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First Semester MBA Degree Examination, June/July 2015
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 do you mean by correlation? Mention any four uses of it. (03 Marks)
- 2 Distinguish between PERT and CPM. (03 Marks)
- 3 What is meant by 'Factor Analysis'? Write the types of factor analysis. (03 Marks)
- 4 What is Poisson distribution? Write Poisson formula. (03 Marks)
- 5 Write the general structure/mathematical model of a transportation problem. (03 Marks)
- 6 Briefly explain the term 'Business analytics'. (03 Marks)
- 7 What is decision theory? Write any four benefits of decision tree. (03 Marks)

SECTION – B*Note : Answer any FOUR questions from Q.No.1 to Q.No.7.*

- 1 What is 'Data Warehousing'? Explain advantages and disadvantages of data warehousing. (07 Marks)
- 2 Find the initial basic feasible solution to the following transportation problem by:
 - i) Northwest-corner cell method and
 - ii) Least cost cell method.

| | | | | | |
|--------|--------|------|---|----|----|
| | | To → | | | |
| | | 1 | 2 | 3 | |
| From ↓ | 1 | 2 | 7 | 4 | 5 |
| | 2 | 9 | 3 | 1 | 8 |
| | 3 | 5 | 4 | 7 | 7 |
| | 4 | 1 | 6 | 2 | 14 |
| | Demand | 2 | 9 | 18 | |

State which of the methods is better. (07 Marks)

- 3 What is 'Decision theory'? Explain the steps of decision making process. (07 Marks)
- 4 An oil exploration firm plans to drill six holes. It is believed that the probability that each hole will yield oil is 0.1. Since the holes are in quite different locations, the outcome of drilling one hole is statistically independent of that of drilling any of the other holes.
 - i) If the firm will be able to stay in business only if two or more holes produce oil, what is the probability of its staying in business?
 - ii) Give the expected value of the number of holes that result in oil. (07 Marks)

5 What do you understand by 'Discriminant Analysis? Brief about the steps in discriminant analysis. (07 Marks)

6 Calculate the mean for the following frequency distribution:

i) By direct method ii) By step-deviation method. (07 Marks)

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
|--------------------|------|-------|-------|-------|-------|-------|-------|
| Number of students | 6 | 5 | 8 | 15 | 7 | 6 | 3 |

7 Construct a network diagram for the following project whose activities and their precedence relationships are given below. Also find out critical path and minimum time to complete a project. (07 Marks)

| Activities | A | B | C | D | E | F | G | H | I |
|----------------------|----|---|----|----|----|------|----|---|------|
| Preceding activities | - | - | - | A | A | B, D | C | B | F, G |
| Time (days) | 23 | 8 | 20 | 16 | 24 | 18 | 19 | 4 | 10 |

SECTION - C

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

1 Consider the following project:

| Activity | Time Estimates in Weeks | | | Predecessor |
|----------|-------------------------|-------|-------|-------------|
| | t_o | t_m | t_p | |
| A | 3 | 6 | 9 | None |
| B | 2 | 5 | 8 | None |
| C | 2 | 4 | 6 | A |
| D | 2 | 3 | 10 | B |
| E | 1 | 3 | 11 | B |
| F | 4 | 6 | 8 | C, D |
| G | 1 | 5 | 15 | E |

Find the critical path and standard deviation. Also find the probability of completing the project by 18 weeks.

[Normal distribution value ($P(Z \leq 1.4556) = 0.9265$) ← HINT]. (10 Marks)

2 Ten competitors in a fashion show are ranked by three judges I, II, III in the following order:

| | | | | | | | | | | |
|-----------|---|---|---|----|---|----|---|----|---|---|
| Judge I | 1 | 6 | 5 | 10 | 3 | 2 | 4 | 9 | 7 | 8 |
| Judge II | 3 | 5 | 8 | 4 | 7 | 10 | 2 | 1 | 6 | 9 |
| Judge III | 6 | 4 | 9 | 8 | 1 | 2 | 3 | 10 | 5 | 7 |

Use rank correlation to find out which pair of judge has a nearest approach to fashion design. (10 Marks)

3 A hospital has 20 Kidney dialysis machines and the chance of any one of them malfunctioning during any day is 0.02. You are required to find the probability that exactly 3 machines will be out of service on the same day. Then,

- i) Can we use the binomial formula to find out this probability? If yes, calculate the probability.
- ii) Can we use the Poisson formula to find out this? If yes calculate the probability.

(10 Marks)

4 Using graphical method, find the maximum value of $Z = 5x_1 + 7x_2$
Subject to the constraints

$$\begin{aligned} x_1 + x_2 &\leq 4 \\ 3x_1 + 8x_2 &\leq 24 \\ 10x_1 + 7x_2 &\leq 35 \\ \text{and } x_1, x_2 &\geq 0 \end{aligned}$$

(10 Marks)

5 What is linear programming? List the advantages, limitations and applications of linear programming. (10 Marks)

6 Explain the following in brief:

- i) Bayes's Theorem ii) Probability iii) Random variable iv) Normal curve.

(10 Marks)

7 The following data relate to the ages of husbands and wives:

| | | | | | | | | | | |
|-------------------------|----|----|----|----|----|----|----|----|----|----|
| Age of husbands (years) | 25 | 28 | 30 | 32 | 35 | 36 | 38 | 39 | 42 | 55 |
| Age of wives (years) | 20 | 26 | 29 | 30 | 25 | 18 | 26 | 35 | 35 | 46 |

Find the regression equations and also find the most likely age of husband when wife's age is 25 years. (10 Marks)

SECTION - D

(Compulsory)

8 a) Solve the following transportation problem using Vogel's method for initial basic feasible solution and use modified distribution method to check whether the solution obtained is optimal or not: (10 Marks)

| | | | | | | |
|----------|---|---------------|----|----|----|--------|
| | | Destination → | | | | Supply |
| | | A | B | C | D | |
| origin ↓ | 1 | 1 | 5 | 3 | 3 | 34 |
| | 2 | 3 | 3 | 1 | 2 | 15 |
| | 3 | 0 | 2 | 2 | 3 | 12 |
| | 4 | 2 | 7 | 2 | 4 | 19 |
| Demand | | 21 | 25 | 17 | 17 | |

b) Following table gives a solution for a transportation:

| | | | | | | |
|----------|----------------|----------------|----------------|----------------|--------|-----|
| | | Destination → | | | Supply | |
| | | D ₁ | D ₂ | D ₃ | | |
| Source ↓ | S ₁ | 8 | 300 | 16 | 10 | 300 |
| | S ₂ | 200 | 12 | 16 | 200 | 400 |
| | S ₃ | 14 | 50 | 10 | 12 | 300 |
| Demand | | 450 | 350 | 200 | | |

Is the above solution optimal? Justify your answer.

(10 Marks)
