**Hall Ticket Number: 18ME401**

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| **II/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | | | | | | | | | | | |
| **July, 2021** | | | | | | | | | **Mechanical Engineering** | | | | |
| **Fourth Semester** | | | | | | | | | **Strength Of Materials-II** | | | | |
| **Time:** Three Hours | | | | | | | | | | | **Maximum: 5**0 Marks | | |
| *Answer Question No. 1 Compulsorily.* | | | | | | | | | | | | | (10X1 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | | | | | | | | | | | (4X10=40 Marks) |

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| 1. | a) | What is the difference between slope and deflection of a beam? | CO1 | |  |
|  | b) | Write the maximum deflection for a simply supported beam subjected to UDL of w/unit run throughout its length. | CO1 | |  |
|  | c) | Define equivalent length for a column. | CO2 | |  |
|  | d) | Distinguish between fixed beam and continuous beam. | CO1 | |  |
|  | e) | What is the Clapeyron’s theorem of 3 moments? | CO1 | |  |
|  | f) | Write the expression for volumetric strain for thin cylinders. | CO3 | |  |
|  | g) | List out the methods used for finding deflections and slopes of beams | CO3 | |  |
|  | h) | Write down the expression for Winkler-Bach formula | CO3 | |  |
|  | i) | In order to analyze which beams claperon’s equation is used. | CO4 | |  |
|  | j) | Write the expression for centrifugal stresses in rotating ring. | CO4 | |  |
| **Unit - I** | | | | | |
| 2. | a) | Find the maximum deflection of simply supported beam subjected to point load at the mid span by using Moment area method. | CO1 | **5M** | |
|  | b) | A beam simply supported at the ends A and B is loaded with two point loads of 30KN each at a distance of 2m and 3m respectively from end A. Determine the position and magnitude of the maximum deflection. Take E=2×105 N/mm2 and I=7200 cm4. | CO1 | **5M** | |
|  |  | **(OR)** |  |  | |
| 3. | a) | Define slenderness ratio. State the limitations of Euler’s formula. | CO1 | **3M** | |
|  | b) | A hollow cylinder cast iron column is 4m long with both ends fixed. Determine the minimum diameter of the column if it has to carry a safe load of 250kN with a factor of safety of 5. Take the internal diameter as 0.8 times the external diameter, critical stress is 550N/ mm2 and Rankine constant is 1/1600 in Rankine formula. | CO1 | **7M** | |
| **Unit - II** | | | | | |
| 4. | a) | What do you understand by statically indeterminate beam? Explain briefly. | CO2 | **3M** | |
|  | b) | A built in beam of uniform section is 16 m span. It carries a U.D.L.of 12 kN/m on the left half of the beam along with a 150 kN load at 12 m from the left end. Calculate the end moments and force reactions. Take E=205 GPa and I=400 x 106 mm4 | CO2 | **7M** | |
|  |  | **(OR)** |  |  | |
| 5. | a) | How will you apply Clapeyron’s theorem of 3 moments to a  i)Continuous beam with simply supported ends  ii)Continuous beam with fixed end supports | CO2 | **5M** | |
|  | b) | A continuous beam consists of 3 successive span of 8m, l0m and 6m and carries uniformly distributed loads of 6kN/m, 4kN/m and 8kN/m respectively on the spans. Determine the bending moment and reactions at the supports. | CO2 | **5M** | |
| **P.T.O.**  **18ME401**  **Unit - III** | | | | | |
| 6. | a) | Show that in thin cylinder shells subjected to internal fluid pressure, the circumferential stress is twice the longitudinal stress. | CO3 | **3M** | |
|  | b) | A Cylindrical vessel whose ends are closed by means of rigid flange plates is made of steel plate 4 mm thick. The length and the internal diameter of the vessel are l00cm and 300cm respectively. Determine the longitudinal and hoop stresses in the cylinder shell due to an internal fluid pressure of 2N/mm2. Also, calculate the increase in length, diameter and volume of the vessel. Take E = 2×I05 N/mm2 and µ= 0.3. | CO3 | **7M** | |
|  |  | **(OR)** |  |  | |
| 7. | a) | Discuss about Winkler-bach theory with an example. | CO3 | **5M** | |
|  | b) | Obtain stresses in crane hook with trapezoidal cross section. | CO3 | **5M** | |
| **Unit - IV** | | | | | |
| 8. | a) | Derive the expression for hoop stress in a rotating ring. | CO4 | **5M** | |
|  | b) | A built up ring consists of an inner copper ring and outer steel ring. The diameter of the surface of contact of the two rings is 60 cm. determine the stresses setup in the steel copper by rotation of the ring at 2500 rpm. Both the rings are of rectangular cross section of 15mm in the radial direction and 20mm in the direction perpendicular to the plane of the ring. For steel E = 200 GPa, ρ=7800Kg/m3  For copper E=100 GPa, ρ=8900Kg/m3 | CO4 | **5M** | |
|  |  | **(OR)** |  |  | |
| 9. | a) | Write a short note on centrifugal stresses. | CO4 | **3M** | |
|  | b) | Derive the expression for thickness of disc of uniform strength. | CO4 | **7M** | |

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