Reg. No. :

Question Paper Code : X86764

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Second Semester
Manufacturing Engineering
MF 5201 – OPTIMIZATION TECHNIQUES IN MANUFACTURING
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define optimization technique.
2. How can you apply of optimization in production planning ?
3. Duality and dual simplex are same. Why or why not ?
4. What is meant by parametric programming ?
5. Where can you use Kuhn-Tucker conditions ?
6. Describe in short separable programming.
7. What are the types of exact algorithms in Integer programming problem ?
8. How Dynamic programming is different from Linear programming ?
9. What is meant by Fuzzy system ?
10. How was the ANN concept developed ?

PART – B **(5×13=65 Marks)**

11. a) Write the order of various optimization techniques. And why these are developed ?

(OR)

b) How do you classify of optimization problems by various approaches ?

12. a) Apply Graphical method LPP Max Z = 230x + 450y subject to

$2x + y \leq 18$

$3x + 13y \leq 39$

$3x + y \leq 24$

$x \geq 0, y \geq 0$

(OR)

b) Demonstrate with an example how duality is useful for extra resources utility in sensitivity analysis of LPP.

13. a) Solve the following non-linear programming problem by separable programming (lambda).

Maximize $f(x) = 20x_1 + 16x_2 - 2x_1^2 - x_2^2 - (x_1 + x_2)^2$

subject to :

$x_1 + x_2 \leq 5,$

$x_1 \geq 0, \ x_2 \geq 0$

(OR)

b) Solve the following Quadratic programming problem.

Maximize $f(x) = \sum_{j=1}^{n} c_j x_j + \frac{1}{2} \sum_{j=1}^{n} \sum_{k=1}^{n} q_{jk} x_j x_k$

subject to :

$$\sum_{j=1}^{n} a_{ij} x_j \leq b_i \ (i = 1, 2, \ldots. m)$$

$$x_j \geq 0 \ (j = 1, 2, \ldots..n)$$

14. a) Write the algorithm of branch and bound technique in ILPP.

(OR)

b) Write the steps of Dijkstra's algorithm of minimum spanning tree in shortest path model.

15. a) Explain the following terms in simulated annealing method

i) The neighbors of a state

ii) Acceptance probabilities

iii) The annealing schedule

(OR)

b) Explain five major components of genetic algorithm in brief.

PART – C **(1×15=15 Marks)**

16. a) Decide y_1, y_2 and y_3 to minimize the cost w by Dual Simplex Method.

min. $w = 2y_1 + 10y_2 + 8y_3$

s. t. $y_1 + y_2 + y_3 \geq 6$

$y_2 + 2y_3 \geq 8$

$-y_1 + 2y_2 + 2y_3 \geq 4$

$y_j \geq 0$

(OR)

b) Apply cutting plan algorithm for the following ILPP.

max. $3x_1 + 4x_2$

subject to $\frac{2}{5}x_1 + x_2 \leq 3$

$\frac{2}{5}x_1 - \frac{2}{5}x_2 \leq 1$

$x_1, x_2 \geq 0$ and integer.

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