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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination – June – 2017**

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| **Code :** | **14CE2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STRENGTH OF MATERIALS** | **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. | Derive the equation for slope and deflection of a simply supported beam with a central point load. | CO2 | 14 |
| b. | A simply supported beam of span 4m is carrying a uniformly distributed load of 2kN/m over the entire span. Find the maximum slope and deflection of the beam. Take EI for the beam as 80x109 N-mm2. | CO1 | 6 |
| (OR) | | | | |
| 2. | a. | Derive the equation for slope and deflection of a Cantilever beam with a uniformly distributed load. | CO2 | 14 |
| b. | A cantilever 2.4m long carries a point load of 30kN at its free end. Find the slope and deflection of the cantilever under the load. Take flexural rigidity for the cantilever beam as 25x1012 N-mm2. | CO1 | 6 |
| 3. | a. | A beam of span 6m is fixed at its both ends. It carries 2 concentrated loads of 10 kN and 15kN each at a distance of 2m from both the ends. Find the fixing moments and draw the bending moment diagram. | CO1 | 10 |
|  | b. | Derive the equation for a propped cantilever with a uniformly distributed load. Also sketch the shaer force and bending moment diagram | CO2 | 10 |
| (OR) | | | | |
| 4. |  | Determine the shear force and bending moment for a continuous beam shownin figure by Clapeyronstheorm  Image result for continuous beam | CO1 | 20 |
| 5. | a. | Derive Euler’s formula when both the end of the column is hinged. | CO2 | 10 |
|  | b. | Determine the maximum stress developed in circular steel which is subjected to an axial load of 140kN. The outside and inside diameters of the strut are 200mm and 140mm respectively. It is 5m long and has both of its ends hinged. The strut is having initial curvature of sinusoidal form with initial maximum deflection of 8mm. Take E=205GN/m2. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | A hollow cast iron column is 4.5 m long and fixed at both ends. The internal diameter and external diameter of the column are 160 mm and 200 mm respectively. Determine the safe load by Rankine’s formula using a factor of safety of 4. бc = 550 MN/mm2 ; α=1/1600. | CO1 | 10 |
|  | b. | A hollow cylindrical 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. Take σc=550N/mm2 and a =1/1600 in Rankine’s formula. | CO1 | 10 |
| 7. | a. | A long closed cylinder has an internal radius of 100mm and an external radius of 250mm. It is subjected to an internal pressure of 80.0 MPa. Determine the maximum radial and circumferential stresses in the cylinder. | CO1 | 17 |
|  | b. | Define Circumferential and Hoop stress. | CO2 | 3 |
| (OR) | | | | |
| 8. |  | A pipe of 200mm internal diameter and 50mm thickness carries fluid at a pressure of 10MPa. Determine the maximum and minimum circumference stresses across the section.Also sketch the radial stress (pressure) distribution and circumferential stress distribution across the section. | CO1 | 15+5 |
|  | | **Compulsory:** |  |  |
| 9. |  | Explain in detail the following theories of Failure  (a)   Maximum Principal stress theory ( due to Rankine )  (b)   Maximum shear stress theory ( Guest - Tresca )  (c)  Total strain energy per unit volume ( Haigh ) Theory | CO2 | 7+7+6 |

ALL THE BEST