



**MB 115**

**Third Semester M.B.A. Examination, July 2010**  
**Course 15 : OPERATIONS RESEARCH**  
**(Compulsory) (Freshers)**

Time : 3 Hours

Max. Marks: 75

**SECTION – A**

1. Answer **any five** sub-questions. **Each** sub-question carries **2** marks : **(5×2=10)**
- a) What do you mean by operations research ?
  - b) List some important replacement situations and policies.
  - c) What are the different managerial applications of Operations Research ?
  - d) Write the General Mathematical model of Linear Programming problem.
  - e) List the differences between PERT and CPM network techniques.
  - f) How do you differentiate the slack and surplus variable ?
  - g) What do you mean by duality in LPP ?

**SECTION – B**

Answer **any four** questions. **Each** question carries **5** marks : **(4×5=20)**

- 2. Discuss the various stages involved in the methodology of Operations Research.
- 3. With a simple sketch explain the general structure of the queuing system.
- 4. Solve the following LPP graphically :

$$\text{Minimize } Z = 0.07 x_1 + 0.10 x_2$$

$$\text{Subject to } x_1 + x_2 \leq 30,000$$

$$x_1 \geq 6,000$$

$$x_2 \leq 12,000$$

$$x_1, x_2 \geq 0$$

**P.T.O.**



5. Six jobs are to perform in the order of AB. The processing times (Minutes) for the jobs are given in below table. You are required to calculate the Cycle time and Operations Time.

Job	Machine-A	Machine-B
1	7	3
2	4	8
3	2	6
4	5	6
5	9	4
6	8	1

6. Solve the following game by reducing the matrix using dominance rule and hence find the optimal strategies of the players. Also find the value of the game.

	B1	B2	B3
A1	9	8	-7
A2	3	-6	4
A3	6	7	-7

7. What is a replacement problem ? List some important replacement situations and policies.

### SECTION – C

Answer **any three** questions. **Each** question carries **10** marks : **(3×10=30)**

8. You are given following information about cost (Rs.) of performing different jobs by different persons. Using this information, optimize the job assignments and also calculate the cost of optimal assignment.

Worker	Job1	Job2	Job3	Job4	Job5
P1	25	18	32	20	21
P2	34	25	21	12	17
P3	20	17	20	32	16
P4	20	28	20	16	27



9. Transportation cost in terms of rupees per kg for shipping is shown in below table. You are required to find the initial basic feasible solution by Vogel's Approximation Method (VAM). Also estimate the transportations cost.

From/ To	P	Q	R	S	Capacities
A	12	10	12	13	500
B	7	11	8	14	300
C	6	16	11	7	200
Requirement (Tons)	180	150	350	320	

10. The project composed of 8 activities whose time estimates are listed in the below table. You are required to draw the network diagram and find the critical path and its duration.

Sl. No.	Activity (i-j)	Duration (Days)
1.	1-2	6
2.	1-3	8
3.	1-4	5
4.	2-4	3
5.	2-5	5
6.	3-6	12
7.	4-6	8
8.	5-6	6

11. The data on maintenance cost per year and resale prices of equipment whose purchase price is Rs. 80,000 are given in below table. You are required to find the optimal period for replacement.

Year	1	2	3	4	5	6	7
Maintenance Cost (Rs.)	1500	1900	2300	2900	3600	4500	5500
Resale Price (Rs.)	75000	72000	70000	65000	58000	50000	45000



12. In a public telephone booth customer arrival at an average rate of 10 minutes between one to other customer. The length of the call is on an average of 3 minutes. Assuming that the inter-arrival rate follows Poisson's and the service rate the exponential distribution calculate the following :
- The traffic intensity and Idle time of the telephone operator
  - The probability of customer arrived observes that four persons are waiting for their turn.

### SECTION – D

13. Case (**Compulsory**) :

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A glass factory specialized in crystal manufacturing is considering three actions to develop the business to meet greater market demand. The correct choice depends on future demand which may be low, medium and high. By consensus, management ranks the respective probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals the effect upon the profits as indicated in the below table. Show this situation in the form of a decision tree and indicate the most preferred decisions and also the corresponding expected value.

		Courses of action		
Demand	Probability	Sub-contracting S1	Begin overtime S2	Construct facilities S3
Low (L)	0.10	-20	10	-150
Medium (M)	0.50	60	50	20
High (H)	0.40	100	50	200