ACE
Engineering College

(An Autonomous Institution)

Question Paper Code: CE404PC

ACE-R20

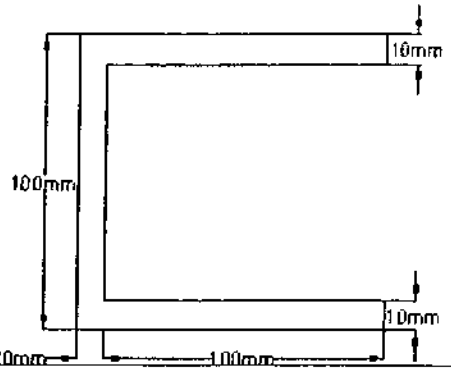
Semester End Examination
II B. Tech- II Semester- AUGUST/SEPTEMBER -2022
Strength of Materials – II
CIVIL ENGINEERING

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

H. T. No										

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks
1.	Derive an expression for the Shear stress produced in a circular shaft which is subjected to torsion and what are the assumptions made in the derivation?	14
2. a)	Find an Expression for crippling load for a long column with one end of the column is fixed and other end hinged.	7
b)	Determine Euler's crippling load for an I-Section Joist 40cm × 20cm × 1cm and 5m long which is used as a strut with both ends fixed . Take young's Modulus for the joist as 2.0×10^5 N/mm^2	7
3. a)	A masonry dam of trapezoidal section is 9m high. It has top width of 1.25 m and bottom width 6m. The face exposed to water is vertical. Determine the maximum and minimum stresses on the base, when the level coincides with top of the dam. Take weight density of masonry as 19.62 kN/m^3.	9
b)	What do you mean by stability of a dam? Explain the different conditions under which a dam is going to fail?	5
4. a)	Define the term 'Polar modulus'. Find the expressions for polar modulus for a solid shaft and hollow shaft	7
b)	A hollow column of C.I. whose outside diameter is 200mm and has a thickness of 20mm. It is 4.5 m long and is fixed at both the ends. Calculate the safe load by Rankine's formula using a factor of safety as 4. Calculate slenderness ratio and ratio of Euler's and Rankine's critical loads. Take a=1/1600, E=9.4×10^4 N/mm^2 and σ_c=550 N/mm^2.	7
5. a)	Two close-coiled concentric helical springs of the same length, are wound out of the same wire, circular in cross-section and supports a compressive load 'P'. The inner spring consists of 20 turns of mean diameter 16cm and the outer spring has 18 turns of mean diameter 20cm. Calculate the maximum stress produced in each spring if the diameter of wire=1 cm and P=1000N	8
b)	Discuss in detail about the following terms with neat sketches i) Middle third rule for Rectangular sections ii)Middle quarter rule for circular sections	6
6. a)	Derive an expression for circumferential stress and longitudinal stress for a thin shell subjected to an Internal pressure	10

6.b)	i) Differentiate between a thin cylinder and thick cylinder ii)What do you mean by Lame's equations?	4
7. a)	Determine the shear centre for a channel section shown in fig.  	10
b)	i) Define shear center? ii) What are the reasons for unsymmetrical bending	4
8. a)	Write the different methods of reducing hoop stress.	4
b)	A simply supported beam of span 3.6m carries a load of 600N at its center. The section of beam is an equal angle of size 120 X 120 X 15mm. The load line passes through the centroid G of the section vertically. Determine stresses at extreme corner points of mid-section of beam. Find also the position of neutral axis.	10