

(35)

SARDAR PATEL UNIVERSITY**MASTER OF BUSINESS ADMINISTRATION EXAMINATION****SECOND SEMESTER**

2008

MONDAY, 28TH APRIL

Time: 11.00 a.m. to 2.00 p.m.

Marks: 60

CC – 109 QUANTITATIVE TECHNIQUES FOR MANAGEMENT - II

- Notes: (1) Figures to the right indicates marks of individual question.
 (2) All questions are compulsory.
 (3) It is a closed book examination.
 (4) Be precise and to the point in your answers.

- Q.1 (a) 'Management science does help in decision-making. But, it does not provide ultimate answer to the managerial problem always.' Do you agree? Why? (Word limit: 50 words) (03)
- (b) A company has three resources, machining, assembly, and packing. The operation manager has found out the shadow prices of these three resources from the simplex table as $10/3$, $13/4$, and 5 respectively. The company has developed a new product and it is estimated that it will require 6 hours of machining, 4 hours of assembly and one hour of packing. If the sales price of this product is estimated to be Rs. 40, should it be considered for production? (03)
- (c) The Head of the Management Department has decided to apply Hungarian method in assigning professors to courses. As a criterion for judging who should teach each course, he reviews the past two years' teaching evaluations (which were filled out by students). Since, each of the professors had taught each of the four courses at one time or another during the two-year period, he is able to record a course rating for each instructor. These ratings are shown in the table: (06)

Professor	Course			
	Statistics	Management	Finance	Marketing
A	90	65	95	40
B	70	60	80	75
C	85	40	80	60
D	55	80	65	55

Find the best assignment of professors to courses to maximize the overall teaching rating.

- Q.2 (a) In integer programming, there are three reasons under which the nodes of branch and bound method should be terminated. What are these three reasons? (02)
- (b) What does it mean to rank goals in goal programming? How does this affect the problems solution? (04)

(2)

(c) Solve the following transportation problem:

(06)

Source	Destination				Supply
	D ₁	D ₂	D ₃	D ₄	
S ₁	5	20	7	10	100
S ₂	14	15	9	4	200
S ₃	16	5	12	8	150
Demand	50	75	100	80	

Q.3 (a) The owner of a mall has received five loads of mangoes, which he wants to send to the three malls. Since, the malls are located in different parts of the city, the profitability differs in the three malls. The expected profit obtainable from selling different number of loads in the three malls is shown below: (09)

Loads	Store		
	1	2	3
0	0	0	0
1	2,000	2,400	1,600
2	3,600	4,400	3,600
3	5,600	6,000	5,200
4	6,800	7,600	7,200
5	8,400	8,800	8,000

Use dynamic programming to determine how the loads should be divided between the three malls so as to maximise the expected profit.

(b) A box contains 100 balls of which 10 percent are white, 40 percent black and 50 percent are spotted. Develop a simulation model of the process of drawing balls at random from the box. Each time a ball is drawn, its colour is noted and then it is replaced. Use the following random numbers to simulate for withdrawal of 15 balls: (03)

26	42	95	95	66	17	03	56	83	55	84	47	08	36	05
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Find the percentage of three types of balls from your simulation.

Q.4 (a) A departmental store has a single cashier. During the rush hours, customers arrive at the rate of 20 customers per hour. The average number of Customers that can be served by the cashier is 24 per hour. Assume that the conditions for use of single channel queuing model apply. What is the: (06)

- Probability that the cashier is idle?
- Average number of customers in the system?
- Average time a customer spends in the system?
- Average number of customers in the queue?
- Average time a customer spends in the queue waiting for service?

$$L_s = \lambda / (\mu - \lambda), L_q = L_s - \lambda / \mu, W_q = L_q / \lambda, W_s = L_s / \lambda, L_q' = \mu / (\mu - \lambda)$$

(3)

- (b) A company has to choose one of the three types of Biscuits: Cream, Coconut and Glucose. Sales expected during next year are highly uncertain. Marketing Department estimates the profit considering manufacturing cost, promotional efforts and distribution set up etc. as given in the table below: (03)

Type of Biscuits	Profit on estimated level of sales (in lakhs) for quantities		
	5,000	10,000	20,000
Cream	15	25	45
Coconut	20	55	65
Glucose	25	40	70

Use Laplace, Maximin, and Minimax criteria to decide as to which type of biscuits the company should launch under different criteria.

- (c) In solving routing problems, we are using theories of two techniques of operations research. Which are these two techniques? Give names only. (02)
- (d) If there are four supply stations and five destinations in a transportation problem, what will be the matrix size of a trans-shipment problem? (01)
- Q.5 (a) Using the PERT, (08)
- Draw the network
 - Calculate the expected time and standard deviation of time required for each activity.
 - Determine the critical path and expected completion time. Also calculate the standard deviation of the critical path.

Activity	Immediate Predecessor	Estimate time (weeks)		
		Optimistic time	Most likely time	Pessimistic time
A	—	7	8	9
B	—	5	7	8
C	A	6	9	12
D	B	4	4	4
E	B	7	8	10
F	B	10	13	19
G	D	3	4	6
H	E, G	4	5	7
I	E, G	7	9	11
J	C, F, H	3	4	8

- (b) Solve the following game: (04)

		Player Q		
		Q ₁	Q ₂	Q ₃
Player P	Strategy P ₁	-3	5	3
	Strategy P ₂	-3	-3	4
	Strategy P ₃	2	-3	4

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