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



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

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| **Code :** | **14CE2006** | Duration : | **3hrs** |
| **Sub. Name :** | **STRENGTH OF MATERIALS** | Max. marks : | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A beam of length 10m is simply supported at its ends and carries two point loads of 10kN and 30 kN at a distance of 4m from both the ends. Calculate (i) deflection under each load (ii) maximum deflection. Take E = 2x106N/mm2 and I = 1.2x109 mm4. | CO2 | 20 |
| (OR) | | | | |
| 2. | a. | A cantilever of length 3m carries a point load of 60 kN and 80 kN at the distance of 1m and 2m from the right end. If E = 2.2x105 N/mm2 and I = 109mm4 find the slope and deflection at the free end using conjugate beam method. | CO2 | 20 |
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| 3. | a. | A continuous beam ABC of length 10m rests on three supports A, B, and C at the same level in which span AB = 6m and span  BC = 4m. In span A, there is a point load of 8kN at a distance of 2m from the end A, whereas in the span BC, there is a uniformly distributed load of 6kN/m run over the whole length. Determine the support moments and support reactions. Draw S.F. and B.M. diagrams. | CO1 | 20 |
| (OR) | | | | |
| 4. | a. | List the advantages and disadvantages of a fixed beam over a simply supported beam. | CO1 | 4 |
|  | b. | A continuous beam ABCD, simply supported at A,B,C and D is loaded as shown in fig. Sketch the B.M. and S.F. diagrams. | CO1 | 16 |
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| 5. | a. | A simply supported beam of length 8m is subjected to a uniformly distributed load of 10 kN/m over the left half of the span and deflects 10 mm at the center. Estimate the crippling load when this beam is used as a column the following conditions:   1. one end is fixed and other end hinged 2. both the ends pin jointed 3. Both the ends fixed | CO2 | 20 |
| (OR) | | | | |
| 6. | a. | The external and internal diameter of a hollow cast iron are 50mm and 30mm respectively. If the length of this column is 4m and both of its end are fixed, determine the crippling load using Rankine’s formula.  Take the value of = 550 N/mm2 and a = in Rankine’s  formula. | CO2 | 15 |
|  | b. | List the assumptions of Euler’s theory for long column analysis. | CO2 | 5 |
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| 7. | a. | A beam of T section (flange: 100mm x 20mm; web: 150mm x 10mm) is 2.5m long and is simply supported at the ends. It carries a concentrated load of 3.2kN at its centre but inclined at an angle of 20o to the vertical and passing through the centroid of the section. If E = 200GPa, determine the maximum tensile stress, maximum compressive stress. | CO2 | 12 |
|  | b. | Define shear centre. Give its significance.  Locate the shear centre of a channel section of of uniform thickness,  b = 100mm, h = 150mm, t = 3mm. | CO2 | 8 |
| (OR) | | | | |
| 8. | a. | Find the thickness of metal necessary for a cyclindrical shell of internal diameter 160mm to withstand an internal pressure of 8N/mm2. The maximum hoop stress in the section is not to exceed 35 N/mm2. | CO1 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Explain in detail the following theories of Failure and its significance.   1. Maximum Principal stress theory ( due to Rankine). 2. Maximum shear stress theory ( Guest - Tresca ). 3. Total strain energy per unit volume ( Haigh ) Theory. | CO3 | 20 |