Reg. No ..... Name **17P3643**

MSc DEGREE END SEMESTER EXAMINATION- OCTOBER-NOVEMBER 2017

SEMESTER 3 : MATHEMATICS

COURSE : **16P3MATT14 ; OPERATION RESEARCH**

(For Regular - 2016 admission)

Time : Three Hours Max. Marks: 75

Section A
Answer any 10 (1.5 marks each)

1. Explain the factors affecting inventory control ?
2. What do you mean by fundamental EOQ problem and write the assumptions of this kind.
3. Explain the effect of concavity/convexity on search of an optimum with constraied maximization problem.
4. Write the Kuhn-Tucker conditions for non linear optimization.
5. Suppose a point satisfies the sufficiently conditions for a local minimum. How do you establish that it is a global minimum?
6. Describe backward recursion ?
7. What do you mean by decomposable, for an optimization problem?
8. What is the general form of an integer L.P.P.? Give an example.
9. Explain the terms
   (a) Pruned (b) Fathomed
10. What is the potential difference in the arc u_i

10 x 1.5 (15)

Section B
Answer any 4 (5 marks each)

11. Explain the condition for local minimum?
12. Explain the effects of concavity/convexity on the search for an optimum?
13. What are the disadvangates of DP.
14. Solve using D.P. maximize $2x_1 + 5x_2$ subject to

$$\begin{aligned} 2x_1 + x_2 &\leq 430 \\ x_2 &\leq 230 \\ x_1, x_2 &\geq 0. \end{aligned}$$

15. Describe minimum path problem. Give an algorithm to find the minimum path when all the arc lengths are non-negative.

16. State and prove maximum flow minimum cut theorem.

4 x 5 (20)

Section C
Answer any 4 (10 marks each)

17.1. (a) Explain EOQ problem with finite replenishment.
(b) The demand for an item in a company is 18000 units per year, and the company can produce the items rate of 3000 per month. The cost of one setup is Rs. 500, and the holding cost of 1 unit per month is 15 paise. The shortage cost of one unit is Rs. 20 per month. Determine

i. Optimum production batch quantity and the number of strategies.
ii. Optimum cycle time and production time
iii. Maximum inventory level in the cycle
iv. Total associated cost per year if the cost of the item is Rs. 20 per unit.

OR

2. (a) Explain EOQ problem with instantaneous production and variable order cycle.
(b) Explain EOQ problem with instantaneous production and fixed order cycle.

18.1. Minimize the objective functions using Golden search. Use a resolution of $\epsilon = 0.10$

$$\text{Minimize:} \quad f(x) = 3x^4 + (x-1)^2$$
$$0 \leq x \leq 4$$

OR

2. Solve the problem through classical Lagrangian technique.
(a) Minimize $f(x) = x_1^2 + x_2^2 - 4x_1 + 2x_2 + 5$ subject to $g(x) = x_1 + x_2 = 4$.
(b) Minimize $f(x) = (x_1 - 2)^2 + (x_2 - 1)^2$ subject to $g(x) = x_1 - 2x_2 + 1 = 0$.

19.1. Solve using D.P. $u_1 + u_2 + u_3$ subject to $u_1 u_2 u_3 \leq 10$, $u_1 + u_2 + u_3 \leq 15$, $u_j > 0$.

OR

2. Describe minimum path problem using D.P. by an example.

20.1. (a) Describe the algorithm for minimum path problem with arc length is unrestricted in sign.

(b) Find the minimum path from $v_1 \rightarrow v_8$ in the graph with arc and length as follows.

Arc	(1,2)	(1,3)	(1,4)	(2,3)	(2,6)	(2,5)	(3,5)	(3,4)	
Length	-1	4	-11	2	-8	7	-3	7	
Arc	(4,7)	(5,6)	(5,8)	(6,3)	(6,4)	(6,7)	(6,8)	(7,3)	(7,8)
Length	3	1	12	4	2	6	-10	-2	2

OR

2. Find the maximum non-negative flow in the following network.

Arc	$(a,1)$	$(a,2)$	(1,2)	(1,3)	(1,4)	(2,4)	(3,2)	(3,4)	(4,3)	$(3,b)$	$(4,b)$
Capacity	8	10	3	4	2	8	3	4	2	10	9

4 x 10 (40)