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SEAT No. :

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M.B.A.

(204) : DECISION SCIENCE

(2016 Pattern) (Semester - II)

Time : 2¼ Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Each question has an internal option.
- 2) Each question carries 10 marks.
- 3) Graph paper will not be provided.
- 4) Use of non-scientific calculator is allowed.

Q1) A car rental company has one car at each of four depots 1, 2, 3, and 4. A customer in each five areas A, B, C, D and E requires a car. The distance (in kms) between the depots and areas where customers are, is given in the following distance matrix. [10]

Area
Distance (in kms)

		A	B	C	D	E
Depots	1	50	70	110	60	70
	2	80	50	50	60	50
	3	60	70	100	70	30
	4	100	50	80	40	20

How should the cars be dispatched so as to minimize the total distance traveled? Which area will not receive a car?

OR

A firm manufacturing a single product has three plants at location X, Y & Z. The three plants have produced 60, 35 & 40 units respectively during this

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week. The firm has made commitments to sell 22,45,20,18 & 30 units of product to customers A, B, C, D & E. The net unit cost of transporting from the three plants to five customers is given below: [10]

		A	B	C	D	E
Plant	X	4	1	3	4	4
Location	X	2	3	2	2	3
	Z	3	5	2	4	4

Find optimal solution.

- Q2)** A manufacturer employs 5 skilled men & 10 semi skilled men. They make an article in two qualities a deluxe model & an ordinary model. The making of a deluxe model requires 2 hours work by a skilled man & 2 hours work by a semiskilled man. The ordinary model requires 1 hour of skilled and 3 hours by a semi skilled man. By union rules no man work more than 8 hours per day. The manufacturer's clear profit of the deluxe model is Rs. 10 & of the ordinary model Rs. 8 Formulate the problem and find number deluxe and ordinary model articles to be produced per day so as to maximize the profit. [10]

OR

A big company is involved in the manufacture of small boring machines. The production is about 15 machines per day. There is some variation in production due to deviation in supply of raw materials by vendors. The probability distribution of production per day has been given in the following table: [10]

Production per day	11	12	13	14	15	16	17	18	19
Probability	0.05	0.07	0.08	0.15	0.30	0.15	0.08	0.07	0.05

The daily production is transported by truck which could not accommodate more than 15 machines. If truck is operated daily only once determine the following :

- 1) Average number of waiting machines in the company due to lack of space
- 2) Average empty space on the truck due to reduced of production.

Random Numbers: 10, 25, 73, 61, 89, 91, 47, 77, 51 and 81.

- Q3)** A food products company is contemplating the introduction of a revolutionary new product with new packaging to replace the existing product at much higher price (S_1) or moderate change in the composition of the existing product with a new packaging at a small increase in price (S_2) or a small change the composition of existing product except the word 'new' with a negligible increase in price (S_3). The possible states of nature are: high increase in sales (N_1); no change in sales (N_2) or decrease in sales (N_3). The marketing department of the company worked out the pay-offs in terms of yearly net profits for each of the strategies of three events. This is represented in the following table. [10]

Strategies	State of Nature		
	N_1	N_2	N_3
S_1	7,00,000	3,00,000	1,50,000
S_2	5,00,000	4,50,000	0
S_3	3,00,000	3,00,000	3,00,000

Which strategy should the concerned executive choose on the basis of

- Maximin Criterion
- Maximax Criterion
- Minimax Regret Criterion
- Laplace criterion

OR

Two airlines A and B operate their flights to an island and interested in increasing their market share. Airline A has three alternatives it advertise its special fare; it advertise its special feature or do nothing. On the other hand, airline b has three alternatives advertise special fare, advertise unique features or do nothing. The following table shows gains and losses of two airlines in lakh of rupees. Find the value of game and best strategy by both airlines.

Airline B

Airline A		B_1	B_2	B_3
	A_1	350	-100	250
	A_2	200	250	180
	A_3	150	150	170

Q4) The three time estimates for activities of a project are given below [10]

Activity	Estimated duration (days)		
	Optimistic	Most Likely	Pessimistic
1 - 2	5	6	7
1 - 3	1	1	7
1 - 4	2	4	12
2 - 5	3	6	15
3 - 5	1	1	1
4 - 6	2	2	8
5 - 6	1	4	7

Draw the network diagram. Find out critical path of the project & project duration. What is probability that the project will complete at least 5 days earlier than expected?

Given that

Z	2.21
Area 0 to Z	0.4864

OR

Solve the following sequencing problem.

Job Machine	1	2	3	4	5	6
A	8	3	7	2	5	1
B	3	4	5	2	1	6
C	8	7	6	9	10	9

Determine the optimal sequence of Jobs. Also find idle time of each machine.

Q5) a) In a city three news papers X, Y and Z are published. 40% of the people read X, 50% read Y, 30% read Z, 20% read both X and Y, 15% read X and Z, 10% read Y and Z and 4% read all the 3 papers. Calculate the percentage of people who do not read any of the 3 newspapers. [5]

- b) A survey of 50 students at ABC College about the participation in the number of extracurricular activities resulted in the data given below. [5]

Number of activities	0	1	2	3	4	5
Frequency	8	20	12	6	3	1

What is the probability that i) student participates in exactly 2 activities
ii) student participates in 3 or more activities.

OR

From the past data, it is observed that very few (10%) start-up companies by MBA students of Pune University were successful. A random sample of 7 students who started own business were selected, Find the probability that [10]

- i) No will be successful
iii) All will be successful and
ii) At least one will be successful.

