[124 & A-45] SEAT No._____ No. of Printed Pages : 4

SE

SARDAR PATEL UNIVERSITY

T.Y.B.C.A. (Fifth Semester) EXAMINATION – 2018

US05FBCA01 : Operations Research

Date:04/04/2018, Wednesday Time:02:00 to 05:00 PM Total Marks : 70

Q.1 Multiple choice questions: [10]

1 In graphical method the restriction on number of constraint is _____.
A.2 B. 3
C. not more than 3 D. none

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 In graphical representation the bounded region is known as _____region.
A. Solution B. feasible solution
C. basic solution D. optimum

4 The coefficient of artificial variable in the objective function is _____.
A. -M B. +M
C. 0 D. None of these

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 Number of basic allocation in any row or column in Assignment Problem can be
A. Exactly one B. at most 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 D. None of the above

9 _____ is indicated by dotted arrow.
A. burst event B. Merge activity
C. dummy activity D. successor activity

10 Activity which starts only after finishing other activity is called _____.
A. dummy B. Predecessor
C. merge D. successor

(1)

(P.T.O.)

Q.2 Attempt any ten out of twelve. [20]

1. Define i] Unbounded solution ii] Optimum solution
2. Write the definition of operation research.
3. Give any four models of operations research.
4. What is the artificial variable?
5. What is the condition for entering variable in simplex table ?
6. Write the standard form of LPP for the following LPP:

   Maximize Z=3x1+5x2

   Sub to: 2x1+3x2<=4, 3x1+2x2>=7, x1,x2>=0
7. What is transportation problem?
8. What is the Travelling salesman problem?
9. What do you mean by unbalanced transportation problem?
10. State Bellman's principle of optimality in dynamic programming.
11. State any two rules for drawing network diagram.
12. Define terms: Merge Event, Burst Event.

Q.3 (a) A company makes two type varieties, Alpha and Beta, of pens. Each Alpha pen needs twice as much labor time as a Beta pen. The company can make 500 pens per day. The market can take only up to 150 alpha pens and 250 Beta pens per day. If alpha and Beta pens yield profits of Rs. 8 and Rs. 5 respectively per pen, determine the number of Alpha and Beta pens to be manufactured per day so as to maximize the profit. Formulate as L.P.P. [5]

(b) Define operations research. Explain phase of OR. [5]

OR

(a) Define Operations research. Explain different scope of operation research. [5]

(b) Find a solution for the following LP problem using graphical method. [5]

Maximize $Z = 50x + 18y$

Subject to restrictions:

$$2x + y \leq 100$$

$$x + y \leq 80$$

$$x \geq 0, \quad y \geq 0$$

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

(b) Solve the following problem using Big-M method [6]

Maximize z=-2x1-x2

Subject to constraints: 3x1+x2=3,

4x1+3x2>=6,

x1+2x2<=4

and x1,x2>=0

OR

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

(b) Solve the following problem using simple method [6]

maximize Z=3x1+2x2

Subject to constraints: x1+x2<=4,

x1-x2<=2,

and x1,x2>=0

Q.5 (a) Write the steps for solving the transportation problem using Least Cost 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. Solve this assignment problem. [6]

Employees

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

OR

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

(b) Obtain Initial Basic Feasible Solution for below TP using Vogel's Approx method. [6]

| | A | B | C | D | Supply |
|---|---|---|---|---|---|
| 1 | 20 | 22 | 17 | 4 | 120 |
| 2 | 24 | 37 | 9 | 7 | 70 |
| 3 | 32 | 37 | 20 | 15 | 50 |
| Dem | 60 | 40 | 30 | 110 | |

(2)

(P.T.O.)

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 | | |

OR

Q.6(a) Write a note on types of activity. [4]

(b) In a printing shop 8 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 |
|---|---|---|---|---|---|---|
| Printing | 4 | 8 | 3 | 6 | 7 | 5 |
| Binding | 6 | 3 | 7 | 2 | 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.