R18 Regulation *Subject code:2P4AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Supplementary Examinations, July 2022

STRENGTH OF MATERIALS – II

(Civil Engineering)

Maximum Marks: 70 Date:22.07.2022 **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.
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)

1 What is the polar modulus for solid shaft and circular shaft?
2 Define Polar Modulus.
3 What are the causes to fail the long column?
4 What is buckling or crippling load?
5 How will you calculate the resultant stress in a curved bar subjected to direct stress and bending stress.
6 How will you calculate the resultant stress in a chain link?
7 Define thin cylindrical shell.
8 Distinguish between cylindrical shell and spherical shell.
9 What do you mean by stress concentration?
10 Define unsymmetrical bending.

Part-B

Answer All the following questions. (5x10M = 50 Marks)

11 A closely coiled helical spring of round steel wire 10 mm in diameter having 10 complete turns with a mean diameter of 12 cm is subjected to an axial load of 200 N. Determine the deflection of the spring, maximum shear stress in the wire, stiffness of the spring. Take $C = 8 * 10^4$ N/mm^2. [10]

OR

12 Two shafts of the same material and of same length are subjected to the same torque, if the first shaft is of a solid circular section and the second shaft is of hollow circular section, whose internal diameter is 2/3 of the outside diameter and the maximum shear stress developed in each shaft is the same, compare the weights of the shafts. [10]

13 A solid round bar 4 m long and 5 cm in diameter was found to extend 4.6 mm under a tensile load of 50 kN. This bar is used as a strut with both ends hinged. Determine the buckling load for the bar and also the safe load taking factor of safety as 4.0. [10]

OR

14 Simplify an expression for crippling load when one end of the column is fixed and the other end is free. [10]

15 Determine the position of neutral axis, minimum and maximum stress when a curved beam of circular section of diameter 100 mm is subjected to pure bending moment of 11.5 kNm. The radius of curvature is 100 mm. [10]

OR

16 The line of thrust in a compression testing specimen 15 mm diameter, is parallel to the axis of the specimen but is displaced from it. Find the distance of the line of thrust from the axis when the maximum stress is 20% greater than the mean stress on a normal section. [10]

17 Find the thickness of metal necessary for a cylindrical shell of internal diameter 160 mm to withstand an internal pressure of 25 MN/m^2, if maximum permissible tensile stress is 125 MN/m^2. [10]

OR

18 A boiler is subjected to an internal steam pressure of 2 N/mm^2. The thickness of boiler plate is 2.0 cm and permissible tensile stress is 120 N/mm^2. Find out the maximum diameter, when efficiency of longitudinal joint is 90% and that of circumferential joint is 40%. [10]

19 Determine the position of shear centre for a channel section of 400 mm by 200 mm outside and 5 mm thick. [10]

OR

20 A simply supported beam of span 3 m carries a load of 500 N at its centre. The section of the beam is an equal angle of size 100 mm by 100 mm and 12.5 mm thick. The load line passes through centroid of the section. Find the position of neutral axis. [10]