OD-103

October-2019

B.B.A., Sem.-V

Operation Research and Quantitative Techniques (Q.T.)

Time : 2:30 Hours] [Max. Marks : 70

Instructions :
(1) Graph paper will be supplied on request.
(2) Use of simple calculator is allowed.

1. (A) (i) Convert the given LPP into dual problem. **7**

   Max. : $\quad Z = 3x_1 + 2x_2$

   Subject to, $\quad -x_1 - x_2 \leq -1$

   $\qquad x_1 + x_2 \leq 7$

   $\qquad x_1 + 2x_2 \leq 10$

   $\qquad x_2 \leq 3$

   $\qquad x_1, x_2 \geq 0$

   (ii) Use graphical method to solve the LPP. **7**

   Minimize $\quad Z = 3x_1 + 2x_2$

   Subject to, $\quad 5x_1 + x_2 \geq 10$

   $\qquad x_1 + x_2 \geq 6$

   $\qquad x_1 + 4x_2 \geq 12$

   $\qquad x_1, x_2 \geq 0$

   OR

   (i) What is Linear Programming ? Give its Mathematical formulation. **7**

   (ii) A company produces 2 types of hats A and B. Every hat A requires twice as much labour time as the second hat B. If the company produces only hat B then it can produce a total of 500 hats per day. The market limits daily sales of hat A and B to 150 and 250 respectively. The profits on hat A and B are ₹ 8 and ₹ 5 respectively. Solve graphically to get the optimal solution. **7**

(B) Answer the following : (any **four**)

(i) Define objective function.

(ii) Most of constrains in LPP are expressed as _____.

(iii) What do you mean by unbounded solution ?

(iv) Define O.R.

(v) LPP involving only two variables can be solved by _____.

(vi) All variables in LPP must take non-negative values. (True/False)

2. (A) (i) Obtain a basic feasible solution of the following transportation by   7

(a) North-West Corner Rule.

(b) Least Cost Method.

	A	B	C	D	Supply
O_1	5	6	8	10	10
O_2	10	8	6	4	15
O_3	2	5	7	11	25
Demand	15	10	10	15	

(ii) Obtain initial basic feasible solution of the following transportation problem by Vogel's method. Also find optimal solution.   7

	A	B	C	Supply
I	18	22	10	20
II	25	11	20	22
III	15	30	7	18
Demand	16	21	23	

OR

(i) Explain North-West Corner Rule for solving Transportation problem.   7

(ii) Obtain an optimal basic feasible solution to the following transportation problem.   7

	P	Q	R	S	Supply
A	21	16	25	13	11
B	17	18	14	23	13
C	32	17	18	41	19
Demand	6	10	12	15	43

(B) Answer the following. (any **four**)   4

(i) If total supply _____ total demand, then dummy column is added to make it balance.

(ii) What do you mean by balanced T.P. ?

(iii) _____ is taken into consideration for allocation in LCM of solving T.P.

(iv) Test of optimality can be done by _____ method.

(v) The solution to transportation problem with m rows and n columns is non-degenerate if No. of occupied allocations are equal to _____.

(vi) What is basic condition for applying MODI method ?

3. (A) (i) State the differences between PERT and CPM.   7

      (ii) Find critical path, also find EFT, LFT and float time.   7

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6	6-7
Time	2	4	3	1	6	5	7	2

OR

(i) State the advantages of PERT.   7

(ii) Time estimates and predecessor of each activity in a project are given below. Find free float for each activity.   7

Activity	A	B	C	D	E	F	G
Predecessor	–	A	A	-	B, D	C, E	F
Time	2	1	3	2	3	3	2

(B) Answer the following : (any three)   3

(i) Define Activity.

(ii) CPM, it is divided into different _____.

(iii) The objective of network analysis is to minimize total project cost. (True/False).

(iv) In PERT the completion of an activity is called _____.

(v) PERT was develop by U.S. Navy in _____ year.

4. (A) (i) Solve the following Payoff matrix, determine optimal strategies and value of game.

$$x \begin{array}{c} \\ \end{array} \overset{\displaystyle y}{\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}}$$

     7

(ii) Solve the following assignment problem for minimum cost.   7

	1	2	3	4
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

OR

(i) Explain Minimax and Maximin principle used in the theory of games. 7

(ii) Solve the following assignment problem. 7

	X	Y	Z
A	16	20	20
B	12	13	16
C	18	20	15
D	16	14	17

(B) Answer the following. (any **three**) 3

(i) The values of _____ are used to reduced the size of payoff matrix.

(ii) What is saddle point ?

(iii) All dummy rows or columns in the Assignment problem are assumed to be zero. (True/False)

(iv) What do you mean by unbalanced assignment problem ?

(v) Solving method of Assignment problem is called _____.

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