Printed Pages –6 Roll No. : .....

337452(37)

B. E. (Fourth Semester) Examination, April-May 2021

(New Scheme)

(Mechanical Engg. Branch)

MECHANICS OF SOLIDS-II

Time Allowed : Three hours

Maximum Marks : 80

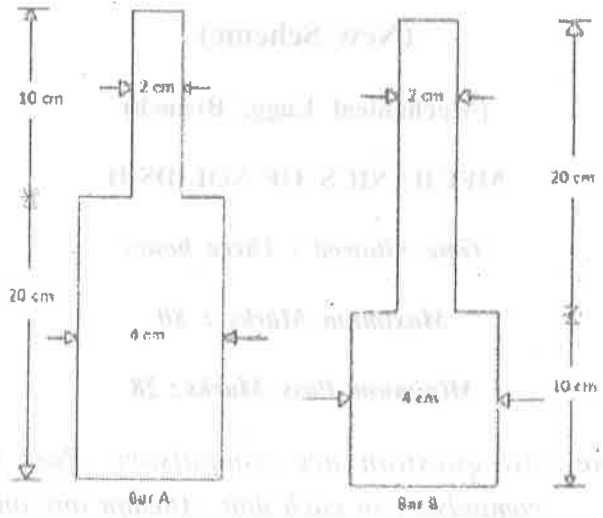
Minimum Pass Marks : 28

Note : *All question are compulsory. Part (a) is compulsory in each unit. Attempt any one part from (b) and (c) each unit. Assume suitable data if necessary.*

Unit-I

1. (a) Define resilience & proof resilience. 2

(b) Two similar bars A & B are each 30 cm long as shown in fig. The bar A receives an axial blow, which produces a maximum stress of 200 MN/m^2. Find the maximum stress produced by the some blow on the bar B. If the bar is stressed to 200 MN/m^2. determine the ratio of energy stored by the bars A and B. 14



(c) Using Castigliano's Theorem, calculate the vertical deflection at the middle of a simply supported beam which carries a uniformaly distributed load of intensity *w* over the full span. The flexural rigidity EI of the beam is constant and only strain energy of bending is to be considered. 14

Unit-II

2. (a) Define fined & continous beam. 2

(b) A fined beam AB of length 6 m carries point loads of 160 kN and 120 kN at a distance of 2 m and 4 m from the left end A. Find the fined end moments and the reactions at the supports. Draw B.M. and S.F. diagrams. 14

(c) A continuous beam ABC covers two consecutive span AB and BC of lengths 4 m and 6 m, carring uniformly distributed loads of 6 kN/m and 10 kN/m respectively. If the ends A and C are simply supported, find the support moments A, B and C. Draw also B.M. and S.F. diagrams. 14

Unit-III

3. (a) Write the assumption made in the analysis of curved bar using Winkler - Boch theory. 2

(b) A hook carries a load of 7.5 kN and the load line is at a distance of 20 mm from the inner edge of the section which is trapezoidal. The load line also passes through the centre of curvature of the hook. The dimensions of the hook. The dimensions of the central horizontal trapezoidal section are : inner width = 30

mm; outer width = 15 mm; depth = 30 mm. Calculate the maximum and minimum stresses. 14

(c) A closed ring of mean radius of curvature 90 mm is subjected to a pull of 3kN. The line of action of the load passes through the centre of the ring. Calculate the maximum tensile & compressive stresses in the meterial of the ring if the ring is circular in cross - section with diameter equal to 15 mm. 14

Unit-IV

4. (a) Explain long column, medium column and short column. 2

(b) Compare the crippling load given by Rankine's and Euler's formulae for tubular strut 2.25 m long having outer and inner diameter of 37.5 mm & 32.5 mm loaded through pin-joint at both ends.

Take : Yield stress as 315 MN/m^2; $a = \frac{1}{7500}$, & E = 200 GN/m^2; If elastic limit for the material is taken as 200 MN/m^2. Then for what length of the strut does the Euler formula cease to apply? 14

(c) A 80mm×80mm×10mm section shown in fig. is

used as a simply supported beam over a a span of 2.4 m.

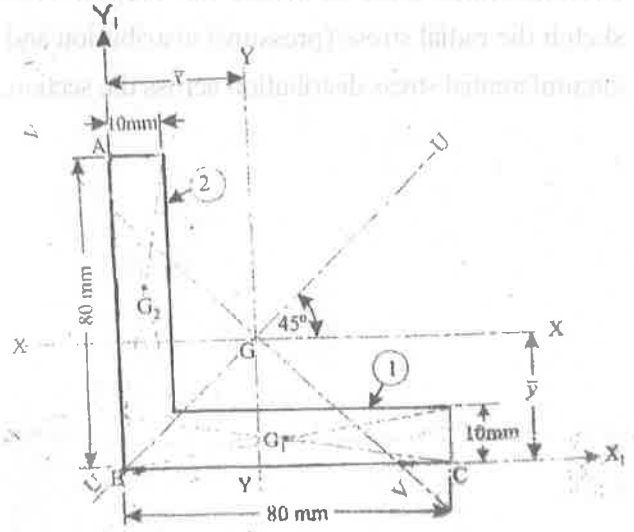
It carries a load of 400 N along the line $\frac{1}{G}$, where G is the centroid of the section. calculate : 14

(i) Stresses at the points A, B and C of the mid section of the beam;

(ii) Deflection of the beam at the mid section and its direction with the load line;

(iii) Position of the neutral axis.

Take : E = 200 GN/m^2.



Unit-V

5. (a) Difference between Thin and Thick shells. 2

(b) A cylindrical shell 3 m long which is closed at the ends has an internal diameter of 1 m and a wall thickness of 15 mm. Calculate the circumferential and longitudinal stresses induced and also change in the dimensions of the shell if it is subjected to an internal pressure of 1.5 MN/m^2. 14

(c) A pipe of 200 mm internal diameter and 50 mm thickness carries a fluid at a pressure of 10 MN/m^2. Calculate the maximum and minimum intensities of circumferential stresses across the section. Also sketch the radial stress (pressure) distribution and circumferential stress distribution across the section. 14