Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17CE2010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STRUCTURAL ANALYSIS – I** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Define the degrees of freedom in a simply supported beam. | 1 | 2 |
| b. | Why is it necessary to compute deflection in structures? | 1 | 2 |
| c. | Find the vertical displacement of the steel truss shown in figure below at the end C. Take A = 1,200 mm2 and E = 200 kN/mm2. | 1 | 16 |
| **(OR)** | | | | |
| 2. | a. | Find the vertical deflection at joint B of the pin-jointed frame shown in figure below. AE is constant for all members. | CO1 | 20 |
|  |  |  |  |  |
| 3. | a. | Analyse the continuous beam shown in figure below using slope deflection method and draw the bending moment diagram. | CO2 | 20 |
| **(OR)** | | | | |
| 4. |  | Analyse the frame given below using slope deflection method. | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | Analyse the continuous beam loaded as shown in figure below by moment distribution method. Sketch the bending moment and shear force diagrams. EI – Constant in all spans | CO2 | 20 |
| **(OR)** | | | | |
| 6. |  | A continuous beam ABC is supported on an elastic column BD and is loaded as shown in figure below treating joint B as rigid. Analyse the frame and the bending moment diagram and sketch the deflected shape of the structure. | CO2 | 20 |
|  |  |  |  |  |
| 7. |  | Four point loads 8kN, 15kN, 15kN and 10kN have centre to centre spacing of 2m between consecutive loads and they traverse a girder of 30m span from left to right with 10kN load leading. Calculate the maximum bending moment and maximum shear force at 6m from the left support. | CO1 | 20 |
| **(OR)** | | | | |
| 8. |  | A girder having a span of 18m is simply supported at the ends. It is traversed by a train of loads as shown in figure below, the 50kN leading. Find the maximum bending moment which can occur:   1. Under the 30kN load; 2. Under leading 50kN load using influence line diagram. | CO1 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Derive the shape factor for a rectangle section of breadth *b* and depth *d*. | CO3 | 8 |
| b. | Determine the plastic moment capacity of the section required for the frame shown in figure below. The loads shown are working loads. Assume same plastic moment capacity for all the members. | CO3 | 12 |