

(i) Printed Pages: 3

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(ii) Questions : 14

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Bachelor of Commerce 3<sup>rd</sup> 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 :

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

A sub-group of the above is  $\bar{X}_1 = 11, \sigma_1^2 = 2.25$  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.