

# Question Paper

Exam Date & Time: 06-Feb-2020 (10:00 AM - 11:30 AM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER MASTER IN HOSPITAL ADMINISTRATION DEGREE EXAMINATION - FEBRUARY 2020  
SUBJECT: MHA 601 - OPERATIONS RESEARCH IN HEALTHCARE  
(REPEATER)

Marks: 50

Duration: 90 mins.

Answer all the questions.

- 1A) Write a short note on economic order quantity. (5)
- 1B) What is fixed order quantity system? Explain. (5)
- 2A) Describe the different phases of project management. (5)
- 2B) List the rules of network construction. (5)
- 3) Answer both the questions given below: (5)

i) Solve the following LPP using graphical method.

$$\text{Maximize } z = 6x + 8y$$

Subject to

$$5x + 10y \leq 60,$$

$$4x + 4y \leq 40,$$

$$x \geq 16,$$

$$x, y \geq 0.$$

ii) Draw the line  $y = x$ .

(4+1 = 5 marks)

- 4) Answer both the questions given below: (5)
- i) What is balanced transportation problem? Verify whether the following transportation problem is balanced or not.

Source	Destination			Supply
	1	2	3	
1	30	50	15	200
2	35	70	20	200
3	20	45	60	100
<b>Demand</b>	<b>250</b>	<b>100</b>	<b>150</b>	

ii) Define an optimal solution of a transportation problem. Write the steps involved in finding an optimal solution for a transportation problem and also list the corresponding methods.

(2+3 = 5 marks)

- 5) Five jobs are to be done on five different machines in a lab. The cost of producing  $i$ th job on the  $j$ th machine is given below. Assign the jobs to different machines so as to minimize the total cost. (5)

Jobs/Machines	A	B	C	D	E
1	9	3	1	13	1
2	1	17	13	20	5
3	0	14	8	11	4
4	19	3	0	5	5
5	12	8	1	6	2

- 6) A hospital help desk receives one call for every four minutes and responds one call for every three minutes in the peak time. If the rate of arrival calls follows Poisson distribution and service time (5)

follows exponential distribution, find out:

- a) Expected waiting time for a call.
- b) Expected time in the system.
- c) Expected number of patients in the system.
- d) Expected number of patients in queue.

7)

Consider the following data of a project:

(5)

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

- a) Construct a project network.
- b) Find the expected duration and variance of each activity.  
(2+3 = 5 marks)

8)

Write a short note on Network Crashing.

(5)

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