume * (2 * Hoop stress + Longitudinal stress)) / Modulus of Elasticity	10	90
10	10. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in length.	Change in length = (Length * Longitudinal stress) / Modulus of Elasticity	10	100

Sl. No.	Question	Answer	Mark	Total
11	11. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in diameter.	Change in diameter = (Diameter * Hoop stress) / Modulus of Elasticity	10	110
12	12. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in thickness.	Change in thickness = (Thickness * (2 * Hoop stress + Longitudinal stress)) / Modulus of Elasticity	10	120
13	13. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in area.	Change in area = (Area * (2 * Hoop stress + Longitudinal stress)) / Modulus of Elasticity	10	130
14	14. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in volume.	Change in volume = (Volume * (2 * Hoop stress + Longitudinal stress)) / Modulus of Elasticity	10	140
15	15. A thin-walled cylindrical shell of diameter 100mm and length 2m is subjected to an internal pressure of 10N/mm ² . Calculate the change in length.	Change in length = (Length * Longitudinal stress) / Modulus of Elasticity	10	150

Signature: _____
 Date: _____