



B.Tech IV Semester Supplementary Examinations, December 2024

STRENGTH OF MATERIALS - II
(Civil Engineering)

Maximum Marks: 70

Date: 05.12.2024

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20) Marks		CO	Bloom Tx
1	What is a torsional equation?	1	L1
2	Why hollow circular shafts are preferred when compared to solid circular shafts?	1	L1
3	List the end conditions of the column?	2	L1
4	What are the assumptions made in the Euler theory?	2	L1
5	What is the shape of distribution of bending stress in a curved beam?	3	L1
6	Where does the neutral axis lie in a curved beam?	3	L1
7	Define longitudinal stress.	4	L1
8	Define hoop stress.	4	L1
9	What is the shear centre equation for unsymmetrical I section.	5	L1
10	Define shear centre.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	A laminated spring 1 m long is made up of plates each 5 cm wide and 1 cm thick . If the bending stress in the plate is limited to 100 N/mm ² , how many plates would be required to enable the spring to carry a central point load of 2 kN? if $E = 2.1 * 10^5 \text{N/mm}^2$. What is the deflection under the load? [10M]	1	L2
OR			
12	A hollow circular shaft 20 mm thick transmits 300 kW power at 200 r.p.m. Determine the external diameter of the shaft if the shear strain due to torsion is not to exceed 0.00086. Take modulus of rigidity = $0.8 * 10^5 \text{N/mm}^2$. [10M]	1	L2
13	Using Euler's formula, Find the critical stresses for a series of struts having slenderness ratio of 40, 80, 120, 160 and 200 under both ends hinged condition. Take $E = 2.05 * 10^5 \text{N/mm}^2$. [10M]	2	L2
OR			
14	Simplify an expression for crippling load when both ends of the column are fixed. [10M]	2	L2

15	A closed ring of mean radius of curvature 90 mm is subjected to a pull of 3 kN. The line of action of the load passes through the centre of the ring. Find the maximum tensile and compressive stresses in the material of the ring if the ring is circular in cross section with diameter equal to 15 mm. [10M]	3	L2
OR			
16	A short column of rectangular cross section 80 mm by 60 mm carries a load of 40 kN at a point 20 mm from the longer side and 35 mm from the shorter side. Determine the maximum compressive and tensile stresses in the section. [10M]	3	L2
17	A boiler shell is to made of 15 mm thick plate having a limiting tensile stress of 120 N/mm ² . If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively. Determine the maximum permissible diameter of the shell for an internal pressure of 2 N/mm ² . [10M]	4	L2
OR			
18	Determine the change in diameter, change in length and change in volume of a thin cylindrical shell 100 cm diameter, 1 cm thick and 5 m long when subjected to internal pressure of 3 N/mm ² . Take the value of $E = 2 \times 10^5 \text{ N/mm}^2$ and poisson's ratio $\mu = 0.3$. [10M]	4	L2
19	Determine the shear centre of a channel section. [10M]	5	L2
OR			
20	A cantilever of length 1 m carries a point load of 2000 N at the free end. The cross section of the cantilever is an unequal angle of dimensions 100 mm by 60 mm and 10 mm thick. The small leg of the angle i.e (60 mm) is horizontal. The load passes through the centroid of the cross section. Determine the position of neutral axis. [10M]	5	L2