



BRAINWARE UNIVERSITY

Course – BCOM

Operation Research (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) Operations Research (OR) , which is a very powerful tool for
 - a. Research
 - b. Decision-Making
 - c. Operations
 - 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) In a transportation problem, when the number of occupied routes is less than the number of rows plus the number of columns -1, we say that the solution is
 - a. Unbalanced
 - b. infeasible
 - c. optimal
 - d. degenerate
 - (iv) Which of the following statements concerning CPM activities is false?
 - a. The late finish of an activity is the earliest late start of all preceding activities.
 - b. The early finish of an activity is the early start of that activity plus its duration.
 - c. The late finish is the earliest of the late start times of all successor activities.
 - d. The late start of an activity is its late finish less its duration.
 - (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) Which costs can vary with order quantity?
- | | |
|----------------------|----------------------|
| a. unit cost only | b. reorder cost only |
| c. holding cost only | d. all of these |
- (ix) An assignment problem can be solved by
- | | |
|---------------------|--------------------------|
| a. simplex method | b. transportation method |
| c. both (a) and (b) | d. none of the above. |
- (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:

$$\text{Minimize } Z = 4X_1 + 2X_2$$

$$\text{Subject to } X_1 + X_2 \geq 3$$

$$X_1 - X_2 \leq 2$$

$$X_1, X_2 \geq 0$$

[5]

3. A job production unit has four jobs A, B, C, D which can be manufactured on each of the four machines P, Q, R and S. The processing cost of each machine is given in the table below. To achieve minimum processing cost 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

[5]

4. Find the dual of the following problem

$$\text{Minimize } Z = 30x_1 + 20x_2$$

Subject to constraints:

$$-x_1 - x_2 \geq -8$$

$$-6x_1 - 4x_2 \leq -12$$

$$5x_1 + 8x_2 = 20$$

$$x_1, x_2 \geq 0$$

[5]

5. Find the solution of the game to the player A and B

		Player A				
		I	II	III	IV	V
Player B	I	-2	0	0	5	3
	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	IV	5	3	-4	2	-6
	V					

[5]

[5]

6. State the advantages of critical path analysis?

Group – C

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

7. Water Limited has two products Drought and Flood. To produce one unit of Drought 3 units of material A and 1 unit each of material B and material C are required respectively. To produce 1 unit of Flood, 1 unit each of material A and material B respectively and 2 units of material C are required. Not more than 40 units of material C can be used and at least 27 units of material A must be used and the use of material B in total should be equal to 21. The selling price per unit of drought & Flood are Rs 16 and Rs 8 respectively. The manufacturing cost per unit of Drought and Flood are Rs 8 and Rs 4 respectively. You are required
- i) To formulate the mathematical model
 - ii) To solve it to minimize cost graphically.
- [8 + 7]
8. XYZ Ltd. is producing product Moon. Monthly requirement of raw material is 10,000 units. Price per material is Rs. 10 and carrying cost is 5% per annum. The ordering cost per order is Rs. 500. Presently the firm purchases minimum 50,000 units to avail the discount scheme and enjoy a discount at the rate of 5%. Being a purchase manager state your opinion about the purchase policy of the company. [15]
9. Use Simplex Method to solve the following LPP
- Maximize $Z = 50x_1 + 60x_2$
 Subject to constraints:
- $2x_1 + x_2 \leq 300$
 - $3x_1 + 4x_2 \leq 480$
 - $4x_1 + 7x_2 \leq 812$
 - $x_1 \text{ to } x_2 \geq 0$
- [15]

10. A company, manufacturing plant and equipment for chemical processing, is 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:

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

Draw the network diagram from the activity and find the critical path and duration of the project.

[15]

11. What is Operations Research?

[7]

State the Phases of Operations Research Study?

[8]