2041
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. Attempt *two* questions each from Section B and C respectively.

x-x-x

SECTION - A

1. Find x such that $\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = 0.$

2. Without expanding the following determinants, show that :

$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x+4)(4-x)^2.$$

3. If $y = \sqrt{2^x + \sqrt{2^x + \sqrt{2^x + \ldots \ldots \infty}}}$, then prove that $(2y-1)\dfrac{dy}{dx} = 2^x \log 2$.

4. Explain the difference between skewness and kurtosis.

5. The mean and standard deviation of a group of 100 observations were found to be 20 and 3 respectively. Later on it was found that three observations were incorrect, which were recorded as 21, 21 and 18. Find the mean and standard deviation if the incorrect observations are omitted.

6. Explain the mathematical properties of arithmetic mean. What is the relationship between mean, median and mode ?

(4x5)

P.T.O.

SECTION - B

7. If $A = \begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$, then compute the inverse of A and verify that $A^{-1}A = I$.

8. Show that $\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2 \begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$.

9. (a) Differentiate $(\log x)^{\log x}$ w.r.t. x.

(b) Find $\dfrac{dy}{dx}$, when $x = a\left(\dfrac{1-t^2}{1+t^2}\right)$, $y = \dfrac{2bt}{1+t^2}$.

10. Show that maximum value of $\left(\dfrac{1}{x}\right)^x$, $x > 0$ is $e^{\frac{1}{e}}$.

SECTION - C

11. Comment on the performance of the students of three universities given below using (i) simple arithmetic mean and (ii) weighted arithmetic mean :

Courses of Study	P.U.		Pbi. U.		G.N.D.U.	
	Pass %	No. of Students (in hundreds)	Pass %	No. of Students (in hundreds)	Pass %	No. of Students (in hundreds)
M.A.	71	3	82	2	81	2
M.Com.	83	4	76	3	76	3.5
B.A.	73	5	73	6	74	4.5
B.Com.	74	2	76	7	58	2
B.Sc.	65	3	65	3	70	7
M.Sc.	66	3	60	7	73	2

12. 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 ?

13. Explain the different components into which a time series may be analyzed. Explain the least square method of fitting trend in a time series.

14. Calculate index number of price from the data given below by using following methods :

    (i)   Laspeyres Method   *(ii)*   Paasche's Method

    (iii)   Bowley's Method   *(iv)*   Fisher's Ideal Method

    (v)   Marshall Edgeworth Method

Commodity	2009		2010	
	Price	Quantity	Price	Quantity
K	2	8	4	6
L	5	10	6	5
M	4	14	5	10
N	2	19	2	13

(15x4)

x-x-x