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08MBA21

Second Semester MBA Degree Examination, December 2011

Quantitative Techniques for Management

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any Four full questions from Q.No.1 to Q.No.7*
2. *Question No. 8 is compulsory.*
3. *Missing data may be suitably assumed if required.*

1 a. What is an optimization technique? (03 Marks)

b. List out differences between PERT and CPM. (07 Marks)

c. Solve by using graphical method :
Objective function : Maximize $Z = 3x + 4y$
Subject to constraints : $2x + 3y \geq 12$, $4x + 2y = 24$, $8x + 9y \leq 72$, $x, y \geq 0$. (10 Marks)

2 a. State the conditions of optimality in transporation model. (03 Marks)

b. Write the dual of the following primal LPP model:
Maximize $Z = 3x_1 + 4x_2 + 7x_3$
Subject to constraints : $x_1 + x_2 + x_3 \leq 10$, $4x_1 + x_2 - x_3 \geq 15$, $x_1 + x_2 + x_3 = 7$
x_1, x_2 and $x_3 \geq 0$. (07 Marks)

c. Draw the network diagram and find :
i) Critical path ii) Total project duration iii) Is the critical path is unique? (10 Marks)

Activity	A	B	C	D	E	F	G	H	I
Logical precedence	-	-	A, B	A, B	B	D, E	C, F	D, E	G, H
Activity duration in (min)	15	10	10	10	5	5	20	10	15

3 a. State the rule of dominance in context game theory. (03 Marks)

b. The initial solution of a typical transport model is given below ;

From ↓ \ To →	I	II	III	IV	
A	5	10	(10) 4	3	10
B	(20) 6	8	7	(5) 2	25
C	(5) 4	(10) 2	(5) 5	7	20
	25	10	15	5	

i) Is this solution feasible? ii) Is this solution degenerate? iii) Is this solution optimal?
(No need to find optimal solution if it is not optimal.) (07 Marks)

c. Solve the following game model. Find optimal strategy and value of the game. (10 Marks)

Player A \ Player B	B_1	B_2	B_3	B_4
A_1	35	65	25	5
A_2	30	20	15	0
A_3	40	50	0	10
A_4	55	60	30	15

4 a. What is SIRO in context of waiting line models? (03 Marks)

b. Find the optimal sequence using Johnson's rule and calculate total lapsed time? (07 Marks)

Job →	A	B	C	D	E
Machine 1	04	13	07	12	06
Machine 2	03	15	06	06	11

c. Find the optimal assignment schedule for the following model : (10 Marks)

	I	II	III	IV	V
A	8	2	X	5	4
B	10	9	2	8	4
C	5	4	9	6	X
D	3	6	2	8	7
E	5	6	10	4	3

5 a. Differentiate bounded versus unbounded solution in LPP. (03 Marks)

b. A T.V. repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come and 16 the arrival of sets is approximately Poisson distribution with an average rate of 10 per 8 hour day. What is his expected idle time/day? How many jobs are ahead of the set just brought in? (07 Marks)

c. Solve the following game model using graphical method. (Use answer book sheet for constructing graph) (10 Marks)

		Player II			
		b_1	b_2	b_3	b_4
Player I	a_1	8	5	-7	9
	a_2	-6	6	4	-2

6 a. What is crashing? (03 Marks)

b. A company produces two types of coffee powder. Brand A coffee powder consists of 70% coffee and 30% of chicory where as brand B consists of 80% coffee and 20% chicory.

In a month not more than 500 kg of chicory is available and 1000 kg coffee seeds are available, The profit obtained by selling 1 kg of brand A coffee powder is Rs.30 and for brand B it is Rs.25. Formulate an LPP model. Suggest whether we can use graphical method to find solution to this model. (07 Marks)

c. Big Bazar in Bangalore has given the following results on research.

- Customer is served in single window.
- The customers are arriving in random fashion
- Customer arrival pattern is as follows :

Time between arrivals (in minutes)	0.5	1.0	1.5	2.0	2.5	3.0
Probability	0.1	0.2	0.2	0.3	0.1	0.1

- Service pattern is as follows :

Time between service (in minutes)	2.0	3.0	4.0	5.0	6.0
Probability	0.2	0.2	0.3	0.2	0.1

Use the following random numbers and simulate for next 10 customers. Find the average waiting time of customers. If the waiting time is more than 5 minutes suggest second counter.

Random numbers : 20, 17, 30, 25, 21, 19, 24, 26, 16, 28, 22, 98, 87, 45, 85, 58, 90, 07, 32, 16, 15, 78, 87. (10 Marks)

7 a. What is a non-negative restriction? **(03 Marks)**

b. Find the initial solution by VAM for the given transportation model : **(07 Marks)**

Max(Z) =

From ↓ \ To →	P	Q	R	S	Supply
A	20	21	16	18	150
B	17	19	28	15	350
C	30	24	22	23	400
D	25	26	27	29	100
Demand	250	200	150	400	

c. A project is represented by the network shown in Fig.Q7(c):

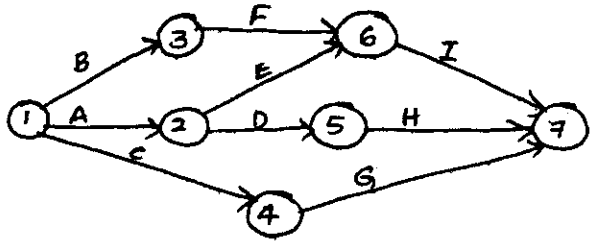

Fig.Q7(c)

Task	A	B	C	D	E	F	G	H	I
t_o	5	18	26	16	15	6	7	7	3
t_p	10	22	40	20	25	12	12	9	5
t_m	8	20	33	18	20	9	10	8	4

Determine : i) Total project duration

ii) The critical path

iii) The probability of project completion by 41.5 wks.

Area under normal distribution (Z value)

Z ↓	0.00	0.01	0.02	0.03	0.04	0.05
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736
0.5	0.6915	0.6950	0.6999	0.7054	0.7088	0.7123
0.6	0.7253	0.7291	0.7324	0.7354	0.7387	0.7422

(portion of Z – table) **(10 Marks)**

8 Write short notes on the following :

a. Waiting line structure

b. Network topology and event labeling

c. Classification of OR models

d. Monte-Carlo simulation methods. **(20 Marks)**

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