(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 270203 | **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

MBA.

(SEM.II) THEORY EXAMINATION 2013-14

OPERATIONS RESEARCH

Time : 3 Hours   *Total Marks : 100*

Note :– Attempt all Sections.

SECTION–A

1. Attempt all parts of this question in 50-75 words each. All questions carry equal marks.   **(10×2=20)**

    (a) Discuss the historical background of OR.

    (b) What is Monte Carlo Simulation ? Explain this by an illustration.

    (c) Write a short note on degeneracy in a transportation problem.

    (d) Write the dual of the problem :

    Min. $Z = 2x + y$

    S.T. $2x + y \geq 3$

    $\qquad 4x + 3y \geq 6$

    $\qquad x + 2y \geq 3$

    And $x, y \geq 0$

    (e) What is two person zero sum game ?

    (f) "Dual of a dual is its primal". Explain.

    (g) Write short note on the application of queuing model for better service to the customer.

    (h) What is replacement ? Describe some important replacement situations and policies.

    (i) Write short notes on PERT and CPM techniques.

    (j) What are the advantages of linear programming techniques ?

SECTION–B

2. Attempt any **three** of the following in not more than 200 words.

$$(3 \times 10 = 30)$$

(a) What is Operations Research ? State the areas of its applications.

(b) Goods to be transported from factories A, B, C and D to warehouses X, Y and Z. The transportation cost per unit, capacities of the factories and requirements of the warehouses are given in the following table. Find the distribution with minimum cost.

Warehouse/Factories	A	B	C	D	Requirement
X	15	24	11	12	2000
Y	25	20	14	16	4000
X	12	16	22	13	7000
Capacity	3000	2500	3500	4000	

(c) For the following two person zero game, find the optimal strategy for each player and the value of the game.

Player B		B1	B2	B3	B4
Player A	A1	0	1	3	5
	A2	–5	2	4	5
	A3	–2	–3	–4	–2

(d) What do you understand by queuing model ? Why do the arrivals and services follow Poisson and Exponential distributions respectively ?

(e) Solve the following L.P.P.

Max. $Z = 5x + 3y$

s.t $x + y \leq 2$

$5x + 2y \leq 10$

$3x + 8y \leq 12$

$\& \ x, y \geq 0$

SECTION–C

3. Answer the following questions in not more than 500 words :

$$(5 \times 10 = 50)$$

(i) Explain transportation problem (initial) with suitable example.

(ii) Define duality with suitable example.

OR

Solve the following L.P.P. by graphical method :

Max. $Z = 40X + 35Y$

Subject to $2X + 3Y \leq 60$

$4X + 3Y \leq 96$

$4X + 3.5Y \leq 105$ and $X, Y \geq 0$

4. What is an Assignment Problem ? Is it true to say that it is a special form of the transportation problem ? Explain with example.

OR

A department has five employees with five jobs to be preformed. The time (in hour) each man will take perform each job is given in the following matrix :

Jobs	Employees				
	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

5. What is a game in a game theory ? State the assumptions made in the theory of game.

OR

Two competitors are competing for a similar product. The pay-off matrix in terms of their advertising plan in given below :

Competitor A	Competitor B		
	Large Advt.	Medium Advt.	Small Advt.
Large Advt.	70	80	50
Medium Advt.	90	60	95
Small Advt.	150	90	65

Find the optimal strategies and the value of the game.

6. A manufacturing firm has come to know from his past records that a machine costing Rs. 56000/- is not working satisfactory in spite of its regular maintenance. With a view to replacing this machine the following facts were obtained :

Year	Annual running cost (Rs.)	Resale value (Rs.)
1	7,000	28,000
2	9,100	14,000
3	11,900	8,400
4	15,400	4,200
5	20,300	3,500
6	26,600	3,000
7	33,600	3,000
8	42,000	3,000

When should the machine be replaced ?

OR

What is replacement ? Describe some important replacement situations and policies.

7. What is critical path ? State the necessary and sufficient conditions for the critical path. Can a project have multiple critical paths ?

OR

A small project consists of the following jobs whose precedence relationship is given below :

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration (days)	15	15	3	5	8	12	1	14	3	14

(i) Draw an arrow diagram representing the project.

(ii) Find the critical path and total durations.

(iii) Calculate the floats.