Answer all questions   17 SEP 2015 Time: 03 Hours

Q1.   LKR Ltd has established a project team to undertake some important software development work.
It is possible to reduce the expected or "normal" times for certain activities in units of one week
but at a certain extra cost. The relevant information is given below:

Activity	Preceding Activities	Normal		Crash	
		Duration (weeks)	Cost of Activity (Rs.)	Duration (weeks)	Extra cost per week saved/ Cost slope
A	-	5	4000	3	2000
B	-	4	3000	4	-
C	A	2	6000	1	1500
D	C,E	4	1000	4	-
E	B	5	4000	3	3000
F	B	5	7000	1	7000
G	C,E	4	4000	2	20,000
H	F	3	5000	2	10,000
I	D,F	2	2000	2	-

In addition to the cost shown, there is a cost of retainer fees and administration overheads of
Rs.4000 for each week the project lasts.

i.   What is the normal expected duration of the project, and its total cost?

ii.   What would be the cost of completing the project in the minimum possible time?

iii.   What would be the duration of the project if costs are to be minimized?

(Total 20 Marks)

1

Q2. Ramesh Ltd has five building contracts (B1-B5) to assign to different contractors. There are contractors (C1-C6) demanded each of the contracts at the following cost (in million rupees Ramesh Ltd has a policy of assigning each building contract to different contractors.

	C1	C2	C3	C4	C5	C6
B1	14	17	20	18	19	24
B2	16	20	22	21	24	27
B3	16	21	22	23	25	26
B4	18	21	23	25	24	25
B5	17	20	24	24	24	27

Required:

i. How does Ramesh Ltd assign each of the building contracts to different contractor order to minimize the total cost?

(10 ma

ii. If you find any alternative solution where a contractor can get any of two o building contracts, identify them and determine the minimum total cost fo assignment to be made.

(5 M

(Total 15 M

Q3. i) "EOQ is always determined where annual total ordering cost equals annual total handling c Do you agree with this statement? Explain.

(3 M

ii) RMG Pvt Ltd purchases 3200 units of material per annum from a supplier. The cost of placi order is Rs.150 and the cost of holding is 25% of item price.

Unit Price is Rs.6 per item.

a) Calculate the Economic Order Quantity (EOQ)

b) The supplier has agreed to offer the following discounts on order beyond a c size. He has offered the following price structure:

Order Size (Units)	Unit Cost (Rs.)
0-800	6
8001-1500	5
Above 1500	4.5

If the RMG Pvt Ltd accept the offer what would be the most economical order Quantity?

(12 Marks)

iii) Write short notes on the following:

(a) Decision making under Risk (4 marks)

(b) Decision making under conflict (3 Marks)

(c) Decision making under uncertainty (3 Marks)

(Total 25 Marks)

Q4. i) Grand Pictures Limited manufactures three types of videocassette tapes:

- The L-500 with a recording time of two hours
- The L-750 with a recording time of three hours
- The P-2000 with a recording time of eight hours

The production manager consults you to help him determine the number of units of each type of cassette tape to be manufactured per week, given an available production capacity of 450 hours per week. The cassette tapes are packed in containers of 100 cassettes each, which must be considered as a unit for production purposes.

The production manager has the following information available:

	L-500	L-750	P-2000
Production cost per unit (Rs.)	30	45	70
Production time per unit (minutes)	15	30	60

The following information is provided by the marketing manager:

- The demand for the L-500 is virtually indefinite and it is dispatched to the trade as it becomes available, without taking permanent orders.
- There is a permanent order of 200 units of the L-750 per week. However, if more is produced, it could be sold without difficulty.
- The P-2000 is specially manufactured for Video Scene Limited, which has placed an order of 150 units per week.

Required

(a)   Formulate a linear programming model.   (05 Mark

(b)   Construct an extended model that can be solved by means of the simplex method to

minimize the cost.   (06 Mark

(c)   Find the optimal solution.   (04 Mark

ii)   A furniture manufacturer makes two types of furniture – chairs and sofas. The production of sofas and chairs requires three operations – carpentry, finishing, and upholstery. Manufacturing chair requires 3 hours of carpentry, 9 hours of finishing, and 2 hours of upholstery. Manufacture a sofa requires 2 hours of carpentry, 4 hours of finishing, and 10 hours of upholstery. The fact has allocated at most 66 labour hours for carpentry, 180 labor hours for finishing, and 200 la hours for upholstery. The profit per chair is Rs. 90 and the profit per sofa is Rs.75. How m chairs and how many sofas should be produced each day to maximize the profit by using graph method?

(10 Mar

(Total 25 Mar

Q5.   Computers Unlimited sells microcomputers to universities and campus on the North East provi and transport them from three distribution warehouses. The firm is able to supply the follow numbers of microcomputers to the universities by the beginning of the academic year:

Distribution (Warehouse)	Supply(microcomputers)
1. Richmond	420
2. Atlanta	610
3. Washington	340

Four universities have ordered microcomputers that must be delivered and installed by the beginning of the academic year:

University	Demand(microcomputers)
A. Eastern University	520
B. South Eastern University	250
C. Jaffna	400
D. Trinco Campus	380

The transportation and installation costs per microcomputer from each distributor to each university are as follows:

From	To			
	A	B	C	D
1	22	17	30	18
2	15	35	20	25
3	28	21	16	14

Required

(a) Construct a Linear Programming Model for this Transportation Problem.   (03 Marks)

(b) Find the initial solution using VAM.   (06 Marks)

(c) Solve using MODI.   (06 Marks)

(Total 15 Marks)