(i) **Printed Pages: 3** **Roll No. .....**

(ii) **Questions : 14** **Sub. Code :** 0820

Exam. Code : 0013

Bachelor of Commerce 3rd Semester

(2122)

BUSINESS MATHEMATICS AND STATISTICS

Paper : BCM-304

Time Allowed : Three Hours] **[Maximum Marks : 80**

Note :—(1) Attempt any **four** questions from Section A. Each question carries **5** marks.

(2) Attempt any **two** questions each from Section B and Section C. Each question carries **15** marks.

SECTION—A

1. What do you mean by skew symmetric matrix ?

2. Describe any four limitations of Statistics.

3. If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, show that $A^2 - 4A + 5I = 0$.

4. Find the maximum and minimum value of $18 + 7x - x^2$.

5. For a distribution, Bowley's coefficient of skewness is -0.56, $Q_1 = 16.4$ and Median = 24.2, what is the coefficient of quartile deviation ?

6. From the following fixed base index number, prepare the chain base index number :

Year	2013	2014	2015	2016	2017	2018	2019	2020
F.B.I.	188	196	204	190	196	200	210	240

SECTION—B

7. If $A = \begin{bmatrix} 2 & 4 & -3 \\ 7 & 8 & 2 \\ 1 & 3 & 4 \end{bmatrix}$ verify that $(A')^{-1} = (A^{-1})'$.

8. If $y = \log\left[\frac{\sqrt{x^2+1}+x}{\sqrt{x^2+1}-x}\right]$, find $\frac{dy}{dx}$.

9. (a) Show, without expansion that :

$$\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix} = 1+a+b+c$$

(b) The demand function of a certain product is $P = \frac{98-3x}{4}$ and cost function is $C = 3x^2 + 2x$, where x is output and p is price. Find the output level, where profit is maximum and value of maximum profit. 6,9

10. Define determinant of a matrix. What are its properties ?

SECTION—C

11. In the following wage distribution the median and mode are Rs. 35 and Rs. 36 respectively, but three class frequencies are missing. Find out the missing frequencies :

Wages(Rs.)	0–10	10–20	20–30	30–40	40–50	50–60	60–70	Total
Frequency	8	12	?	?	?	11	5	100

12. A group has the following measurements :

$$\overline{X} = 10,\ \sigma^2 = 4 \text{ and } N = 60$$

A sub-group of the above is $\overline{X}_1 = 11, \sigma_1^2 = 2.25$ and $n_1 = 40$. Find the mean and standard deviation of the other sub-group.

13. Following data related to Sales of Bansal Departmental Store, Sector 21, Panchkula :

Year	2010	2011	2012	2013	2014	2015	2016
Sales (in crore Rs.)	20	23	22	25	26	29	30

(i) Fit a straight line trend by method of least square and tabulate the trend values.

(ii) Estimate the likely Sales for 2020.

(iii) What is quarterly increase or decrease in Sales ?

(iv) Eliminate the trend. What components are thus left over ?

14. What is the difference between primary data and secondary data ? Explain the various methods of collecting primary data.