

Seat No.	
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S.E. (Civil) (Semester - IV) Examination, November - 2014

STRUCTURAL MECHANICS - II

Sub. Code : 43586

Day and Date : Wednesday, 26 - 11 - 2014

Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :
- 1) Attempt any three questions from each Section.
 - 2) Figures to the right indicate full marks.
 - 3) Assume any suitable data, if required and clearly mention it.

SECTION - I

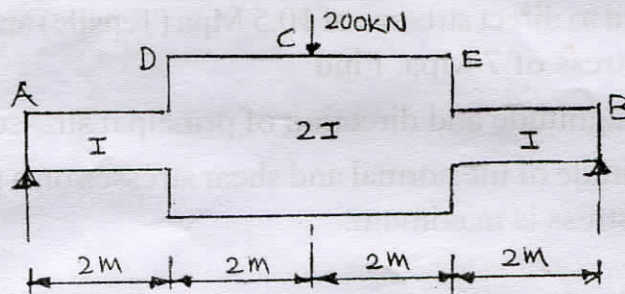
- Q1)** a) Explain the terms Principal plane and principal stress. [4]
 b) At a point in a bracket the stresses on two mutually perpendicular planes are subjected to direct stresses of 10.5 Mpa (Tensile) and 3.5 Mpa (Comp.) and shear stress of 7 Mpa. Find [12]
 i) The magnitude and direction of principal stresses, and
 ii) Magnitude of the normal and shear stresses on a plane on which the shear stress is maximum.
- Q2)** a) Explain the different conditions for the stability of a dam. [5]
 b) A masonry retaining wall of trapezoidal section is 10 m high and retains earth which is level upto the top. The width at the top is 2 m and at the bottom 8 m and the exposed face is vertical. Find the maximum and minimum intensities of normal stress at the base. Take density of earth = 16 KN/m³ Density of masonry = 24 KN/m³, Angle of repose = 30°. [13]
- Q3)** a) What are the assumptions made in torsion formula. [4]
 b) A hollow shaft is to transmit 300 KW at 80 r.p.m. If the shear stress is not to exceed 60 Mpa and internal diameter is 60% of the external diameter, find the external and internal diameters assuming that the maximum torque is 40% more than mean. [12]

P.T.O.

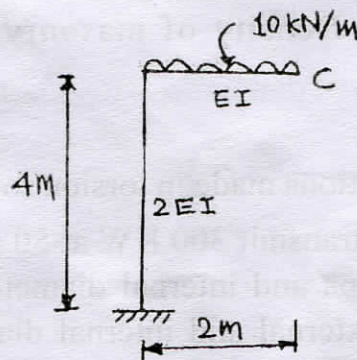
- Q4) a) Define the term column and strut and explain the different types of column. [4]
- b) A hollow cast iron column whose outside diameter is 200 mm has a thickness of 20 mm. It is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine formula using a factor of safety of 4.
- Take $\sigma_c = 550 \text{ Mpa}$. $a = 1/1600$. [12]

SECTION - II

- Q5) a) Derive the relationship between curvature, slope and deflection at a section of a beam. [6]
- b) Using conjugate beam method, for the beam shown in fig. find the slopes and deflections at A, B, C, and D. Take $E = 200 \times 10^6 \text{ KN/m}^2$ and $I = 300 \times 10^{-4} \text{ m}^4$. Neglect the weight of the beam. [12]



- Q6) Determine the horizontal and vertical deflection of the bent as shown in fig below. Take $EI = 2000 \text{ KN-m}^2$. [16]



- Q7) a) Explain any three theories of failure. [6]
- b) A shaft is subjected to a maximum torque of 10 KN-m and a maximum bending moment of 7.5 KN-m at a particular section. If the allowable equivalent stress in simple tension is 160 Mpa. Find the diameter of the shaft according to the maximum shear stress theory. [10]

- Q8) a) What are the uses of influence lines. [4]
- b) Draw ILD for Reaction at D, moment at A, moment at B for the compound beam as shown in fig. below. The beam has internal hinges at C and E. [12]

