BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – Bachelor of Commerce (Honours) in Banking & Financial Accounting

Course Name –Operations Research

Course Code –BCM404

(Semester – 4)

Time allotted: 3 Hours   **Full Marks: 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)   10 x 1 = 10

1. *Choose the correct alternative from the following*

(i)   The innovative science of Operations Research was discovered during

      a.   Civil War   b.   World War 2

      c.   World War 1   d.   None of the above

(ii)   The game is called a fair game if the value of game is

      a.   Zero   b.   negative

      c.   positive   d.   non-zero

(iii) The northwest corner rule requires that we start allocating units to shipping routes in the:

      a.   Middle cell   b.   Lower right corner of the table

      c.   upper left hand corner of the table   d.   upper right corner of the table

(iv)   PERT & CPM are

      a.   Statistical tool   b.   Time-even tool

      c.   Network Analysis   d.   All of these.

(v) Dual of the dual is

    a. Primal   b. Dual

    c. Any one may be   d. None

(vi) In Vogel's Approximation Method, the opportunity cost associated with a row is determined by

    a. The difference between the smallest cost and the next smallest cost in the row

    b. The difference between the smallest unused cost and the next smallest unused cost in the row

    c. The difference between the smallest cost and next smallest unused cost in the row

    d. None of the above

(vii) The graphical method of Linear Programming Problem can be applicable if there are only

    a. 3 variables   b. 2 variables

    c. Infinite number of variables   d. None

(viii) In a maximization assignment problem, the cost matrix is converted to

    a. Opportunity loss matrix   b. Cost-Pay off matrix

    c. Value maximization matrix   d. Both (a) and (c)

(ix) Mixed strategy in game theory is applicable when there is

    a. No saddle point   b. One saddle point

    c. In any game problem   d. All of these

(x) Which of the following statements regarding critical paths is true?

    a. The shortest of all paths through the network is the critical path.

    b. Some activities on the critical path may have slack.

    c. Every network has exactly one critical path.

    d. On a specific project, there can be multiple critical paths, all with exactly the same duration.

Group – B

(Short Answer Type Questions) 3 x 5 = 15

Answer any *three* from the following:

2. Solve by graphical Method: 5

   Minimize $Z = 4X_1 + 2X_2$

   Subject to $X_1 + X_2 >= 3$

   $\quad\quad X_1 - X_2 <= 2$

   $\quad\quad X_1, X_2 >= 0$

3. A job production unit has four jobs A, B, C, D which can be manufactured on each 5
   of the four machines P, Q, R and S. The profit gained from each machine is given
   in the table below. To achieve maximum profit which job will you process on
   which machine?

JOBS	MACHINES			
	P	Q	R	S
A	31	25	33	29
B	25	24	23	21
C	19	21	23	24
D	38	36	34	40

4. Find the dual of the following problem: 5

   Minimize $Z = 30x_1 + 20x_2$

   Subject to constraints:

   $\quad\quad -x_1 - x_2 >= -8$

   $\quad\quad -6x_1 - 4x_2 <= -12$

   $\quad\quad 5x_1 + 8x_2 = 20$

   $\quad\quad x_1, x_2 >= 0$

5. Explain fundamental principle of duality. 5

6. What are slack, surplus and artificial variables and explain the purpose of them 5

Group – C

(Long Answer Type Questions)   3x 15 = 45

Answer any *three* from the following

7. A company sells two different products A and B, making a profit of Rs.40 and Rs.30 per unit, respectively. They are both produced with the help of a common production process and are sold in two different markets. The production process has a total capacity of 30000 person-hours. It takes 3 hours to produce a unit of A and 1 hour to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 8000 units and that of B is 12000 units. Subject to these limitations, product can be sold in any combination. Formulate this problem as an LP model to maximize the profit and solve graphically.   15

8. Use Simplex Method to solve the following LPP   15

    Maximize $Z = 5x_1 + 3x_2$

    Subject to constraints:

    $x_1 + 2x_2 \leq 2$

    $5x_1 + 2x_2 \leq 10$

    $3x_1 + 8x_2 \leq 12$

    $x_1, x_2 \geq 0$

9. A medical scientist claims to have found a cure for the common cold that consists of three drugs called K, S and H. His results indicate that the minimum daily adult dosage for effective treatment is 10 mg of drug K, 6 mg of drug S, and 8mg of drug H. Two substances are readily available for preparing pills or drugs. Each unit of substance A contains 6mg, 1mg and 2 mg of drugs K, S and H respectively and each unit of substance B contains 2 mg, 3mg and 2mg of the same drugs. Substance A costs Rs 3 per unit and substance B costs Rs 5 per unit. Formulate the problem as a LP Problem and give the graphical solution.   15

10. A company manufacturing plant and equipment plant for chemical processing is   15
    in the process of qualifying a tender called by public sector undertaking.
    Delivery date once promised is crucial as penalty cause is applicable. The willing of tender is
    also depending on how soon the company is able to deliver the goods. The project manager has
    listed down the activities in the project as under. Draw the network from the
    activity and find the critical path and duration of the project.

Activity	Immediate Preceding Activity	Activity Time (Weeks)
A	-	3
B	-	4
C	A	5
D	A	6
E	C	7
F	D	8
G	B	9
H	E,F,G	3

11. (a) Find the solution of a game to the player A and B   10

		Player A		
		I	II	III
	I	0	-2	7
Player B	II	2	5	6
	III	3	-3	8

   (b) What is a saddle point?   5