

II Sem. M.B.A. (Day/Evening) Degree Examination, June/July 2007

(Updated Scheme)

MANAGEMENT

Paper – 2.1 : Operations Research

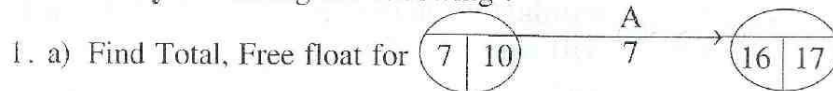
Time: 3 Hours

Max. Marks: 75

SECTION – A

Answer **any six** among the following :

(6×2=12)



- b) What is meant by Resource Levelling ?
- c) What are the properties of Random numbers ?
- d) Give two areas where assignment problems could be used.
- e) Define “PURE STRATEGY” ?
- f) Give two examples of application of multiserver single queue models.
- g) Define “DUAL” in Linear Programming.
- h) Explain “Degeneracy” in transportation model.
- i) Distinguish between TF, FF and IF.

SECTION – B

Answer **any four** questions :

(4×5=20)

2. What is simulation ? Simulate for 10 days.

Driver's absentecism	Probability
0	0.55
1	0.20
2	0.15
3	0.05
4	0.05
	<hr/>
	1.00

P.T.O.

Total number of Drivers for 10 buses are Ten and they have two reserve drivers. If more than two Drivers are absent, the buses have to be cancelled which will cost Rs. 3,000/Bus and if the drivers are idle it will cost Rs. 500/Driver.

Find the total cost to the organisation. Use the following 10 Random numbers. 101, 737, 443, 242, 481, 517, 729, 066, 871, 913.

3. Write the dual of the following :

i) Minimize : $5000x + 3000y$

$$\begin{aligned} \text{s.t} \quad & 60x + 20y \geq 300 \\ & 40x + 40y \geq 200 \\ & 40x + 70y \geq 500 \end{aligned}$$

$$x, y \geq 0$$

ii) Maximize : $10x_1 + 6x_2$

$$\begin{aligned} \text{s.t} \quad & -5x_1 - 4x_2 \geq -800 \\ & 3x_1 + 2x_2 \leq 450 \end{aligned}$$

$$x_1, x_2 \geq 0$$

4. Five Jobs are to be performed on machine X and machine Y. Time taken in hours by each job on each machine is given as

Machine \ Jobs	A	B	C	D	E
x	7	11	9	8	10
y	11	10	7	15	6

Determine the optimal sequence of jobs that minimises the total elapsed time to complete the jobs. Also compute the minimum time.

5. Find the value of the game for the following mixed strategy problem.

		Player 'B'	
		Strategy-1	Strategy-2
Player 'A'	Strategy 1	4	1
	Strategy 2	2	3

6. For the following travelling salesman problem find the best cycle and find the total

	A ₁	A ₂	A ₃	A ₄	A ₅
A ₁	∞	2	5	7	1
A ₂	6	∞	3	8	2
A ₃	8	7	∞	4	7
A ₄	12	4	6	∞	5
A ₅	1	3	2	8	∞

7. Find the economic life of the machine which was purchased for Rs. 12,000. The interest rate is 0%.

End of Year (n)	Operation cost (Rs.)	Maintenance cost (Rs.)	Salvage value (Rs.)
1	2000	2500	8000
2	3000	3000	7000
3	4000	3500	6000
4	5000	4000	5000
5	6000	4500	4000
6	7000	5000	3500
7	8000	5500	2500
8	9000	6000	1000

SECTION – C

Answer any three questions :

(3×10=30)

8. Minimise using simplex method :

$$z = 4x_1 + x_2$$

$$\text{s.t. } 3x_1 + x_2 \geq 27$$

$$x_1 + x_2 \geq 21$$

$$x_1 + 2x_2 \geq 30$$

$$x_1, x_2 \geq 0.$$

9. Solve the following profit matrix of the transportation problem to maximise the profit, how much profit is possible ?

	M ₁	M ₂	M ₃	Production
F ₁	8	6	6	98
F ₂	8	12	10	78
F ₃	11	10	10	58
	108	68	38	

REQUIREMENTS

10. In a Bank withdrawers arrive at the rate of 18/Hr. and depositors arrive @ the rate of 12/Hr. Both follow Poisson distribution. The service for both depositors and withdrawers take 3 minutes per customer. Service time follows negative exponential distribution.
- Find the average waiting time of customers in the withdrawal counter and deposit counter.
 - If both counters were to handle both deposits and withdrawal what would be the average waiting time for a customer ?
11. Solve the following transportation problem for minimising the transportation cost.

	M ₁	M ₂	M ₃	
F ₁	6	7	8	20
F ₂	10	4	7	30
F ₃	4	7	?	80
	40	30	60	

12. Explain the following :

- Reorder point
- Sensitivity analysis
- Saddle point.

SECTION – D

Case study

(Compulsory)

13. Draw the network for the following data and find out :

(1×13=13)

- Total, Free, Independent floats.
- Variance of the critical path.
- Days for completing the project for the probability of 95%.

Activity	Precedence	Duration in days		
		a	m	D
A	–	7	9	12
B	A	10	14	16
C	A	3	4	6
D	C	4	6	8
E	–	10	14	18
F	E	4	6	8
G	B, D	4	5	6
H	F, G	1	2	3

a = Most Optimistic Time

M =

D = Most Pessimistic Time.