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

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**End Semester Examination – Nov/Dec – 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. | The ratio between the change in volume and the original volume of the body is called \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | | 1 |
| 2. | Robert Hooke discovered experimentally that within elastic limit \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | | 1 |
| 3. | The ratio between tensile stress and tensile strain or compressive stress and compressive strain is termed as \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | | 1 |
| 4. | The unit for modulus of elasticity is \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | | 1 |
| 5. | Write the relation between modulus of elasticity and bulk modulus | | CO1 | | 1 |
| 6. | Poisson’s ratio is \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | | 1 |
| 7. | Draw the stress-strain curve for brittle material. | | CO1 | | 1 |
| 8. | List few determinate beams. | | CO2 | | 1 |
| 9. | Enumerate few differences between pins support and fixed support. | | CO2 | | 1 |
| 10. | Draw the typical cantilever beam with concentrated load acting at the free end. | | CO2 | | 1 |
| 11. | What do you understand by sagging and hogging bending moment? | | CO2 | | 1 |
| 12. | Write the sign convention for shear force. | | CO2 | | 1 |
| 13. | Draw the bending moment diagram for simply supported beam with concentrated load is acting at the center. | | CO2 | | 1 |
| 14. | Give your opinion about pure bending. | | CO3 | | 1 |
| 15. | Write the general shear stress equation. | | CO3 | | 1 |
| 16. | What is the expression to find a moment of inertia for a circularsection? | | CO4 | | 1 |
| 17. | Give the expression of Clapeyron’s theorem of three moments. | | CO4 | | 1 |
| 18. | What is the failure type of short column? | | CO5 | | 1 |
| 19. | Recall the expression for crippling load of a column when its both ends are fixed. | | CO5 | | 1 |
| 20. | Omit the expression of deflection for a cantilever beam carrying a point load at the free end. | | CO6 | | 1 |
| **PART B(10 X 5= 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | The safe stress, for a hollow steel column which carries an axial load of 2.2 x 103kN is 120 MN/m2. If the external diameter of the column is 25 cm, determine the internal diameter. | | | CO1 | 5 | |
| 22. | Determine the changes in length, breadth and thickness of a steel bar which is 5m long, 40 mm wide and 30 mm thick and is subjected to an axial pull of 35 kN in the direction of its length. Take E = 2 x 105 N/mm2 and Poisson’s ratio = 0.32. | | | CO1 | 5 | |
| 23. | A cantilever of length 2.0 m carries a uniformly distributed load of 2 kN/m length over the whole length . Draw the shear force and bending moment diagram. | | | CO2 | 5 | |
| 24. | A simply supported beam of length 6 m, carries point load of 3 kN and 6 kN at a distances of 2 m and 4 m from the left end. Draw the shear force and bending moment diagram for the beam. | | | CO2 | 5 | |
| 25. | A rectangular beam 300 mm deep is simply supported over a span of 4 metres. Determine the uniformly distributed load per metre which the beam may carry, if the bending stress should not exceed 120 N/mm2. Take I = 8 x 106 mm4. | | | CO3 | 5 | |
| 26. | A circular beam of 100 mm diameter is subjected to a shear force of 5 kN. Calculate average shear stress, maximum shear stress and shear stress at a distance of 40 mm from NA. | | | CO3 | 5 | |
| 27. | Draw the typical bending moment and shear force diagram for fixed beam carries uniformly distributed load through out the length of the beam. | | | CO4 | 5 | |
| 28. | Draw the typical bending moment and shear force diagram for a three span continuous beam carries uniformly distributed load through out the length of the beam. | | | CO4 | 5 | |
| 29. | A hollow mild steel tube 6 m long and 4 cm internal diameter and 5 mm thick is used as a strut with both ends hinged. Find the crippling load and safe load taking factor of safety as 3. Take E = 2 x 105 N/mm2. | | | CO5 | 5 | |
| 30. | A solid round bar 4m long and 6 cm in diameter is used as a strut with one end is fixed and other end is free. Determine the crippling load . Take E = 2 x 105 N/mm2. | | | CO5 | 5 | |
| 31. | A beam 4 m long, simply supported at its ends, carries a point load W at its centre. If the slope at the ends of the beam is not to exceed 1o, find the deflection at the centre of the beam. | | | CO6 | 5 | |
| 32. | A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 kN/m run over the entire span of 5 m. If the value of E for the beam material is 1 x 104N/mm2, determine slope and deflection of the beam. | | | CO6 | 5 | |
| **PART C(2 X 15= 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Draw the shear force and bending moment diagrams for the beam shown in Fig. | | CO2 | 8 | |
| b. | Draw the shear force and bending moment diagrams for the beam shown in Fig | | CO2 | 7 | |
| 34. | a. | A wooden beam 100 mm wide and 150 mm deep is simply supported over a span of 4 meters. If shear force at a section of the beam is 4500 N, find the shear stress a distance of 25 mm above the NA. | | CO3 | 5 | |
| b. | A fixed beam AB of length 6 m carries a point load of 150 kN and 120 kN at a distance of 2 m and 4 m from the left end. Draw the bending moment diagram. | | CO4 | 10 | |
| 35. | a. | Calculate the safe compressive load on a hollow cast iron column (one end rigidly fixed and other hinged) of 10 cm external diameter, 7 cm internal diameter and 8 m in length. Use Euler’s formula with a factor of safety of 4 and E =95 kN/mm2. | | CO5 | 7 | |
| b. | A beam of uniform rectangular section 100 mm wide and 240 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9.125 kN/m run over the entire span of 4 m. Find the deflection at the centre if E = 1.1 x 104 N/mm2. | | CO6 | 8 | |