

**MASTER OF TECHNOLOGY (MECHANICAL CAD/CAM) (CBCS - 2015 COURSE)**  
**M. Tech. (Mechanical CAD/CAM) Sem-II :SUMMER- 2022**  
**SUBJECT : OPTIMIZATION FOR ENGINEERING DESIGN**

Day : Wednesday

Time : 10:00 AM-01:00 PM

Date : 3/8/2022

**S-14205-2022**

Max. Marks : 60

**N.B.**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Use of non-programmable calculator is allowed.

**SECTION – I**

**Q.1** Discuss optimality criteria for single variable optimization. **(10)**

**OR**

Explain design variables, constraints of objective function.

**Q.2** Minimize  $f(w) = (40 - 90w)^2$  subject to  $0 \leq w \leq 1$  using golden section method. **(10)**

**OR**

Explain bisection method.

**Q.3** Minimize  $f(w) = (1 - x_1)^2 + (2 - x_2)^2$  with initial point  $x^0 = [0, 0]^T$  and scale factor  $\alpha = 2$ . **(10)**

**OR**

Explain Hooke Jeeves pattern search.

**SECTION – II**

**Q.4** Find the distance from the origin to the plane  $x + 2y + 2z = 3$  using method of Lagrange multipliers. **(10)**

**OR**

Explain Kuhn-Tucker optimization techniques.

**Q.5** Minimize  $f(x) = (x_1 - 4)^2 + (x_2 - 4)^2$  subject to  $h(x) = 5 - x_1 - x_2 \geq 0$  using penalty function. **(10)**

**OR**

Explain branch and bound method.

**Q.6** Explain genetic algorithm. **(10)**

**OR**

Explain simulated annealing.

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