MBA.F.2/06.2

M.B.A. DEGREE (FT) II SEMESTER EXAMINATION, MAY 2006

MANAGEMENT SCIENCE

Time: 3 Hours

Maximum marks : 50

(Answer **ALL** questions)
(All questions carry **EQUAL** marks)

I.   A.   (a)   Explain the steps in Decision Tree Analysis.

           (b)   A news paper boy has the following probabilities of selling a magazine:

No. of copies sold	10	11	12	13	14
Probability	0.10	0.15	0.20	0.25	0.30

               Cost of copy is 30 paise and sale price is 50 paise. He cannot return unsold copies. How many copies should he order ?

<div align="center">OR</div>

   B.   (a)   Solve the game

$$A \begin{bmatrix} 19 & 15 & -5 & -2 \\ 19 & 15 & 17 & 16 \\ 0 & 20 & 15 & 5 \end{bmatrix}$$

(with B labelling the columns)

           (b)   Describe how a 'Two-person zero-sum game' can be solved by Linear Programming.

II.   A.   Mohan Meakins Breweries Ltd. has two bottling plants, one located at Solan and the other at Mohan Nagar. Each plant produces three drinks whiskey, beer and fruit juices named A, B and C respectively. The number of bottles produced per day are as follows:

<div align="center">Plant at</div>

	Solan (S)	Mohan Nagar (M)
Whiskey	1,500	1,500
Beer B	3,000	1,000
Fruit juice C	2,000	5,000

A market survey indicates that during the month of April, there will be a demand of 20,000 bottles of whiskey, 40,000 bottles of beer and 44,000 bottles of fruit juices. The operating costs per day for plants, at Solan and Mohan Nagar are 600 and 400 monetary units. For how many days each plant be run in April so as to minimize the production cost, while still meeting the market demand ?

<div align="center">OR</div>

   B.   Solve

$$Maximise \ \ Z = 2x_1 + 3x_2$$

$$Subject \ to \ \ 6x_1 + 5x_2 \le 25$$

$$x_1 + 3x_2 \le 10$$

$$x_1 \ x_2 \ non-negative \ int$$

(Turn over)

III. A. (a) Four new machines M_1, M_2, M_3 and M_4 are to be installed in a machine shop. There are five vacant places A, B, C, D and E available. Because of limited space, machine M_2 cannot be placed at C and M_3 cannot be placed at A. C_{ij} the assignment cost of machine I to place j in rupees is shown below.

	A	B	C	D	E
M_1	4	6	10	5	6
M_2	7	4	–	5	4
M_3	–	6	9	6	2
M_4	9	3	7	2	3

Find the optimal assignment schedule.

(b) Distinguish between transportation model and assignment model.

OR

B. (a) What are the three fundamental properties of a finite-state, first order Markov chains ?

(b) On January 1 (this year), Bakery A had 40 per cent of its local market share while the other two bakeries B and C had 40 per cent and 20 per cent, respectively, of the market share. Based upon a study by a marketing research firm, the following facts were complied. Bakery A retains 90 per cent of its customers while gaining 5 per cent of B's customers and 10 per cent of C's customers. Bakery B retain 85 per cent of its customers while gaining 5 per cent of A's customers and 7 per cent of C's customers. Bakery C retains 83 per cent of its customers and gains 5 per cent of A's customers and 10 per cent of B's customers. What will each firm's share be on January 1next year and what will each firm's market share be at equilibrium ?

IV. A. (a) Write short notes on:
   (i) Traffic intensing
   (ii) Service discipline and
   (iii) Queue

(b) On average 96 patients per 24 hour day require the service of an emergency clinic. Also an average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs.100/- per patient treated to obtain an average servicing time of 10 minutes, and that each minutes of decrease in this average time would cost Rs.10/- per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from $1\frac{1}{3}$ patients to ½ patient ?

OR

B. (a) Solve the following sequencing problem giving an optimal solution when passing is not allowed. Find total elapsed time corresponding to the optimal sequence.

Machine	Job				
	A	B	C	D	E
M_1	11	13	9	16	17
M_2	4	3	5.	2	6
M_3	6	7	5	8	4
M_4	15	8	13	9	11

(b) What are the general assumptions in sequencing problems.

V. A. (a) 'PERT' takes care of uncertain durations. How far is this statement correct ? Explain with reasons.

    (b) A small project is composed of 7 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending (j) mode numbers.

Activity	Estimated durations (weeks)		
(i -j)	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

    (i) Draw the project network

    (ii) Find the expected duration and variance for each activity. What is the expected project length ?

    (iii) What is probability that the project will be completed at least 4 weeks earlier than expected time ?

OR

B. (a) Distinguish between solutions derived from simulation models and solutions derived from analytical models ?

    (b) A project consists of eight activities A to H. The completion time for each activity is a random variable. The data concerning probability distribution along with completion times for each activity is as follows:

Activity	Immediate Predecessor(s)	Time (day) (Probability)								
		1	2	3	4	5	6	7	8	9
A	--	--	--	--	0.2	--	0.4	0.4	--	--
B	--	--	--	--	--	--	0.5	--	0.5	--
C	A	--	--	0.7	0.3	--	--	--	--	--
D	B,C	--	--	--	--	0.9	--	--	0.1	--
E	A	--	--	--	--	0.2	--	--	--	0.8
F	D,E	--	--	--	0.6	0.4	--	--	--	--
G	E	--	--	0.4	0.4	--	0.2	--	--	--
H	F	--	0.4	--	--	--	--	0.6	--	--

    (i) Draw the network diagram and identify the critical path.

    (ii) Simulate the project to determine the activity times. Determine the critical path and project expected completion time.

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