Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER MASTER OF HOSPITAL ADMINISTRATION DEGREE EXAMINATIONS - MARCH 2021
SUBJECT: MHA 601: OPERATIONS RESEARCH IN HEALTHCARE
(REPEATERS)

Marks: 50   **Duration: 120 mins.**

1. **Answer the following questions.**

1A)   What is an Operations Research? Write any two of its scope.   (2)

1B)   Solve the following LPP using graphical method.   (8)

$$Maximize \ z = 6x_1 + 8x_2$$

Subject to

$$5x_1 + 10x_2 \leq 60,$$
$$4x_1 + 4x_2 \leq 40,$$
$$x_1, x_2 \geq 0.$$

Answer all the questions.

2.   Consider the following data of a project:

Activities	Predecessor(s)	a	m	b (in weeks)
A	-	3	5	8
B	-	6	7	9
C	A	4	5	9
D	B	3	5	8
E	A	4	6	9
F	C, D	5	8	11
G	C, D, E	3	6	9
H	F	1	2	9

2A)   Construct a project network and write the expression for computing the latest completion time of all   (3)
the activities which are ending at node $2, i.e \ LC_2$.

2B)   From the CPM network of above project it is observed that the critical path is $B - D - F - H$.   (7)

i) Find out expected project completion time and variance of project completion time.
ii) What is the probability of the project being completed within 30 weeks?
iii) Estimate the duration of project being completed with probability 0.9.

3. **Answer all the following six questions.**

3A) A marketing manager has 5 medical representatives and 5 sales districts. Considering the capabilities of the medical representative and the nature of districts, the marketing manager estimates that sales per month (in thousand rupees) for each medical representative in each district would be follows: (5)

Representative/District	A	B	C	D	E
1	22	28	30	18	30
2	30	14	18	11	26
3	31	17	23	20	27
4	12	28	31	26	26
5	19	23	30	25	29

Assign different district to the representatives so as to **maximize** the total sales.

3B) In the registration desk of a hospital the average arrival rate of patients is 10 per every 30 minutes following Poisson process. The average time taken by the receptionist to list and calculate the patient's bill in 2.5 minutes following exponential distribution. What is the probability that the queue length exceeds 6? What is the expected time spent by a patient in the system? (5)

3C) Obtain initial basic feasible solution for the following transportation problem table using Vogel's Approximation method and also find the corresponding total cost. (5)

Source	Destination				Availability
	A	B	C	D	
1	21	16	25	13	11
2	17	18	14	23	13
3	32	27	18	41	19
Demand	6	10	12	15	

3D) Check for the optimality of the transportation suggested in the following table. Find the optimal solution, if the basic solution is not optimal. (5)

	A	B	C	D	E
S1	3	4	6	14 8	6 8
S2	18 2	10	8 1	4 5	30
S3	15 7	11	20	40	15
S4	7 2	6 1	9	14	18

3E) What is a fixed order quantity system? Explain. (5)

3F) Write a note on the requirements for effective inventory management. (5)

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