

[56-A]

SARDAR PATEL UNIVERSITY
T.Y.B.C.A (Vth Semester) EXAMINATION – 2016
US05FBCA01: Operation Research

Date: 04/04/2019, Thursday

Time: 2:00 P.M TO 5:00 P.M

Total Marks: 70

Q-1 Give answers of following Questions. (MCQs)

[10]

1. In graphical method the restriction on number of constraint is _____.
(a) 2 (b) 3
(c) not more than 3 (d) none of the above
2. The linear function of variables which is to be maximized or minimized is called _____.
(a) constraints (b) basic requirements
(c) objective function (d) none of them
3. Minimize $Z =$ _____.
(a) $-\text{maximize}(Z)$ (b) $\text{maximize}(-Z)$
(c) $-\text{maximize}(-Z)$ (d) none of the above
4. The coefficient of slack variable in the objective function is _____.
(a) $-M$ (b) $+M$
(c) 0 (d) none of them
5. The _____ variable is added to the constraint of less than equal to type.
(a) slack (b) Surplus
(c) artificial (d) basic
6. The _____ method's solution for transportation problem is sometimes an optimal solution itself.
(a) NWCM (b) VAM
(c) LCM (d) Row Minima
7. _____ Operation is carried out on a machine at a time.
(a) Two (b) only one
(c) at least one (d) none of them.
8. North – West corner refers to _____.
(a) top left corner (b) top right corner
(c) both of them (d) none of them
9. Activity which starts only after finishing other activity is called _____.
(a) dummy (b) Predecessor
(c) successor (d) none of them
10. _____ is indicated by dotted arrow.
(a) burst event (b) merge event
(c) dummy activity (d) none of them

(1)

P.T.O

Q-2 Give answers of following Questions.(Any Ten)

[20]

1. Define Operation research.
2. Give any four models of operations research.
3. Define i] Unbounded solution ii] Optimum solution
4. Define surplus variables.
5. Write the standard form of LPP for the following LPP:
Maximize $Z = 13x_1 + 25x_2$
Subject to $21x_1 + 3x_2 \leq 40$, $5x_1 + 2x_2 \leq 7$, $x_1, x_2 \geq 0$
6. What is the condition for entering variable in simplex table?
7. What is travelling salesman problem?
8. Write mathematical form of transportation problem.
9. Give mathematical form of assignment problem.
10. State any two rules for drawing network diagram.
11. Define: Merge Event, Burst Event.
12. What is Dynamic Programming Problem?

Q-3

[A] Note down the applications of operations research.

[05]

[B] A diet for sick person must contain at least 4000 units of vitamins, 50 units of minerals, 1400 units of calories two foods A and B are available at a cost of Rs. 4 and Rs. 3 respectively if one unit of A contains 200 units of vitamins, 1 unit of mineral and 40 calories one unit of food B contain 100 units of vitamins, 2 units of minerals 40 units of calories. Formulate the LPP to maximize cost.

[05]

OR

Q-3

[A] Explain in detail different scope of operation research.

[05]

[B] Find a solution for the following LP problem using graphical method.

[05]

$$\text{Maximize } Z = 15x_1 + 10x_2$$

$$\text{Subject to } 4x_1 + 6x_2 \leq 360$$

$$3x_1 \leq 180$$

$$5x_2 \leq 200$$

$$\text{And } x_1, x_2 \geq 0$$

Q-4

[A] Define slack and surplus variables with example.

[04]

[B] Solve the below LPP using simplex method.

[06]

$$\text{Max } Z = 3x_1 + 5x_2$$

$$\text{Subject to } x_1 + x_2 \leq 4,$$

$$3x_1 + 2x_2 \leq 18$$

$$x_1, x_2 \geq 0$$

OR

(2)

P.T.O

Q-4

[A] Differentiate the unbound solution and optimum solution. [04]

[B] Solve the below LPP using Big-M method. [06]

$$\text{Min } Z = 5x_1 + 3x_2$$

$$\text{Subject to } 2x_1 + 4x_2 \leq 12,$$

$$2x_1 + 2x_2 = 10,$$

$$5x_1 + 2x_2 \geq 10$$

$$x_1, x_2 \geq 0$$

Q-5

[A] Write the steps for solving the transportation problem using Least Cost method. [05]

[B] Solve the following assignment problem so as to minimize the time (in days) required completing the entire task. [05]

	1	2	3	4
A	22	30	21	15
B	18	33	9	31
C	44	25	24	21
D	23	30	28	14

OR

Q-5

[A] Write the steps for solving Assignment Problem by Hungarian method. [04]

[B] Obtain the optimal solution to Transportation Problem using northwest corner method. [06]

	Destination				Supply
	A	B	C	D	
F ₁	19	30	50	10	7
F ₂	70	30	40	60	9
F ₃	40	8	70	20	18
Demand	5	8	7	14	

Q-6

[A] State the rules for drawing network diagram. [04]

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P.T.O

[B]

[06]

A project has the following time schedule :

Activity	Time In month	Activity	Time In month	Activity	Time In month
1-2	2	3-6	8	6-9	5
1-3	2	3-7	5	7-8	4
1-4	1	4-6	3	8-9	3
2-5	4	5-8	1		

Construct PERT network and compute total float for each activity.
Find Critical path with its duration.

OR

Q-6

[A] A project has the following time schedule:

[05]

Draw the arrow network of the project. Determine the critical path.

Jobs	Duration in days	Jobs	Duration in days	Jobs	Duration in days
1-2	2	3-5	5	6-10	4
2-3	7	4-6	3	7-9	4
2-4	3	5-8	5	8-9	1
3-4	3	6-7	8	9-10	7

[B] In a machine shop 8 different products are being manufactured each requiring time on two different machines A and B are given in the table below: [05]

Product	1	2	3	4	5	6	7	8
Machine-A	30	45	15	20	80	120	65	10
Machine B	20	30	50	35	35	40	50	20

Find an optimal sequence of processing of different product in order to minimize the total manufactured time for all product. Find total ideal time for two machines and elapsed time.

— X —
(4)