

(01/13-II)

4052

B. Com. (First Year) EXAMINATION

BUSINESS MATHS

Second Paper

Time : Three Hours *Maximum Marks : 80*

Note : Q. No. 1 is compulsory. Attempt *Five* questions including Q. No. 1. All questions carry equal marks.

1. (a) Evaluate :

$$\int_1^2 \frac{x}{\sqrt{x-1}} dx$$

(b) Without expanding prove :

$$\begin{bmatrix} 3 & 1 & 6 \\ 5 & 2 & 10 \\ 7 & 4 & 14 \end{bmatrix} = 0$$

(c) Construct a 2×2 matrix, whose elements are given by $a_{ij} = \left(\frac{i-j}{2}\right)^2$.

(d) Divide 14 into two parts such that their product is maximum.

(e) Write advantages of LPP.

(f) Find the amount of an ordinary annuity of Rs. 600 payable at the end of each quarter for 2 years at 8% p.a. compounded quarterly.

(g) Solve $x + 2y = 5$ and $2x - y = 5$ by determinants.

(h) Draw the graph of :
 $x + 2y = 5, 2x - y = 5, x \geq 0, y \geq 0$

2. (a) If $u = f(r)$ and $x^2 + y^2 = r^2$, prove that :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r)$$

(b) Find the minimum value of $x^2 + y^2 + z^2$ subject to $xyz = a^3$.

3. (a) Evaluate :

$$\int \frac{x+1}{(x+2)^2} e^x dx$$

(b) Find the area of the region included between the parabolas $y^2 = 4ax$ and $x^2 = 4ay, a > 0$.

4. (a) Prove that :

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc \left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right)$$

(b) Solve by matrix method :

$$x + y + z - 7 = 0$$

$$x + 2y + 3z - 16 = 0$$

$$x + 3y + 4z - 22 = 0$$

5. (a) The population of a city increases every year by 2.3% of the population at the beginning of that year, in what time will the population treble itself ?
- (b) Find the amount of an ordinary of Rs. 2,000 payable at the end of each year for 10 years, if money is worth 4% rate of interest per year.

6. Two labourers A and B earn Rs. 150 and Rs. 200 per day, respectively. A can manufacture 6 chairs and 4 tables, while B can manufacture 10 chairs and 4 tables per day. Form a LPP to minimize the labour cost to produce at least 60 chairs and 32 tables. Also find the minimum labour cost.

7. Solve the LPP :

$$\text{Max. } Z = 2x_1 + 3x_2,$$

subject to the constraints :

$$x_1 + 3x_2 \leq 12$$

$$2x_1 + x_2 \geq 6$$

$$x_1 + 5x_2 = 10$$

$$x_1, x_2 \geq 0$$

by finding the dual.

8. (a) If $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$, verify that

$$A^3 - 6A^2 + 9A - 4I = 0 \text{ and hence find } A^{-1}.$$

- (b) Show that :

$$\int_3^{15} \frac{dx}{(x-3)\sqrt{x+1}} = \frac{1}{2} \log \frac{5}{3}$$

9. (a) If $u = f(x-y, y-z, z-x)$, prove that :

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$$

- (b) A sum of money invested at C-I amounts to Rs. 10,816 at the end of second year and Rs. 11,248.64 at the end of third year. Find the rate of interest and the sum invested.

10. Solve the following :
- Two dice are tossed. What is the probability that the total is divisible by 3 or 4 ?
 - A student applies for a job in two firms X and Y. The probability of his being selected in firm X is 0.7 and being rejected in the firm Y is 0.5. The probability of at least one of his applications being rejected is 0.6. What is the probability that he will be selected in one of the firms ?

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B. Com. (Second Year) EXAMINATION
BUSINESS STATISTICS

Fourth Paper

Time : Three Hours Maximum Marks : 80

Note : Attempt only Five questions, selecting one question from each Unit. All questions carry equal marks.

Unit I

1. What do you mean by statistics ? Explain its functions and scope.
2. Explain the following :
 - (a) Properties of regression coefficient
 - (b) Find regression equation X and Y from the following data :

X :	20	22	24	26	28	30	32
Y :	30	35	38	45	52	60	55

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3. From the following information find out :
- (a) Which factory pays larger amount as daily wages ?
 - (b) What is average daily wage of workers of two factories taken together ?
 - (c) Explain the characteristics of good average :

	Factory A	Factory B
No. of wage earners	250	200
Average daily wages	Rs. 2	Rs. 2.50

Unit II

4. Explain the concept of index numbers. Discuss the problems in the construction of index numbers.

5. Calculate the Laspeyre's, Paasche's and Fisher's price index the following information :

Expenses	A	B	C	D
Prices (2005) Rs.	40	50	70	20
Prices (2007) Rs.	60	60	90	10
Quantity (2005)	3	4	2	3
Quantity (2007)	2	4	5	5

6. From the following data of production of a factory in ('000) tonnes :
- (a) Fit a straight line trend by method of least square and show the trend values
 - (b) Convert your annual trend equation into a monthly trend equation
 - (c) What is rate of growth of production per month ?

Year	: 1997	1998	1999	2000	2001	2002	2003
Production	: 70	75	90	91	95	98	100

7. Define a time series. How is it useful ? Explain the various components of a time series.

Unit III

- 8. Define probability and explain the approaches to probability. Also discuss its applications in business.
- 9. Differentiate between binomial and Poisson probability distributions.