

2012
Bachelor of Commerce
Third Semester
BCM-304: Business Mathematics and Statistics

Time allowed: 3 Hours

Max. Marks: 80

NOTE: Attempt four short answer type questions from Section-A carries 5 marks each. Attempt two questions each from Section B and C respectively carries 15 mark each.

x-x-x

SECTION - A

1. If $A = \begin{bmatrix} 5 & 2 \\ -1 & 2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then show that $(A - 3I)(A - 4I) = O$.

2. Using cofactors of elements of third column, evaluate $\Delta = \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$.

3. Differentiate $\sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}}$ w.r.t. x .

4. What is primary data ? Discuss the different methods of collecting primary data.

5. Find modal marks from the data given below :

25, 32, 59, 37, 17, 22, 26, 28, 33, 40, 45, 58, 67.

6. Define index numbers with their uses and discuss the problems in the construction of index numbers.

SECTION - B

7. For the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$, show that $A^3 - 6A^2 + 5A + 11I = 0$.

Hence, find A^{-1} .

8. (a) Solve the following system of equations using matrix method

$$5x + 2y = 4,$$

$$7x + 3y = 5.$$

(b) Without expanding, prove that the determinant $\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b & c & a \end{vmatrix}$ vanishes.

9. (a) If $y = \sqrt{2^x + \sqrt{2^x + \sqrt{2^x + \dots \infty}}}$, then prove that $(2y-1)\frac{dy}{dx} = 2^x \log 2$.

(b) If the demand function is given by $q = 25 - 4p - p^2$, compute the price elasticity of demand at $p = 5$.

P.T.O.

(2)

10. (a) Find the minimum values of the function $f(x) = \frac{x}{2} + \frac{2}{x}$, $x > 0$.

(b) The total cost function of producing and marketing x units of a commodity is given by $C = x^2 - 2x + 16$. Find the level of output at which it is minimum. Also find the minimum value of total cost C .

SECTION - C

11. Following are the records of two players regarding their performance in a cricket matches series :

| | | | | | | | | |
|----------------------------------|----|----|----|----|-----|----|----|----|
| Score of player A (X_1) : | 48 | 52 | 55 | 60 | 65 | 45 | 63 | 70 |
| Score of player B (X_2) : | 33 | 35 | 80 | 70 | 100 | 15 | 41 | 25 |

(i) Which player has scored more on average ?

(ii) Which player is more consistent in his performance ?

12. Fit a second degree parabolic trend to the following data. Calculate trend values and estimate price of the commodity for 2014.

| | | | | | | |
|---------|------|------|------|------|------|------|
| Year : | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Price : | 100 | 107 | 128 | 140 | 181 | 192 |

13. (a) Explain the difference between dispersion, skewness and kurtosis.

(b) The first four central moments of a distribution are 0, 19.67, 29.26 and 866. Find the coefficient of kurtosis of the distribution. Also comment on the result.

14. Compute index number for 2009 taking 2008 as base by using geometric mean, arithmetic mean and median from the data given below :

| Commodities | Price 2008 (in ₹) | Price 2009 (in ₹) |
|-------------|----------------------|----------------------|
| A | 40 | 44 |
| B | 30 | 50 |
| C | 36 | 32 |
| D | 50 | 52 |
| E | 32 | 40 |
| F | 84 | 90 |