Sanjay Ghodawat University, Kolhapur

2019-20

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Year and Program	**School of Commerce and Management**	**Department: Management**
2019 SYBBA		
Course Code: MBC201	**Course Title: Operation Research Techniques**	**Semester – Odd (III)**
Day and Date Tuesday 19/11/19	**End Semester Examination**	**Time: 3 hrs, Max Marks: 100** 10.30 am to 1.30 pm

Instructions: 1) All Questions are compulsory.

		Marks	Level	COs
Q.1				
a)	True or False. Any 5 out of 6 (2*5)	10	L1	
	1. Operations research approach is multi-disciplinary.			CO1
	2. In a transportation problem, a single source may supply something to all destinations.			CO2
	3. Action means anything that a decision maker can do and it is in control of the decision maker..			CO3
	4. Any linear programming problem can be solved using the graphical solution.			
	5. Interest, insurance and opportunity cost are all associated with holding cost.			
	6. The method used for solving an assignment problem is called Hungarian method.			
b)	Answer the following terms in short. Any 5 out of 6 (2*5)	10	L1	
	1.Necessity of Inventory Management			CO4
	2.North –west corner rule			CO5
	3.PERT			CO6
	4.State of Nature			
	5.Rules of Network construction			
	6. Inventory Carrying cost			

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Q.2 Answer the following

a) A farm is engaged in breeding pigs. The pigs are fed on various products grown on the farm. In view of the need to ensure certain nutrient constituents, it is necessary to buy products (call them A and B) in addition. The contents of the various products , per unit , in nutrients are vitamins , proteins etc , is given in the following table — 10 L3 CO1

Nutrients	Nutrient Content		Min. Amount of Nutrient
	A	B	
M1	36	6	108
M2	3	12	36
M3	20	10	100

The last of the above table gives the minimum amount of nutrient constituents M1, M2, M3 which must be given to pigs.
If the A and B cost of Rs. 20 and Rs. 4 per unit respectively, how much each of these two products should be bought so that the total cost is minimized.

OR

a) Solve the following L.P.P. by graphical method. — 10 L3 CO1

Maximize $Z = 40X_1 + 100X_2$

Subject to $12X_1 + 6X_2 \leq 3000$

$4X_1 + 10X_2 \leq 2000$

$2X_1 + 3X_2 \leq 900$

and $X_1, X_2 \geq 0$

b) A department head has four subordinate and four task have to be performed. Subordinates differ in efficiency and task differ in their intrinsic difficulty. Time each man would take to perform each task is given in the effectiveness matrix. How the tasks should be allocated to each person so as to minimize the total man-hours. — 10 L2 CO2

		Subordinates			
		I	II	III	IV
Tasks	A	8	26	17	11
	B	13	28	4	26
	C	38	19	18	15
	D	19	26	24	10

OR

b) A machine tool company decides to make four subassemblies through four contractors. Each contractor is to receive only subassembly . The cost of each subassembly is determined by the bids submitted by each contractor and is shown in following table in hundreds of rupees. — 10 L3 CO2

Assign the different subassemblies to contractors so as to minimize the total cost.

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Subassemblies		1	2	3	4
	1	15	13	14	17
	2	11	12	15	13
	3	13	12	10	11
	4	15	17	14	16

Q.3 Answer the following

a) Find the optimum solution to the following transportation problem for which the cost , origin –availabilities and destination requirement are as follows . Obtain IBFS by VAM. 10 L3 CO3

		To					
		A	B	C	D	E	ai
From	I	3	4	6	8	8	20
	II	2	10	1	5	30	30
	III	7	11	20	40	15	15
	IV	2	1	9	14	18	13
	bj	40	6	8	18	6	

OR

a) Solve the following Transportation problem to maximize profit. 10 L3 CO3

	Sales Agencies						Production Capacity
		1	2	3	4	5	
Factories	1	15	17	12	11	11	140
	2	5	9	7	15	7	190
	3	14	15	16	20	10	115
	Demand	74	94	69	39	119	

b) Draw a network to represent the project and find the minimum time of completion of the project , when time in days of each task as follows 10 L3 CO4

Task	A	B	C	D	E	F	G	H	I
Time	8	10	8	10	16	17	18	14	9
Immediate Predecessor	-	-	-	A	A	B,D	C	C	F,G

OR

b) The time estimates (in weeks) for the activities of a PERT network are given below 10 L3 CO4

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

Draw the network and find critical path for the following project.

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Q.4 Answer any Two

a) A company purchases 10,000 items per year for use in production shop. The unit cost is Rs.10 per year, holding cost is Rs.0.80 per month and cost of making a purchase is Rs.200. Determine the following if no shortages are allowed: 10 L2 CO5

i)The optimum order quantity
ii)The optimum total yearly cost
iii)The number of order per year
iv)the time between orders

b) Derive the EOQ formula, where the symbols have usual meanings. State the assumptions and limitations in this formula. 10 L1 CO5

c) A stockiest has to supply 12,000 units of a product per year to his customer. The demand is fixed and known and shortage cost is assumed is to be infinite .The inventory holding cost is Rs. 0.20 per unit per month and the ordering cost per order is Rs.350. determine 10 L2 CO5

i)The optimum lot size
ii)Total inventory cost

Q.5 Answer any Two

a) What are the different environments in which decision are made. 10 L2 CO6

b) The following matrix gives the payoff of different strategies S1,S2,S3 against different conditions N1,N2, N3 and N4 10 L2 CO6

	N1	N2	N3	N4
S1	4,000	-100	6,000	18,000
S2	20,000	5,000	400	0
S3	20,000	15,000	- 2,000	1000

Indicate the decision taken under the following approach
i)Pessimistic ii)Optimistic iii)Regret

c) Calculate the decision under 10 L2 CO6

i)Maximax decision
ii)Maximin decision
iii)Minmin Decision

	Good Market	Fair Market	Poor Market
Small	50,000	20,000	- 10,000
Medium	70,000	35,000	-25,000
Large	90,000	35,000	-45,000
Very large	2,00,000	25,000	-1,20,000

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