



I Semester M.B.A. (Day) Examination, January 2010
(2007-08 Scheme)

Management

Paper – 1.5 : BUSINESS MATHEMATICS AND STATISTICS

Time : 3 Hours

Max. Marks : 75

Instruction : Calculators and Tables are allowed.

SECTION – A

Answer any six questions :

(6×2=12)

1. a) What is meant by degrees of freedom ?
- b) When does the arithmetic mean lose its significance ?
- c) Differentiate between a census and a survey.
- d) Illustrate symmetrical and asymmetrical distributions.
- e) Find the 5th term and the sum of the first 8 terms of an A.P. 1, 10, 19, ...
- f) Explain “level of significance”.
- g) What is the significance of a null hypothesis ?

SECTION – B

Answer any three questions :

(3×8=24)

2. a) Fit a straight line trend by the method of least squares for the following data. Forecast the production figures for the coming year. A graph is not necessary.

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|------------------------------------|------|------|------|------|------|------|
| Production (in '000 Metric Tonnes) | 140 | 146 | 142 | 145 | 150 | 160 |

P.T.O.



- b) Calculate Karl Pearson's and Bowley's coefficient of skewness for the marks obtained by students of 2 institutions.

| Measure | Institution A | Institution B |
|--------------------|---------------|---------------|
| Mean | 65 | 66 |
| Median | 61 | 62 |
| Standard deviation | 10 | 13 |
| Third Quartile | 87 | 102 |
| First Quartile | 28 | 30 |

3. a) A manufacturing company produces plastic buckets which are normally distributed with a mean diameter of 9 inches and a variance of 3 inches. In a total production of 12,000 buckets how many are expected to be
- Greater than 12 inches in diameter ?
 - Less than 7 inches in diameter ?
 - Between 8 inches and 10 inches in diameter ?
- b) Discuss briefly the steps involved in setting up and testing a hypothesis.
4. a) A box contains 50 coins numbered from 1 to 50. One coin is drawn at random. Find the probability that the number on the coin drawn will be a multiple of
- 3 or 9 and b) 5 or 7.

b) If the opening stock matrix $O = \begin{vmatrix} 6 & 3 & 1 & 1 \\ 1 & 2 & 3 & 5 \\ 1 & 6 & 3 & 8 \end{vmatrix}$, the purchases matrix $P = \begin{vmatrix} 2 & 3 & 1 & 4 \\ 9 & 1 & 3 & 2 \\ 3 & 5 & 4 & 6 \end{vmatrix}$ the

sales matrix $S = \begin{vmatrix} 8 & 4 & 2 & 9 \\ 1 & 5 & 3 & 7 \\ 3 & 2 & 6 & 4 \end{vmatrix}$. Find the closing stock matrix C.

5. What is sampling ? When is sampling done ? Discuss the different methods of sampling and their applicability in business.
6. a) If the cost curve $C = 8x^3 + 6x^2 + 3x$ find a) the average cost. b) the marginal cost if the quantity produced is 300 units. If the price per unit for sales is as 2750, what is the profit or loss in the sale ?
- b) Find the coefficient of correlation for the following data :

| | | | | | |
|---|----|----|----|----|----|
| X | 19 | 21 | 23 | 25 | 32 |
| Y | 65 | 66 | 65 | 68 | 75 |



SECTION - C

Answer any two questions :

(2×12=24)

- 7. Explain the terms “level of significance” and “degree of freedom” used in Chi Square test.

A clinical trial gave the following results for a ceratin experiment conducted in using a new treatment for curing cold. Using the Chi Square test, determine whether the new treatment was effective or not.

| Treatment | Favourable Response | No Response | Total |
|--------------|---------------------|-------------|-------|
| New | 265 | 185 | 450 |
| Conventional | 375 | 115 | 490 |
| Total | 640 | 300 | 940 |

- 8. Infer whether there is a significant variation in the preference for sweet or salty snacks in different cities from the following data elicited with a sample.

| | Bangalore | Mumbai | Chennai | Kolkata |
|---------------|-----------|--------|---------|---------|
| Sweets Snacks | 624 | 987 | 523 | 842 |
| Salty Snacks | 365 | 482 | 650 | 962 |

- 9. How is regression and its applicability in business different from correlation and its applicability ?

An investment company speculates about the relationship between family incomes and their allocation for investment. A survey of 8 randomly selected families gives the following data :

| | | | | | | | | |
|-----------------------------------|----|----|----|----|----|----|----|----|
| Annual income in '000 Rs. | 18 | 21 | 19 | 34 | 23 | 30 | 36 | 38 |
| Percent allocation for investment | 28 | 36 | 32 | 40 | 35 | 55 | 60 | 64 |

- a) Develop the regression equations to describe this data.
- b) Estimate the probable income of a family who allocates 22 percent for investment.
- c) What could be the percentage of income allocated to investment by a family earning Rs. 27,500 per annum ?



SECTION - D

This section is **compulsory**.

(1×15=15)

10. A restaurateur has 3 projects in hand. He can only take up one project at a time. The first project is to take up a fast food corner at an investment of Rs. 6,00,000 where the chances of success will be 0.75 with a cash inflow of Rs. 9,00,000. Failure means cash inflow of Rs. 1,50,000 in salvage furniture and utensils.

The second project is to open an expresso coffee shop with an investment of Rs. 8,00,000 where there will be definite success with an inflow of Rs. 9,00,000.

The third project is to start a Darshini with an investment of Rs. 10,00,000. The chances of success are 0.6 with an inflow of Rs. 12,00,000. Failure means an inflow of Rs. 3,00,000 in salvage material.

If there is success, the restaurateur will decide to start a fast food Kiosk with an investment of Rs. 4,00,000, whereby he can expect high demand with 0.8 probability and Rs. 5,00,000 inflow, medium demand with 0.15 probability and cash inflow of Rs. 4,00,000, low demand with a cash inflow of Rs. 1,00,000.

All the amounts have been adjusted to current value. You are expected to draw a decision tree and a pay off table and thereby advise the restaurateur about the best course of action.

| Project | Investment (Rs.) | Success Probability | Cash Inflow (Rs.) | Failure Cash Inflow (Rs.) |
|----------------------|------------------|---------------------|-------------------|---------------------------|
| Fast Food Corner | 6,00,000 | 0.75 | 9,00,000 | 1,50,000 |
| Expresso Coffee Shop | 8,00,000 | 1.00 | 9,00,000 | 0 |
| Darshini | 10,00,000 | 0.6 | 12,00,000 | 3,00,000 |