Q.P. Code: 19CE0103

R19

Reg. No: | | | | | | | | | | |

B.Tech II Year I Semester Regular Examinations Feb-2021

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 Hours | Max. Marks: 60

(Answer all five units **5 x 12 = 60 Marks**)

UNIT-I

1	a	Derive an expression for hoop and radial stresses across thickness of the thick cylinder.	6M
	b	A compound cylinder is made by shrinking a cylinder of external diameter 300 mm and internal diameter of 250 mm over another cylinder of external diameter 250 mm and internal diameter 200 mm. The radial pressure at the junction after shrinking is 8 N/mm2 . Find the final stresses set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 84.5 N/mm2	6M

OR

2	a	A thin cylindrical shell with following dimensions is filled with a liquid — atmospheric pressure Length =1.2 m, external diameter = 20 cm, thickness of metal = 8 mm. Find the value of the pressure exerted by the liquid on the walls of the cylinder and the-op stress induced if an additional volume of25 cm3 of liquid is pumped into the cylinder.-Take E = 2.1 x 105 N/mm2 and Poisson's ratio = 0.33.	6M
	b	A steel cylinder of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking, the diameter at the junction is 250 mm and radial pressure at the common junction is 28 N/mm2 . Find the original difference in radii at the junction. Take E = 2 x 105 N/mm2 .	6M

UNIT-II

3	a	Explain maximum principal strain theory	6M
	b	Determine the diameter of a bolt which is subjected to an axial pull of 9 kN together with a transverse shear force of 4.5 kN using : (i) Maximum principal stress theory. (ii) Maximum principal strain theory. Given the elastic limit in tension = 225 N/mm2, factor of safety = 3 and Poisson's ratio = 0.3.	6M

OR

4	a	Explain maximum strain energy theory.	6M
	b	A cylindrical shell made of mild steel plate and 1.2 m in diameter is to be subjected to an internal pressure of 1.5 MN /m2. If the material yields at 200 MN m2, calculate the thickness of the plate on the basis of the following three theories, assuming a factor of safety 3 in each case : (i) Maximum principal stress theory, (ii) Maximum shear stress theory, (iii) Maximum shear strain energy theory	6M

UNIT-III

5	a	State the difference between twisting moment and bending moment.	6M
	b	Define Polar modulus, Torsional rigidity.	6M

OR

6	a	In a torsion test, the specimen is a hollow shaft with 50 mm external and 30 mm internal diameter. An applied torque of 1.6 kN-m is found to produce an angular twist of 0.4° measured on a length of 0.2 m of the shaft. The Young's modulus of elasticity obtained from a tensile test has been found to be 200 GPa. Find the values of (i) Modulus of rigidity (ii) Poisson's ratio	6M

	b	A hollow steel rod 200 mm long is to be used as torsional spring. The ratio of inside to outside diameter is 1 : 2.The required stiffness of this spring is 100N.m/degree. Determine the outside diameter of the rod. Value of G is 8 x 104 N/mm2.	6M

UNIT-IV

7	**a**	State advantages of fixed ends or fixed supports.	6M
	b	A fixed beam AB of length 3 m is having moment of inertia I = 3 x 106 mm4. The support B sinks down by 3 mm. If E = 2 x 108 N/mm2, find the fixing moments.	6M

OR

8	**a**	A fixed beam AB of length 3 m carries a point load of 45 kN at a distance of 2 in from A. If the flexural rigidity (i.e., EI) of the beam is 1 x 104 kNm2 , determine : (i) Fixed end moments at A and B, (ii) Deflection under the load, (iii) Maximum deflection, and (iv) Position of maximum deflection.	6M
	b	Derive Clapeyron's Equation of three Moments.	6M

UNIT-V

9	**a**	Define curved beam and write a note on stresses generated in curved beams.	6M
	b	Calculate the stresses in curved beams and state the assumptions made in the analysis of curved beams.	6M

OR

10	**a**	Explain the importance of circular beam loaded uniformly and supported on symmetrically placed columns.	6M
	b	Explain the importance of simply supported on three supports equally spaced.	6M

****END****