Year and Program: BBA 2020-21	**School of Commerce and Management**	**Department: Management**
Course Code: MBC 201	**Course Title: Operation Research Techniques**	**Semester : III**
Day and Date: Tuesday, 01.12.2020	**End Semester Examination**	**Time:11.00am-1.00pm Max Marks:50**

Instructions: 1) All Questions are compulsory.
2) Scientific calculators are not allowed.

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)–**			
a)	Explain the applications of Operation Research in managerial decision making. Give suitable examples from different areas.	9	L1	CO1
b)	Anita Electric company produces two products P1 and P2. Products are produced and sold on a weekly basis. The weekly production cannot exceed 25 for product P1 and 35 for product P2 because of limited available facilities. The company employs total of 60 workers. Product P1 requires 2 man-weeks of labor, while P2 requires 1 man-week of labor. Profit margin on P1 is Rs.60 and on P2 is Rs.40. Formulate this problem as an LPP and solve by graphical method for maximum profit.	9	L3	CO2
c)	An automobile dealer wishes to put four repairman to four different jobs. The repairmen have somewhat different kinds of skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of ma-hours that would be required for each job-man combination. This is given in matrix form in the following table. Find the optimal assignment that will result in minimum man hours need.	9	L2	CO3

		Jobs		
		A	**B**	**C**
Men	**1**	5	3	2
	2	7	9	2
	3	6	4	5
	4	5	7	7

Q.2 Answer the following (any two) –

a) A dairy plant has three plants located in a state. The daily milk production at each plant is as follows : 8 L3 CO4

Plant 1: 7 million liters Plant 2: 9 million liters

Plant 3 : 18 million liters

Each day, the firm must fulfill the needs of its four distribution centers. The minimum requirement of each center is as follows :

Distribution center 1 : 5 million miters

Distribution center2: 8 million liter

Distribution center 3: 7 million liter

Distribution center4 : 14 million liter

Cost (in hundreds of rupees) of shipping one million liter from each plant distribution center is given in the following table.

Find the optimum quantity to be supplied from each plant to different distribution center at the minimum cost. Use VAM method for IBFS

	Distribution Center				
		D1	D2	D3	D4
Plant	P1	19	30	50	10
	P2	70	30	40	60
	P3	40	8	70	20

b) An aircraft company uses rivets at constant rate of 2500 per year. Each unit cost Rs.30. The company personnel estimate that it costs Rs.130 to place an order, and that the carrying cost of inventory is 10 percent per year. How frequently should orders be placed? Also determine the optimum size of the each order and total Inventory cost. what is effect on order size if order cost is increased to Rs.500. 8 L2 CO5

c) Derive an expression for the economic order quantity when the stock replenishment is instantaneous giving assumptions made. How the expression changes in case of gradual build up of stock. 8 L1 CO1

Q.3 **Answer the following (Any two) –**

a) The owner of a chain of fast food restaurants is considering a new computer system for accounting and inventory control. A computer company sent the following information about the computer system installation. Construct the network diagram for the project. Determine the critical path and compute expected completion timeby using ES/EF and LS/LF. 8 L4 CO5

Activity	Immediate Predecessor	Time (days)		
		Pessimistic	Optimistic	Most likely
A	-	7	1	1
B	-	7	1	4
C	-	8	2	2
D	A	1	1	1
E	B	14	2	5
F	C	8	2	5
G	E,D	15	3	6

b) The following is a payoff (in rupees) table for three strategies and two state of nature 8 L2 CO5

Strategy	**State of nature**	
	N1	**N2**
S1	40	60
S2	10	-20
S3	- 40	150

Select a strategy using each of the following decision criteria a) Maximax b)Minimax Regret c) Maximin d) Hurwitz Criteria

c) A small project consist of nineactivities, the details of each are given below. Draw the network diagram for the project. 8 L3 CO5

Activity	**Immediate predecessor**	**Time Estimates (weeks)**
A	-	8
B	-	6
C	A	14
D	A	5
E	C	11
F	D	7
G	B	11
H	E,F	4
I	G	18

Identify the critical path.Determine the project completion time.

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