

(143 & A-41)

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SARDAR PATEL UNIVERSITY

TYBCA Examination October/November - 2018 - V SEM

US05FBCA01 : Operations Research

Date: 22/10/2018, Monday

Time: 02:00 to 05:00 PM

Total Marks : 70

Q.1 Multiple choice questions:

[10]

1. Operations research is the application of _____ methods to arrive at the optimal solutions to the problems."
[a] economical [b] scientific [c] a and b both [d] artistic
2. In graphical representation the bounded region is known as _____ region.
[a] Solution [b] feasible solution
[c] basic solution [d] optimal
3. 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
4. The _____ variable is added to the constraint of less than equal to type.
[a] slack [b] Surplus [c] artificial [d] basic
5. In the simplex method for solving of LPP number of variables can be _____
[a] Not more than three [b] at least three
[c] at least two [d] none of them
6. The Penalty in VAM represents difference between _____ costs of respective row/column.
[a] Two Largest [b] smallest two
[c] largest and smallest [d] none of them
7. If number of sources is not equal to number of destination in Assignment problem then it is called _____.
[a] balanced [b]symmetric [c] unsymmetric [d] unbalanced
8. The _____ method used to obtain optimum solution of travelling salesman problem.
[a] Simplex [b]Hungarian [c] dominance [d] graphical
9. Activity which starts only after finishing other activity is called _____.
[a] dummy [b]Predecessor [c] successor [d] none of them
10. _____ event represents beginning of more than one activities.
[a] burst [b] merge [c] dummy [d] none of them

Q.2 Write short answer of any ten

[20]

1. Define i] Unbounded solution ii] Optimum solution
2. Give any four models of operations research.
3. Define feasible solution.
4. Write the standard form of LPP for the following LPP:
Maximize $Z = 13x_1 + 25x_2$
Subject to $21x_1 + 3x_2 \leq 40$, $5x_1 + 2x_2 \leq 7$, $x_1, x_2 \geq 0$
5. Define artificial variables.
6. What is the condition for optimality in simplex table ?
7. What is non degenerate solution in transportation problem?
8. What is the Assignment problem?
9. What is travelling salesman problem?
10. Define two types of events used in network analysis.
11. What is successor activity?
12. In brief explain problem of sequencing.

Q.3(A) What are various phases of operation research?

[5]

Q.3(B) A carpenter produces two products chairs and tables. Processing of these products is done on two machines A and B. Chair requires 2 hours on machine A and 6 hours on machine B. A table requires 5 hours on machine A and 3 hours on machine B. There are 22 hours of time per day available on machine A and 35 hours on machine B. Assuming that the profit per chair is Rs. 10 and Rs. 15 for table. Formulate the problem as LPP in order to determine the number of chairs and tables to be produced so as to maximize the profit.

OR

Q.3(A) State the different scope of operation research.

[5]

Q.3(B) Use graphical method to solve the following linear programming problem.

[5]

Maximize $Z = 2x + 10y$

Subject to the constraints

$2x + 5y \leq 16$,

$x \leq 5$,

$x \geq 0, y \geq 0$

Q.4(A) Differentiate Slack and Surplus Variable.

[2]

Q.4(B) Solve the following problem using simplex method.

[8]

Maximize $Z = 12X_1 + 16X_2$

Subject To: $10X_1 + 20X_2 \leq 120$

$8X_1 + 8X_2 \leq 80$

$X_1 \geq 0, X_2 \geq 0$

OR

Q.4(A) What is the condition for entering variable in simplex table? [2]

Q.4(B) Solve the following problem using Big-M Method. [8]

(1) Maximize $Z = 3x_1 - x_2$

Subject to $2x_1 + x_2 \geq 2, \quad x_1 + 3x_2 \leq 3, \quad x_1, x_2 \geq 0$

Q.5(A) Give the algorithm of VAM to obtain basic feasible initial solution to transportation problem. [4]

Q.5(B) Solve the following Assignment problem using Hungarian method. [6]

	A	B	C	D
I	8	10	17	9
II	3	8	5	6
III	10	12	11	9
IV	6	13	9	7

OR

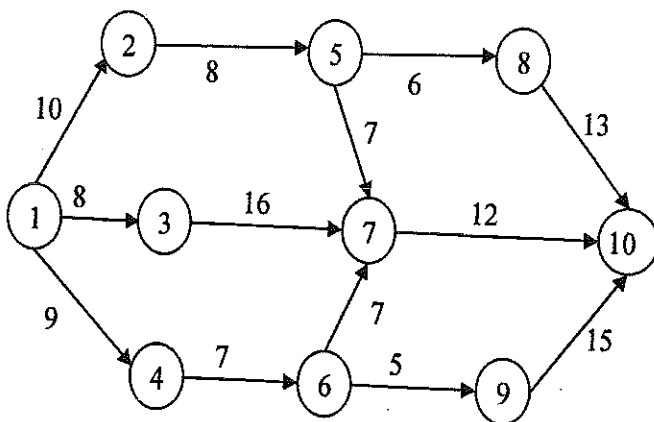
Q.5(A) Write the steps for solving a A.P. by Hungarian method. [4]

Q.5(B) Solve the following transportation problem using Least-Cost Method. [6]

	R1	R2	R3	R4	Supply
W1	8	9	11	16	50
W2	12	7	5	8	80
W3	14	10	6	7	120
Demand	90	70	40	50	

Q.6(A) Write down the procedure for solving problem of sequencing with two machines. [4]

Q.6(B) Find the critical path and calculate the Total float and Free float for the following PERT diagram. [6]



OR

Q.6(A) State the rules for drawing network diagram. [4]

Q.6(B) In a machine shop 6 different products are being manufactured each requiring time [6]
on two different machines A and B are given in the table below:

Product	1	2	3	4	5	6
Machine-A	30	120	50	20	90	110
Machine B	80	100	90	60	30	10

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.

