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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

**End Semester Examination – April/May – 2017**

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| **Code :** | **14CE3003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STRUCTURAL OPTIMIZATION** | **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. | Use simplex method to solve  Maximize Z = 3 x1 + 5x2  such that 3x1 + 2x2 ≤ 18  x1  ≤ 4  x2 ≤ 6  x1, x2 ≥ 0 | CO2 | 15 |
| b. | List the statement of optimization problem and explain the constraint surface and objective function. | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Minimize F= -3x1 -2x2  subject to x1 - x2  ≤1  3x1 -2 x2 ≤ 6  x1 ≥ 0, x2 ≥ 0 | CO2 | 15 |
| b. | Name the characteristics of L.P.P? How are they achieved ? | CO1 | 5 |
| 3. |  | Consider the figure given below . The cross sectional area 'A' of gutter with equal base and edge length of 2 is given by  A = 4 sinθ(1+cosθ), calculate the angle θ which maximizes the cross sectional area of the gutter. Using an initial interval [ 0, π/2]. find the solution using golden section algorithm. use an initial ε =0.05.    2 2  θ 2 θ  Cross section of Gutter | CO2 | 20 |
| (OR) | | | | |
| 4. | a. | Use dichotomous search technique to minimize x5 -5x3 -20x + 5 in the interval 1 to 5 taking δ = 0.2 | CO2 | 15 |
|  | b. | State the classification of optimization problem? | CO1 | 5 |
| 5. | a. | Minimize f(x) =20x1x3+ 15x2x3 + 30x1x2  subject to 5x1-1x2-1x3-1 ≤ 1  x1, x2, x3 ≥ 0 | CO2 | 15 |
|  | b. | Explain the difference between the Golden section algorithm and Fibonacci method. | CO1 | 5 |
| (OR) | | | | |
| 6. | a. | Minimize U12 +U22 +U32  Such that U1+U2+U3=100 | CO2 | 15 |
|  | b. | Explain the Bellman's principle of optimality | CO1 | 5 |
| 7. | a. | Explain how genetic algorithm has higher efficiency than traditional algorithms? | CO1 | 8 |
|  | b. | By taking an example show how genetic algorithm can be used in solving civil engineering problems? | CO2 | 12 |
| (OR) | | | | |
| 8. | a. | Enumerate on the ant colony algorithm used for solving optimization problems? | CO2 | 12 |
|  | b. | Compare a human brain with the neural network and explain how it can be used in solving problems. | CO1 | 8 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the different steps used in solving fuzzy logic problem? | CO1 | 12 |
|  | b. | Differentiate crisp and the fuzzy set. | CO1 | 8 |

ALL THE BEST