R18 Regulation Subject code:2P4AB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, July 2021

STRENGTH OF MATERIALS-II

(Civil Engineering)

Maximum Marks: 70 Date:15.07.2021 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 Compare torsional stiffness and torsional rigidity.
2 What is resilience? List the application of leaf springs.
3 State the limitations of Euler's formula.
4 A solid round bar 3 m long and 5 cm in diameter is used as a strut with both ends hinged. Determine the crippling load. Take $E = 2 \times 10^5$ N/mm^2
5 What is the value of Kernel of the section for solid circular section?
6 Compare direct stress and bending stress.
7 A cylindrical pipe of diameter 1.5 m and thickness 1.5 cm is subjected to an internal fluid pressure of 1.2 N/mm^2. Determine the hoop stress.
8 What is the expression for circumferential strain in thin cylinder?
9 State the significance of shear center.
10 What are the reasons for unsymmetrical bending of a beam section?

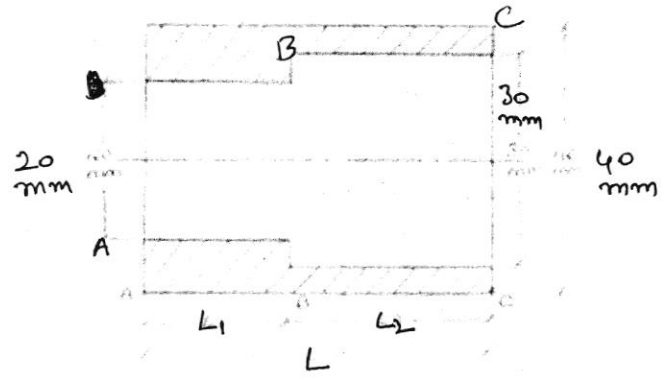
Part-B

Answer All the following questions. (5X10M=50Marks)

11 A closed coil helical spring of mean diameter 20 cm is made of 3 cm diameter rod with 16 turns. A weight of 3 kN is dropped on this spring. Find the height from which it should be dropped before striking the spring, so that it is compressed by 18 cm. Take $C = 8 \times 10^4$ N/mm^2. (10M)

OR

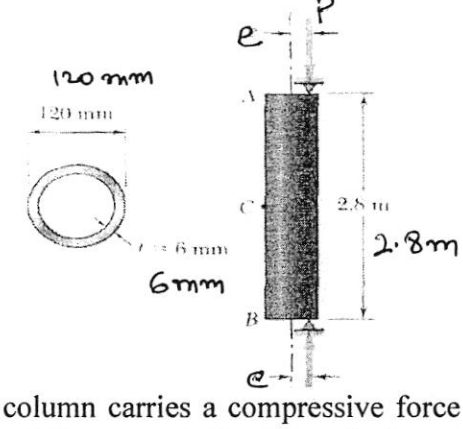
12 A shaft ABC shown below, of length 500 mm and 40 mm external diameter is bored, for a part of its length AB, to a 20 mm diameter and for the remaining length BC to a 30 mm diameter bore. If the shear stress is not to exceed 80 N/mm^2, find the maximum power, the shaft can transmit at a speed of 200 rpm. If the angle of twist in the length of 20 mm diameter bore is equal to that in the 30 mm diameter bore, find the length of the shaft that has been bored to 20 mm and 30 mm diameter. (10M)



13 A solid round bar 3 m long and 5 cm in diameter is used as a strut. Determine the crippling load when (a) both the ends are hinged, (b) Both ends are fixed and (c) one end is fixed and other end is hinged. Take $E = 2\times10^5 N/mm^2$. (10M)

OR

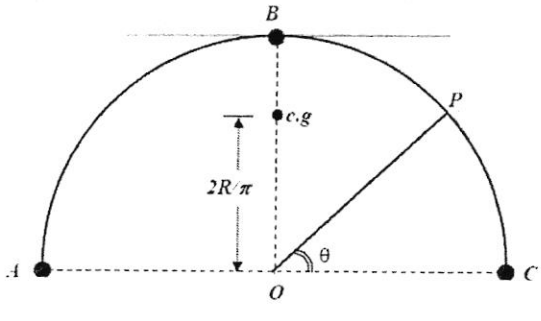
14 A mild steel pipe with shown cross section is subjected to an axial load applied 5 mm from its geometric axis. Find the load 'P' for which the horizontal deflection at mid-point is 5 mm and corresponding maximum stress. (10M)



15 A short hollow cylindrical column carries a compressive force of 400 kN. The external diameter of the column is 200 mm and the internal diameter is 120 mm. Find the maximum permissible eccentricity of the load, if the allowable stresses are 60 N/mm^2 in compression and 25 N/mm^2 in tension. (10M)

OR

16 A Semi-circular beam is simply supported on three equally spaced columns. Find the torsional moment at point B, maximum positive and negative bending moment. (10M)



17 A thick spherical shell of 200 mm internal diameter is subjected to an internal fluid pressure of 7 N/mm^2. If the permissible tensile stress in the shell material is 8 N/mm^2, find the thickness of the shell. (10M)

OR

18 A cylindrical thin drum of 64 cm diameter and 2.8 m length has a shell thickness of 11 mm. If the drum is subjected to an internal pressure of 2.8 N/mm^2. Determine the (a) change in diameter (b) change in length (c) change in volume, if $E = 2 \times 10^5$ N/mm^2 and Poisson's ratio = 0.3. (10M)

19 A beam of rectangular section, 80 mm wide, 120 mm deep is subjected to a bending moment of 20 kNm. The trace of the plane of loading is inclined at 45° to the YY axis of the section. Locate the neutral axis of the section and calculate the bending stress induced at each corner of the beam section. (10M)

OR

20 Locate the shear center of an unsymmetrical cross section shown below. (10M)