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First Semester MBA Degree Examination, Dec.2017/Jan.2018
Business Analytics

Time: 3 hrs.   Max. Marks:100

SECTION - A

Note : Answer any FOUR questions from Q.No.1 to Q.No.7.

1   What is correlation ? What are the types of correlation?   **(03 Marks)**

2   State Baye's theorem.   **(03 Marks)**

3   What is a decision tree?   **(03 Marks)**

4   What is cluster analysis?   **(03 Marks)**

5   State the difference between PERT and CPM.   **(03 Marks)**

6   Write the general structure or mathematical model of a transportation problem.   **(03 Marks)**

7   What is the scope of analytics in business?   **(03 Marks)**

SECTION - B

Note : Answer any FOUR questions from Q.No.1 to Q.No.7.

1   Explain different types of decision making environments.   **(07 Marks)**

2   Find the mean and median age from the following distribution:

Age (yrs)	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
No. of persons	1	3	11	21	43	32	9

(07 Marks)

3   The scores made by a candidate in a certain test are normally distributed with mean 500 and standard deviation 100. What percent of candidates receive scores
   (i)   less than 400.
   (ii)   between 400 and 600.
            (Given $P(0 \leq Z \leq 1) = 0.3413$)   **(07 Marks)**

4   What is 'Discriminant Analysis'? Brief about the steps in discriminant analysis.   **(07 Marks)**

5   Solve the following LPP graphically,
   Maximize $z = 10x_1 + 20x_2$
   Subject to,
   $$2x_1 + 4x_2 \geq 16$$
   $$x_1 + 5x_2 \geq 15$$
   $$x_1, x_2 \geq 0$$

(07 Marks)

6 A firm owns facilities at six places. It has manufacturing plants at places A, B and C with daily production of 50, 40 and 60 units respectively. At point D, E and F it has three warehouses with daily demands of 20, 95 and 35 units respectively. Per unit shipping costs are given in the following table. Firm wants to minimize its total transportation cost.

		Warehouse		
		D	E	F
Plant	A	6	4	1
	B	3	8	7
	C	4	4	2

Find the initial feasible solution of the above transportation problem by least cost method.

(07 Marks)

7 Draw a network corresponding to the following information. Obtain the early and late start and completion times and determine the critical activities. (07 Marks)

Activity	1 – 2	1 – 3	2 – 6	3 – 4	3 – 5	4 – 6	5 – 6	5 – 7	6 – 7
Duration	4	6	8	7	4	6	5	19	10

SECTION - C

Note : Answer any FOUR questions from Q.No.1 to Q.No.7.

1 The following data relate to age of employees and the number of days they reported sick in a month. Calculate Karl Pearson's coefficient of correlation. (10 Marks)

Age (yrs)	30	32	35	40	48	50	52	55	57	61
No. of sick days	1	0	2	5	2	4	6	5	7	8

2 The following data relate to the scores obtained by 9 salesman of a company in an intelligence test and their weekly sales (in 000's ₹)

Test score	50	60	50	60	80	50	80	40	70
Weekly sales	30	60	40	50	60	30	70	50	60

Obtain the regression equation of sales on intelligence test score of salesman. If the intelligence test score of a salesman is 65, what would be his expected weekly sales? (10 Marks)

3 What is decision theory? Explain its characteristics and discuss the steps involved in decision making process. (10 Marks)

4 An agriculturist has a 125-acrefarm. He produces radish, muttar and potato. Whatever he raises is sold fully in the market. He gets ₹ 5 per kg for radish, ₹4 per kg for muttar and ₹ 5 per kg for potato. The average per acre yield is 1500 kg of radish, 1800 kg of muttar and 1200 kg of potato. To produce each 100 kg of radish and muttar and 80 kg of potato, a sum of ₹ 12.50 has to be used for manure. Labour required for each acre to raise the crop is 6 man-days for radish and potato each and 5 man-days for muttar. A total of 500 man-days of labour at a rate of ₹ 40 per man-day is available. Formulate this as a linear programming model to maximize the agriculturist's total profit. (10 Marks)

5. 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) node numbers.

Activity (i – j)	Estimated duration (weeks)		
	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 network diagram of activities in the project.

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

  (iii) Calculate the variance and standard deviation of the project length. what is the probability that the project will be completed at least 4 weeks earlier than expected time. (Given $P(0<z<1.33) = 0.4082$) **(10 Marks)**

6. Solve the following assignment problem for optimal solution using HAM. **(10 Marks)**

Time taken (in minutes) by 4 workers

Worker	Job			
	A	B	C	D
1	45	40	51	67
2	57	42	63	55
3	49	52	48	64
4	41	45	60	55

7. Write a short note on the following:
  (i)   Design of experiment.
  (ii)   Data warehouse.
  (iii) Linear programming.
  (iv) Measures of dispersion.

(10 Marks)

SECTION - D
CASE STUDY – [Compulsory]

Solve the following transportation problem for maximum profit using VAM for initial feasible solution and MODI method for optimal solution. **(20 Marks)**

Per unit profit (₹)

		Market			
		A	B	C	D
Warehouse	X	12	18	6	25
	Y	8	7	10	18
	Z	14	3	11	20

Availability at warehouses: Demand in the markets:
X : 200 units   A: 180 unis
Y : 500 units   B : 320 units
Z : 300 units   C : 100 units
                          D : 400 units

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