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**End Semester Examination – Apr/May – 2018**

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| **Code :** | **17CE2067** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STRENGTH OF MATERIALS FOR AGRICULTURAL ENGINEERING** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
|  | **PART-A(20X1=20 MARKS)** | | |
| 1. | What is Hooke’s law? | CO1 | 1 |
| 2. | Define poisson’sraio. | CO1 | 1 |
| 3. | What is lateral strain? | CO1 | 1 |
| 4. | Write the expression for compressive strain. | CO1 | 1 |
| 5. | Draw the different types of supports. | CO2 | 1 |
| 6. | List the different types of loading. | CO2 | 1 |
| 7. | Draw the shear force diagram for a cantilever beam of length “L” subject to point load “W” at the free end. | CO2 | 1 |
| 8. | What do you mean by point of contraflexure? | CO2 | 1 |
| 9. | Write the bending equation. | CO3 | 1 |
| 10. | What is the value of bending stress on the neutral axis? | CO3 | 1 |
| 11. | What are the assumptions made in the theory of simple bending? | CO3 | 1 |
| 12. | What do you mean by shear stresses in beams? | CO3 | 1 |
| 13. | Write the expression for end moments of a fixed beam due to sinking of a support. | CO4 | 1 |
| 14. | What is clapeyron’s theorem of three moments? | CO4 | 1 |
| 15. | Find an expression for the fixed beam carrying a point load at the centre. | CO4 | 1 |
| 16. | What do you mean by deflection of a beam? | CO4 | 1 |
| 17. | When the column is designated a short column? | CO5 | 1 |
| 18. | What is effective length of a column? | CO5 | 1 |
| 19. | What is a strut? | CO5 | 1 |
| 20. | Write the expression for slope of a cantilever beam at the free end. | CO6 | 1 |

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|  | **PART B(10 X 5= 50 MARKS)**  **(Answer any 10 from the following)** | | |
| 21. | A bar 30 mm in diameter was subjected to tensile load of 54 kN and the measured extension on 300 guage length was 0.112mm and change in diameter was 0.00366mm.Calculate poisson’s ratio and values of three modulii. | CO1 | 5 |
| 22. | Find the modulus of elasticity for a rod, which tapers uniformly from 89mm to 30mm diameter in a length of 650mm. The rod is subjected to a load of 10kN and extension of the rod is 0.06mm. | CO1 | 5 |
| 23. | Draw shear force and B.M diagrams for the loaded beam shown. Also show the shear force and bending moment calculations. ACDB A  C  D  B  3m  3m  3m  4kN  3kN/m  8kN | CO2 | 5 |
| 24. | A simply supported beam of length 10 m carries point load of 4kN and 6kN at a distance of 2m and 4m from the left end. Draw the shear force diagram. | CO2 | 5 |
| 25. | A circular beam of 150 mm diameter subjected to a shear force of 5kN.Calcuate the average shear stress and maximum shear stress. | CO3 | 5 |
| 26. | An I section of flanges of width b and the overall depth is 2b. The flanges and web are of uniform thickness t. Find the ratio of the maximum shear stress to the average shear stress. | CO3 | 5 |
| 27. | A timber beam is 120 mm wide and 200mm deep and is used on a span of 4m. The beam carries a uniformly distributed load of 2.8kN/m run over the entire length. Find the maximum bending stress produced. | CO4 | 5 |
| 28. | How will you apply theorem of three moments to a continuous beam with simply supported ends? | CO4 | 5 |
| 29. | A fixed beam AB 5m long carries a point load of 48k N at its centre. The moment of inertia of the beam is 5x107mm4 and value for E for the beam materials is 2x105N/mm2. Determine the fixed end moments at A and B. | CO4 | 5 |
| 30. | What is equivalent length of a column? How is the concept used in column theory? | CO5 | 5 |
| 31. | Define slenderness ratio. State the limitations of Euler formula. | CO5 | 5 |
| 32. | Find the expression for the slope of a cantilever of length L which carries a UDL of w/m over a length ‘a’ from the fixed end by double integration method. | CO6 | 5 |

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|  | | **PART C(2 X 15= 30 MARKS)**  **(Answer any 2 from the following)** | | |
| 33. | a. | An axial pull of 40000N is acting on a bar consisting of three sections of length 30 cm, 25 cm and 20 cm and of diameters 2cm,4cm and 5cm respectively. If the Young’s Modulus= 2x105 N/mm2, determine  i) stress in each section and ii) total extension of the bar. | CO1 | 7 |
| b. | Find the shear force values of a cantilever beam as shown in fig. | CO2 | 8 |
| 34. | a. | Prove that the bending stress in any fiber is proportional to the distance of that fiber from neutral layer in a beam. | CO3 | 7 |
| b. | A fixed beam AB 6m long is carrying a point load 50 kN at its centre. The moment of inertia of the beam is 78x106mm4 and value of E for beam materials is 2.1x105 N/mm2. Determine fixed end moments at A and B and deflection under the load. | CO4 | 8 |
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| 35. | a. | Determine the crippling load for a T section of dimension 12cmx12cmx2cm and of length 6cm when it is used as a strut with both of its ends hinged. Take E = 2 x 105N/mm2. | CO5 | 7 |
| b. | A cantilever of length 2m carries a point load of 30kN at the free end. If moment of inertia I=108mm4 and value of E=2x105N/mm2 then find slope of the cantilever at the free end and deflection at the free end. | CO6 | 8 |