



GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

(An Autonomous Institute of Government of Maharashtra)

National Highway No.6, JALGAON – 425 002

Phone No.: 0257-2281522

Fax No.: 0257-2281319

Website : www.gcoej.ac.in

E-mail : princoej@rediffmail.com



Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **CE253U - Basic Theory of Structures**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

1) Solve following sub-questions. (Qu. 1a OR 1b, Question 1c is compulsory)

- a)
- i). Find the rotation and deflection at the free end in the overhanging beam shown in fig. 1. Use conjugate beam method. [6]



Fig. 1

- ii). Explain concept of moment area method. [2]

OR

- b)) Determine θ_A , θ_B , θ_C and deflection Δ_C in the beam shown in figure 2 by conjugate beam method. [8]

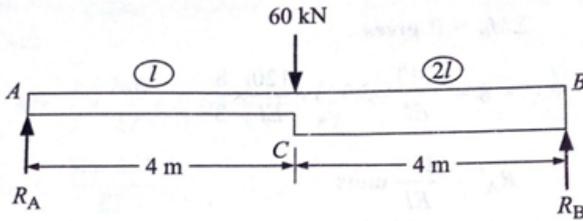


Fig. 2

- c)

 - i). Explain lack of fit in truss. [3]
 - ii). Write a short note on two hinged arches. [3]

2) Solve all sub-questions.

- a)) For the beam loaded as shown in fig. 3, find deflection at the free ends and at centre. Also find slopes at the supports and free ends. Use moment area method. [10]

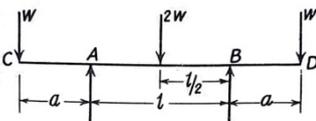


Fig. 3

- b)) Find the fixing moments at the supports and draw the bending moment diagram for the fixed beam shown in figure 4 if support B sinks by 10 mm. Take $E = 200 \text{ kN/mm}^2$ and $I = 2.75 \times 10^7 \text{ mm}^4$. Also find final reactions at supports. [7]

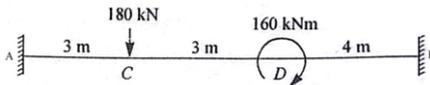


Fig. 4

- c)) Analyse the continuous beam ABCD shown in figure 5 if support C settles down by 5 mm. Take $E = 15 \text{ kN/mm}^2$. Moment of inertia is constant throughout and is equal to $5 \times 10^9 \text{ mm}^4$. [6]

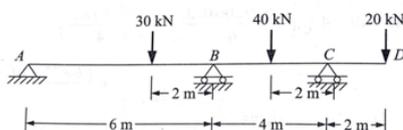


Fig. 5

3) Solve all sub-questions.

- a)) A train of 5 wheel loads as shown in figure 6 crosses a simply supported beam of span 24 m from left to right. Calculate the maximum positive and negative shear force values at the center of the span and the absolute maximum bending moment anywhere in the span. [8]

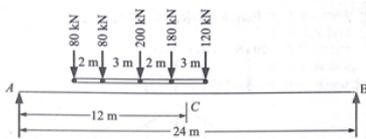


Fig. 6

- b)) A uniformly distributed load of 4 kN/m covers left hand half of the span of a three hinged parabolic arch of 36 m span and 8 m central rise. Calculate the horizontal thrust. Also find the B.M. S. F. and normal thrust at the loaded quarter point. [8]

4) Solve following sub-question.

- a)) Determine the vertical and horizontal displacement components of joint C of the truss shown in fig. 7. Take $E = 200 \times 10^6 \text{ KN/m}^2$ and sectional area of each bar $A = 100 \text{ mm}^2$. Use Castiglione's theorem. [7]

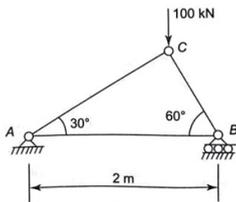


Fig. 7

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