MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech II Sem Supply End Examination, March 2022
Strength of Materials – II
(CIVIL)

Time: 3 Hours.   **Max. Marks: 70**

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	Determine the diameter of a solid shaft which will transmit 300kW at 200 r.p.m. The maximum shear stress should not exceed 30 N/mm² and be more than 10 in a shaft length of 2m. Take modulus of rigidity as 1×10^5N/mm²	7M	CO1	TL3
	b)	Distinguish between close and open helical coil springs	7M	CO1	TL2
2	a)	Define a) Torque b) Torsional moment of resistance c) Polar section modulus d)Proof load e) Proof stress f) Proof resilience	7M	CO1	TL2
	b)	Derive the relation between Twisting moment, Shear stress and angle of twist Apply	7M	CO1	TL2
3	a)	Derive the expression for Euler's crippling load for column with both ends hinged	7M	CO2	TL2
	b)	A hollow cylindrical cast iron column is 4 m long and fixed at the ends. Design the column to carry an axial load of 250 kN. Use Rankine's formula and adopt a factor of safety of 5. The internal diameter may be taken as 0.8 times the external diameter. Take fc = 550 N/mm² and Rankine's constant is 1/1600.	7M	CO2	TL3
4	a)	What is equivalent length of a column? Give the ratios of equivalent length and actual length of columns with various end conditions.	7M	CO2	TL2
	b)	Prove that an eccentric load causes a direct stress as well as bending stress	7M	CO3	TL2
5	a)	A rectangular column of width 120mm and of thickness 100mm carries a point load of 120kN at an eccentricity of 10mm. Determine the maximum and minimum stresses at the base of the column	7M	CO3	TL3
	b)	A masonry dam of trapezoidal section of 10m high. It has top width of 1m and bottom width 7m. The face exposed to water has a slope of 1 horizontal to 10 vertical. Determine the maximum and minimum stresses on the base, when the water level coincides with top of the dam. Take unit weight of masonry as 19.62 kN/m³.	7M	CO3	TL3

6	a)	A cylindrical shell is 3.0m long, 0.75m internal diameter and 12.5 mm thickness. Determine the change in diameter of the shell if it is subjected to an internal pressure of 1.5 N/mm². Also calculate the maximum shear stress induced in the shell. Given that E=200GPa and poissions ratio=0.25.	7M	CO4	TL3
	b)	Derive the expressions for hoop stress and longitudinal stress in a thin cylinder with ends closed by rigid flages and subjected to internal fluid pressure p. Take the internal diameter and shell thickness of cylinder to be d and t respectively.	7M	CO4	TL2
7	a)	A boiler is subjected to an internal steam pressure of 3MPa. The thickness of the boiler plate is 2.5cm and the permissible tensile stress is 125 MPa. Find out hte maximum diameter, when the efficiency of longitudinal joint is 90% and that of circumferential joint is 35%.	7M	CO4	TL3
	b)	A beam of rectangular cross-section, 100mm x 150mm is subjected to a bending moment of 25kNm in a plane making an angle 30 degrees (counter clockwise) with respect to vetical axis passing through the centroid of the section. Determine the neutral axis of the section and also calculate the maximum bending stress induced in the section	7M	CO5	TL3
8	a)	Discuss about deflection of a beam under unsymmetrical bending.	7M	CO5	TL2
	b)	Develop the equation of Shear centre for channel section.	7M	CO5	TL2

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