SVKM'S

Narsee Monjee Institute of Management Studies (NMIMS)

School of Distance Learning

Subject: Quantitative Techniques.

Program: ADSCM

Semester: I

Date : 31/5/2010

Total Marks: 100

Duration : 3 Hours

Time : 11.00 to 2.00

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

NB:

1. All 4 questions to be attempted.
2. All sub-questions carry equal marks.
3. Answer to each new question to be started on a fresh page.
4. Figure in brackets indicate full marks.

Q1. Attempt **any 2** out of any 3 (Marks : 30)

a. A class has 5 boys and 6 girls. A committee of four has to be formed. Find the probability that there are:
   i. No boys
   ii. Not more than two girls
   iii. Two boys and two girls
   iv. At least one boy

b. Solve the following simultaneous equations using determinants
   $2x + 3y + z = 24$
   $3x + y + z = 19$
   $x + 2y + 3z = 29$

c. At a selling price of Rs. 3.80 per unit the expected sales of a particular product would be 10200 units. If the selling price was increased to Rs. 4.70 per unit, the expected sales would decrease to 8400 units. The fixed cost for the product is Rs. 15000 and the variable cost is Rs. 1.80 per unit.
   i. Derive the demand function, assuming it is linear of the type $S(x) = a + bx$
   ii. Derive an expression for total profit
   iii. Calculate the maximum profit and the level of sales that achieves it
   iv. What price is charged per unit at the maximum profit point?

Q2. Write Short notes on **any 2** out of 3 (Marks : 30)

a. Find the mean, median, mode, range, standard deviation and range for the following grouped data

Class Interval	Frequency	Class Interval	Frequency
101 - 200	45	401 - 500	32
201 - 300	85	501 - 600	21
301 - 400	65	601 - 700	12

b. Bharti Drugs has introduced flexible time for its officers at its two plants in Bhartipur. The HR dept. samples the reaction of 80 officers at both plants.

	Plant 1	Plant 2
Strongly Support	10	7
Mildly Support	12	10
Undecided	31	26
Mildly Oppose	15	22
Strongly Oppose	12	15

Find the probability that:

(i) An officer strongly supports the change.
(ii) An officer from plant 1 supports the change.
(iii) A randomly chosen officer who is undecided is from Plant 1.
(iv) An officer mildly or strongly opposes the change.
(v) An officer in Plant 2 is not undecided

c. Six months after joining HAL Ltd. the sales trainees were put through a personality test. The records were tabulated against the average sales made by the trainee.

Trainee No.	1	2	3	4	5	6	7	8	9	10
Test Score	2.6	3.7	2.4	4.5	2.7	5.0	2.8	3.0	4.0	3.4
Sales ('000)	95	140	85	180	100	195	115	136	175	150

Create a linear regression equation to predict the sales on the basis of the test score.

Also find the rank correlation coefficient.

Q3. Attempt **any 2** out of 3 (Marks : 40)

a. A plant has four work manufacturing shops and five supervisors. Four out of the five supervisors are to be promoted as foremen. The skill matrix of the supervisors is given below.

	Manufacturing Division			
Foreman	D1	D2	D3	D4
F1	92	94	70	85
F2	95	90	0	85
F3	85	85	70	0
F4	75	95	0	85
F5	91	93	76	90

To maximise efficiency which foremen should be promoted to which department?

b. Per Unit Transportation costs have been given in the table below. Find a way to minimise the transportation costs.

	W1	W2	W3	Capacity
P1	40	70	90	300
P2	12	80	30	400
P3	60	90	45	200
Demand	300	300	300	

Find the optimum solution so as to minimise the transportation costs from P1, P2 and P3 to the three warehouses W1, W2 and W3.

c. A farm is engaged in breeding Pigs. The pigs are fed with various items, two of which are purchased from outside. The nutrient content of the purchased items are as follows:

Nutrient	Product		Minimum amount of nutrients necessary
	A	B	
	Nutrient Content (per kg)		
N_1	36	6	108
N_2	3	12	36
N_3	20	10	100

Product A costs Rs. 20 per Kg and Product B costs Rs. 40 per kg. What are the quantity of each product to be purchased to provide the pigs with the nutrients at minimum cost.

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