

(30 & A-17) Seat No.: \_\_\_\_\_

No. of printed pages:04

SARDAR PATEL UNIVERSITY

TYBCA (SEMESTER: V) (CBCS) EXAMINATION

Tuesday, 15<sup>th</sup> November, 2016

USO5FBCA01: Operation Research

Time:02:00 p.m. to 05:00 p.m.

Total Marks: 70

Q.1 Multiple choice questions:

[10]

1. Operation research is the application of \_\_\_\_\_ methods to arrive at the optimal solutions to the problems.  
A. Scientific  
B. economical  
C. both  
D. none of the above
2. The linear function of variables which is to be maximized or minimized is called \_\_\_\_\_.  
A. Basic requirements  
B. Objective function  
C. Constraints  
D. none of the above
3. In non-degenerate solution number of allocated cell is \_\_\_\_\_.  
A. equal to  $m + n + 1$   
B. not equal to  $m + n + 1$   
C. equal to  $m + n - 1$   
D. not equal to  $m + n - 1$
4. The \_\_\_\_\_ variable is added to the constraint of less than equal to type.  
A. basic  
B. surplus  
C. slack  
D. artificial
5. Number of basic allocation in any row or column in Assignment problem can be \_\_\_\_\_.  
A. exactly one  
B. at least one  
C. at most one  
D. none of them
6. If total supply is equal to the total demand in Transportation problem then it is called \_\_\_\_\_.  
A. balanced  
B. unbalanced  
C. symmetric  
D. asymmetric
7. North-West corner refers to \_\_\_\_\_.  
A. top right corner  
B. top left corner  
C. both  
D. none of the above
8. Activity which does not require any resources or time is called \_\_\_\_\_.  
A. dummy  
B. predecessor  
C. successor  
D. none
9. Activity which starts only after finishing other activity is called \_\_\_\_\_.  
A. dummy  
B. merge  
C. successor  
D. predecessor
10. \_\_\_\_\_ operation is carried out on a machine at a time.  
A. at least one  
B. two  
C. only one  
D. none of the above

Q.2 Attempt any ten:

[20]

1. List out various phases of operation research.
2. Define: solution, basic solution.
3. What is the artificial variable?
4. What is the condition for entering variable in simplex table?

①

(P.T.O.)

5. Write the limitations of LPP.
6. What is the Travelling Salesman problem?
7. Write the standard form of LPP for the following LPP:  
 Maximize  $Z = 3x_1 + 5x_2$   
 Subject to  $2x_1 + 3x_2 \leq 4$ ,  $3x_1 + 2x_2 \geq 7$ ,  $x_1, x_2 \geq 0$
8. What is the Assignment problem?
9. Write steps for Matrix Minima method.
10. Define terms: Events, Merge event.
11. State any two rules for drawing network diagram.
12. What is dynamic Programming problem?

Q.3 (a) A firm manufactures two types of products A and B and sells them at a profit of Rs. 200 on type A and Rs. 300 on type B. each product is processed on two machines G and H. type A requires 1 minute of processing time on G and 2minutes on H; Type B requires 1 minute on G and 1 minute on H. the machine G is available for not more than 6 hours, 40 minutes while H is available for 10 hours during any working day. Formulate this problem as a linear programming problem. [5]

(b) Define operation research. Explain phases of Operation Research. [5]

OR

Q.3 (a) Define operation research. Explain different scope of Operation Research. [5]

(b) Find a solution for the following LP problem using graphical method. [5]  
 Maximize  $Z = 25x_1 + 20x_2$   
 Subject to  $16x_1 + 12x_2 \leq 100$   
 $8x_1 + 16x_2 \leq 80$   
 and  $x_1, x_2 \geq 0$

Q.4 (a) Differentiate the unbound solution and optimum solution. [4]

(b) Solve the following problem using Simplex method: [6]  
 Maximize  $Z = 7x_1 + 5x_2$   
 Subject to  $x_1 + 2x_2 \leq 6$   
 $4x_1 + 3x_2 \leq 12$   
 and  $x_1, x_2 \geq 0$

OR

Q.4 (a) Write a note about slack and surplus variable. [4]

(b) Solve the following problem using Big-M method: [6]  
 Maximize  $Z = -2x_1 - x_2$   
 Subject to  $3x_1 + x_2 = 3$   
 $4x_1 + 3x_2 \geq 6$   
 $x_1 + 2x_2 \leq 4$   
 and  $x_1, x_2 \geq 0$

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

**(b)** Obtain Initial Basic Feasible solution for below TP using Vogel's Approximation method: [6]

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

OR

**Q.5 (a)** Write the steps for solving Assignment Problem by Hungarian method. [4]

**(b)** A departmental has four employees with four jobs to be performed. The time (in hours) each men will take to perform each job is given in the effectiveness matrix. How the jobs should be allocated, one per employee, so as to minimize the total man hours. [6]

Jobs	Employees			
	1	2	3	4
A	20	25	22	28
B	15	18	23	17
C	19	17	21	24
D	25	23	24	24

**Q.6 (a)** Draw the PERT diagram for each activity. [4]

Activity	1-2	1-3	1-4	2-6	3-7	3-5	4-5	5-9	6-8	7-8	8-9
Time in Weeks	2	2	1	4	5	8	3	5	1	4	3

**(b)** In a printing shop 7 different books are printed and bounded on two different machines A and B. Time required on two machines are given in the table below: [6]

Product	1	2	3	4	5	6	7
Printing	8	9	5	12	6	7	5
Binding	8	6	3	10	11	8	4

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 also elapsed time.

(3)

(P.T.O.)

OR

Q.6 (a) Write the steps for processing n jobs through two machines.

[4]

(b) A project has the following time schedule. Construct a PERT network and compute Critical path and its duration. Also calculate float time.

[6]

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-7
Time in Weeks	2	2	2	4	5	8	4
Activity	5-8	6-8	7-9	8-9	9-10		
Time in Weeks	2	4	5	3	4		

