23/06/2016 JNIT

4E4111

Roll No. _____ Total No of Pages: 7

4E4111

B.Tech. IV-Sem (Main & Back) Exam; June-July 2016
Civil Engineering
4CE1A Strength of Materials-II

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks (Main & Back): 26

Min. Passing Marks (Old Back): 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

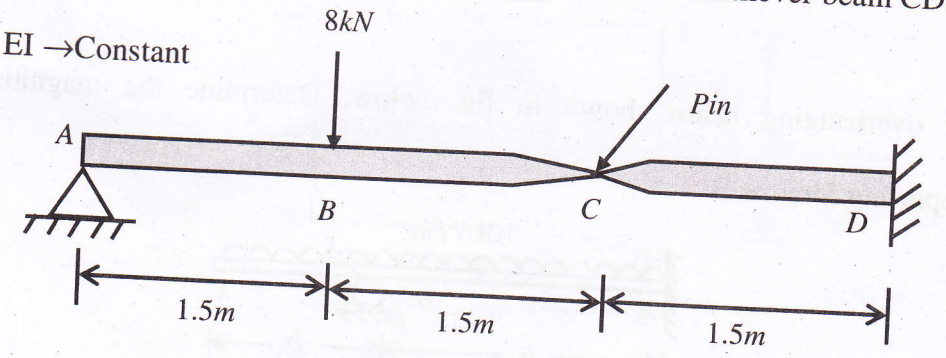
(Mentioned in form No.205)

1. NIL

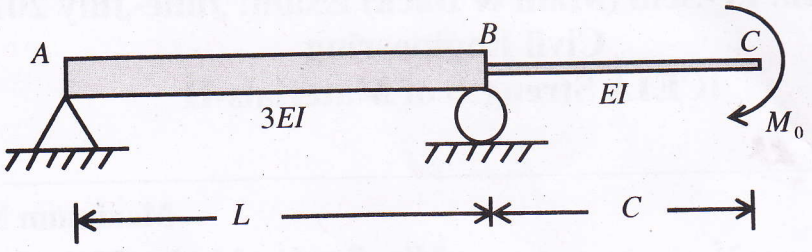
2. NIL

UNIT-I

Q.1 (a) Determine the deflection of point B for beam and loading shown below. Beam AC is simply supported at A and at C is pinned to a cantilever beam CD. [8]

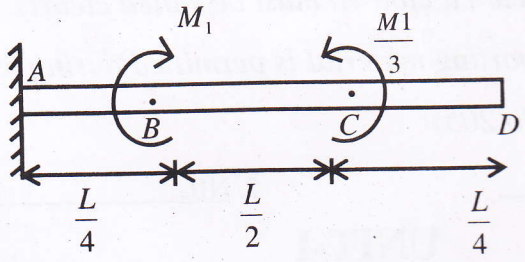


(b) For Beam ABC and loading shown in fig below, calculate deflection at free end C. Flexural rigidity for beam AB is 3EI and for BC is EI. [8]



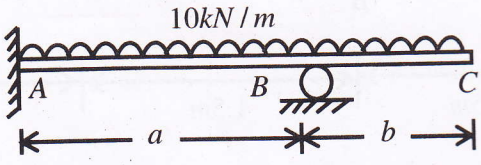
OR

Q.1 The cantilever beam AD is loaded by the applied couples M_1 and $M_{1/3}$ as shown in fig below. Determine the equation of the deflected beam & deflection at D. [16]



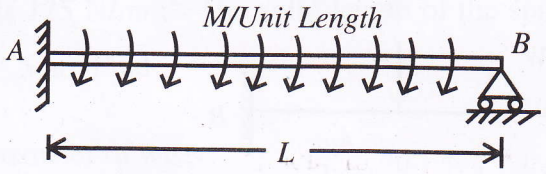
UNIT-II

Q.2 For overhanging beam shown in fig. below. Determine the magnitude of the supporting force at B. [16]



OR

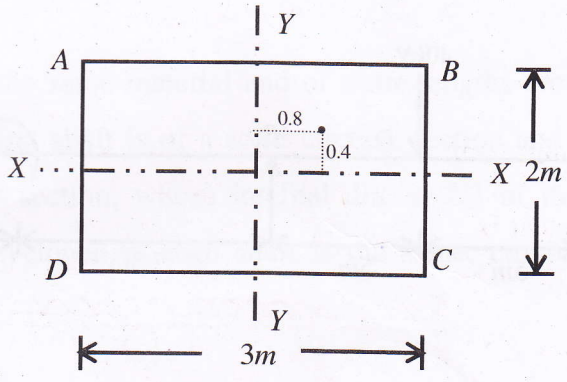
Q.2 (a) A propped cantilever is acted by a uniformly distributed moment of intensity m per unit distance along the axis of the beam. Find the Reaction at B. [8]



(b) A masonry pier of 2m x 3m supports a vertical load of 50 kN as shown in fig below. Find. [8]

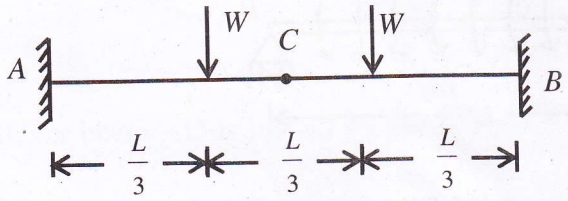
(i) Stresses developed at each corner of the pier.

(ii) What additional load should be placed at the centre of the pier, so that there is no tension any where in the pier section.



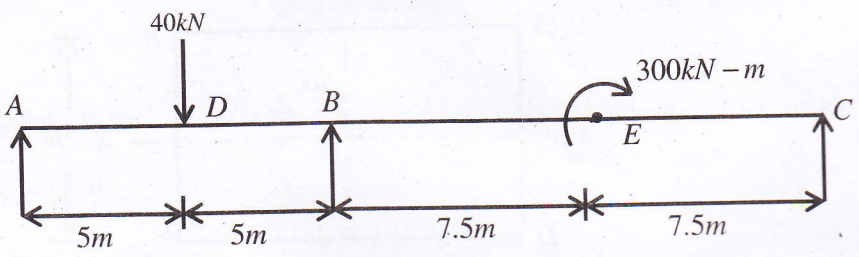
UNIT-III

Q.3 Find the support moments of a built - in beam loaded at third points by two point loads W each. Also draw the B.M and S.F diagrams and compute the deflection at the centre. [16]



OR

Q.3 A continuous beam ABC of constant moment of inertia is simply supported at A, B and C. The beam carries a central point load of 40 kN in span AB and a central clockwise couple of 300 kN-M in the Span BC, as shown in fig. below. Find the support moments and plot the shear force and bending moment diagrams. [16]



UNIT-IV

Q.4 (a) Write down the assumptions used in developing the equations for stresses and deformation in a bar subjected to pure torsion. [4]

(b) The stiffness of a close-coiled helical spring is 1.5 N/mm of compression under a maximum load of 60N. The maximum shearing stress produced in the wire of the spring is 125 N/mm^2. The solid length of the spring (when coils are touching) is given as 5cm. Find [12]

(i) Diameter of wire

(ii) Mean diameter of the coils and

(iii) Number of coils required. Take $N = 4.5 \times 10^4$ N/mm^2 (Modulus of rigidity)

OR

Q.4 (a) Derive expressions for stiffness of composite springs when two springs of stiffness S_1 and S_2 respectively are arranged in [6]

(i) Series &

(ii) Parallel

(b) Two shafts of the same material and of same lengths 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 dia. is 2/3 of the outer dia. and max. Shear stress developed in each shaft is the same; compare the weights of the shafts. [10]

UNIT-V

Q.5 Write short notes on the following (any four) [4×4=16]

(a) Degrees of freedom.

(b) Consequences of vibration

(c) Vibration control in the design of structures.

(d) Mathematical modelling of an SDOF system

(e) D' Alembert's principle

(f) Types of vibration.

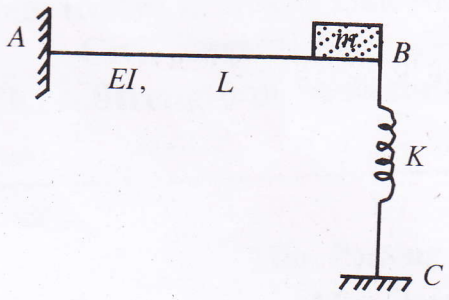
OR

Q.5 (a) A cantilever beam AB of Length L is attached to a spring K and a mass M as shown in fig. below. [10]

(i) Form the equation of motion.

(ii) Find expression for the frequency of motion

(iii) Determine static deflection of spring.



(b) Explain the Rayleigh's method to determine the natural frequency of the system. [6]
