**20CE501**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **December, 2023** | **Civil Engineering** | | |
| **Fifth Semester** | **Structural Analysis** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | State Eddy’s theorem | CO 1 | L1 | 1M |
|  | b) | Differentiate three hinged and circular arches. | CO 1 | L2 | 1M |
|  | c) | What is meant by equilibrium of cable? | CO 1 | L1 | 1M |
|  | d) | Where do you get maximum tension in the cable when loaded uniformly throughout the span? | CO 1 | L2 | 1M |
|  | e) | State the uses of influence line diagrams | CO 2 | L1 | 1M |
|  | f) | Mention the condition for maximum shear force at a given section when a udl shorter than the span traverse on a cross girder | CO 2 | L2 | 1M |
|  | g) | Write the fixed end moments for a fixed beam of length ‘L’ and uniform cross section with a central point load ‘W’ acting on it. | CO 3 | L2 | 1M |
|  | h) | List out advantages of fixed beams over simply supported beams | CO 3 | L2 | 1M |
|  | i) | What is elastic prop? | CO 3 | L1 | 1M |
|  | j) | Write the theorem of three moment equation for a two-span continuous beam. | CO 3 | L1 | 1M |
|  | k) | Define the relative stiffness. | CO 4 | L1 | 1M |
|  | l) | Differentiate determinate and indeterminate structures | CO 4 | L2 | 1M |
|  | m) | Describe the term carryover factor. |  |  | 1M |
|  | n) | What do you mean by moment distribution factor? | CO 4 | L1 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | A three-hinged parabolic arch of uniform cross section has a span of 60 m and a rise of 10 m. It is subjected to uniformly distributed load of intensity 10 kN/m as shown in the following figure. Show that the bending moment is zero at any cross section of the arch. | CO 1 | L4 | 14M |
| **(OR)** | | | | | |
| 3 |  | A suspension cable of horizontal span 15 m is to be used to support five equal loads of 30 kN each at 3 m spacing. The central dip of the cable is limited to 1.5 m. Find the length of the cable required and also its sectional area if the safe tensile stress is 800 N/mm2. | CO 1 | L3 | 14M |
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| **Unit-II** | | | | | |
| 4 |  | Two-wheel loads of 12 kN and 4 kN at a fixed distance 4.5 m, cross a beam of span 25 m. Draw the influence line diagram for bending moment and shear force at a point 12 m from the left abutment and find the maximum bending moment and shear force at that point. Also, find out the absolute maximum bending moment that may occur anywhere on the beam. | CO 2 | L4 | 14M |
| **(OR)** | | | | | |
| 5 |  | Two-wheel loads, 160 kN and 90 kN, spaced 4 m apart, are moving over a simply supported beam of 12 m span. Determine the maximum shear force and moment that may be developed anywhere on the beam. | CO 2 | L4 | 14M |
| **Unit-III** | | | | | |
| 6 | a) | Analyse the propped cantilever shown below by using method of consistent deformations. | CO 3 | L4 | 7M |
|  | b) | A beam AB of uniform cross section if fixed at both ends and is loaded as shown in Fig. Determine fixing moments and reactions at A & B. Also draw SF and BM diagrams. E = 2x105 N/mm2 and I = 5x108 mm4. | CO 3 | L4 | 7M |
| **(OR)** | | | | | |
| 7 | a) | What is sinking of supports in fixed beam? Determine the fixed end moments induced in a fixed beam of span L due to sinking of one of the supports. | CO 3 | L3 | 10M |
|  | b) | Write a brief note on effect of rotation of a support with an example. | CO 3 | L2 | 4M |
| **Unit-IV** | | | | | |
| 8 |  | Analyse the continuous beam shown in figure, Calculate the support moments using slope deflection method. Sketch the SF and BM diagrams. | CO 4 | L4 | 14M |
| **(OR)** | | | | | |
| 9 |  | For the continuous beam shown in figure. Calculate the support moments by using moment distribution method. Draw the SF and BM diagrams. | CO 4 | L4 | 14M |

