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



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

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| **Code : 17CE2006** |  | **Duration :** | **3hrs** |
| **Sub. Name : STRENGTH OF MATERIALS – II** |  | **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. | Using Castligliano’s theorem, compute the deflection under the point load for the given beam. Take flexural rigidity value as 2.3 MNm2. | CO1 | 14 |
| b. | A steel bar of 3cm x 3cm cross section is 3m long. This bar is subjected to an axial pull of 100 kN. Estimate the elongation of the bar and strain energy stored in the bar. Take E= 200GPa. | CO1 | 6 |
| **(OR)** | | | | |
| 2. | a. | Determine the vertical deflection of point D in the given truss. Members AB, BD and DE are 4m long; Member CD is 3m long. Cross sectional areas of members AD and DE are 1000 mm2 while the other members are of 700 mm2. Take E= 200kN/mm2. | CO1 | 15 |
| b. | Distinguish between proof resilience and modulus of resilience. | CO1 | 3 |
| c. | State and explain Castligliano’s first theorem. | CO1 | 2 |
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| 3. | a. | Analyze the given beam and draw its BMD and SFD. Calculate the value of maximum deflection in the beam. Take flexural rigidity value as 15.8x104 kNm2 | CO2 | 16 |
|  | b. | Give the expression for fixed end moments at supports A and B. Also draw the final BMD. | CO2 | 4 |
| **(OR)** | | | | |
| 4. | a. | A continuous beam ABCD of length 15 m rests on four supports covering 3 equal spans and carries a UDL of 10 kN/m length. Calculate the moments and reactions at the supports. Plot the BM and SF diagrams. | CO2 | 16 |
| b. | Define “*point of contra flexure*”. | CO2 | 2 |
| c. | List any two advantages of fixed beam. | CO2 | 2 |
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| 5. | a. | A hollow cast iron column whose outside diameter is 180mm has a  thickness of 20mm. It is 4.5m long and is fixed at both ends. Calculate the safe load by Rankine’s formula using a factor of safety of 3. Evaluate the ratio of Euler’s and Rankine’s Buckling loads. Take σc = 550N/mm2 , α = 1/1600 and E = 9.4x104N/mm2. | CO3 | 18 |
| b. | Differentiate between strut and column. | CO3 | 2 |
| **(OR)** | | | | |
| 6. |  | A simply supported beam of length 4 m is subjected to a uniformly distributed load of 20 kN/m over the whole span and deflects 10 mm at the center. Estimate the crippling load when this beam is used as a column with the following support conditions:   1. One end is fixed and other end hinged. 2. Both the ends pin jointed. 3. Both the ends fixed. | CO3 | 20 |
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| 7. | a. | Estimate the change in i. Diameter ii. Length and iii. Volume of a thin cylindrical shell of 100cm diameter, 1cm thickness and 5m length when subjected to an internal fluid pressure of 4N/mm2. Take the value of E= 2x105 N/mm2 and Poisson’s ratio = 0.3. | CO5 | 15 |
| b. | Give the significance of theories of failure. List the names of any five theories of failure. | CO4 | 5 |
| **(OR)** | | | | |
| 8. | a. | A channel section has flanges 120 X 20 mm and web 160 X 10 mm. Determine the shear centre of the channel. | CO6 | 6 |
| b. | Determine the maximum and minimum hoop stress across the section of a pipe of 400mm internal diameter and 100m thick, when the pipe contains a fluid at a pressure of 8N/mm2. Also sketch the radial pressure distribution and hoop stress distribution across the section. | CO5 | 14 |
|  | | **Compulsory**: |  |  |
| 9. |  | A cantilever made up of I section shown in the figure is 3m long is subjected to a load of 300 kN at the free end as shown in the figure. Determine the resulting bending stresses at corners A and B on the fixed end of the cantilever. Evaluate the deflection due to load. | CO6 | 20 |