**18CE403**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **July, 2021** | **Civil Engineering** | | |
| **Fourth Semester** | **Mechanics of Materials** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No.1 compulsorily.* | | | (1X10 = 10 Marks) |
| *Answer ONE question from each unit.* | | | (4X10=40 Marks) |

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| 1. | a) | What is the radius of Mohr’s circle? | | CO1 | |  |
|  | b) | State the principle of super position. | | CO1 | |  |
|  | c) | Define Kernal of a section. | | CO1 | |  |
|  | d) | What are the assumptions made for Euler column theory? | | CO2 | |  |
|  | e) | Define Slenderness ratio. | | CO2 | |  |
|  | f) | Mention different types of theories of failure. | | CO3 | |  |
|  | g) | State Castigliano's Theorem. | | CO3 | |  |
|  | h) | What is the difference between statically determinate and in-determinate beam? | | CO3 | |  |
|  | i) | Define the terms slopes and deflections | | CO4 | |  |
|  | j) | State Mohr’s theorems for Moment area method | | CO4 | |  |
| **Unit - I** | | | | | | |
| 2. |  | A point in a strained material is subjected to stresses as shown in the figure. Using Mohr’s circle method, determine the normal and tangential stresses across the oblique plane.Check the answer analytically. | | CO1 | 10M | |
|  |  | **(OR)** | |  |  | |
| 3. |  | A masonry pier of 5m x 6m supports a vertical load of 75 kN as shown in figure.   1. Find the stresses developed at each corner of the pier 2. What additional load should be placed at the center of the pier, so that there is no tension anywhere in the pier section? 3. What are the stresses at the corner with additional load in the center? | | CO1 | 10M | |
| **P.T.O.**  **18CE403**  **Unit - II** | | | | | | |
| 4. |  | Derive Euler’s crippling load equation for a long column with both ends fixed. | | CO2 | 10 M | |
|  |  | **(OR)** | |  |  | |
| 5. |  | Write short note on any three failure theories. | | CO2 | 10M | |
|  |  | **Unit - III** | |  |  | |
| 6. |  | Determine the vertical deflection at the free end and rotation at A for the overhanging beam shown in the figure. Assume EI as constant. Use Castiglino’s method. | | CO3 | 10M | |
|  |  | **(OR)** | |  |  | |
| 7. |  | Determine the deflection and slope at A of the cantilever beam shown in the figure. Use strain energy method |  | CO3 | 10M | |
|  |  | **Unit - IV** | |  |  | |
| 8. |  | A simply supported beam AB of span 6m carries a point load of 120 kN at its center C. the value of I for the left half is 2 x 108 N/mm2 and for right half portion is 1 x 108 N/mm2 . Find the slopes at the two supports and deflection under each load. Use conjugate beam method  Or | | CO4 | 10M | |
| 9. |  | A beam of uniform rectangular section 100mm wide and 150mm deep is simply supported at its ends. It carries a uniformly distributed load of 6 kN/m run over the entire span of 4m. If the value of E for the beam material is 1 x 104 N/mm2 , find   1. the slope at the supports and 2. maximum deflection   **download** | | CO4 | 10M | |