

SEMESTER I – B. B. A. EXAMINATION 2008
BUSINESS MATHEMATICS & STATISTICS -I

Full Marks: 75

Time: 3 hrs

Students should answer in their own words as far as practicable.

GROUP - A

BUSINESS MATHEMATICS

[35 Marks]

Answer **Question No 1** and **ANY THREE** from the rest.

1. Answer ANY FOUR questions: (4 x 2 = 8)
- (a) Find the sum of $5^2 + 6^2 + 7^2 + \dots + 20^2$ (Using formula only).
- (b) If one of the roots of the equation $ax^2 - 3x + 2 = 0$ be double the other, then find the value of 'a'.
- (c) Find 'n' if ${}^nC_0 + {}^nC_1 + {}^nC_2 = 4$.
- (d) Solve for x : $\frac{1}{2} \log(11 + 4\sqrt{7}) = \log(2 + x)$.
- (e) If $f(x+1) = x-1$, find $f(x-1)$.
- (f) Evaluate $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{x}$.
- (g) Find $\frac{dy}{dx}$, if $x + y = xy$.
2. (a) The fifth term of a G.P. is 4 and 9th term is 16. find the 3rd term. (3)
- (b) Three numbers whose sum is 15 are in A.P. and if 1,4 and 19 are added to them respectively the results are in G.P. Determine the numbers. (3)
- (c) If one root of the equation $x^2 + px + q = 0$ be square of the other, prove that $p^3 + (1-3p)q + q^2 = 0$. (3)
3. (a) A committee of 5 is to be formed from 3 ladies and 6 gentlemen. In how many ways can it be done so that the committee consists of at least 2 ladies? (3)
- (b) If n is a positive integer ($n > 1$), prove that $2^{5n} - 31n - 1$ is always divisible by 961. (3)
- (c) If $\frac{a(b+c-a)}{\log a} = \frac{b(c+a-b)}{\log b} = \frac{c(a+b-c)}{\log c}$, then show that $a^b \cdot b^a = b^c \cdot c^b = c^a \cdot a^c$ (3)

4. (a) In how many ways can the letters of the word MATHEMATICS be arranged so that the two 'M's are always together? (3)
- (b) If 2 is one root of the equation $x^2 + bx + 4 = 0$, show that 4 is one of the roots of $x^2 - 3x + b = 0$. (3)
- (c) If the middle term of the expansion of $\left(\frac{k}{2} + 2\right)^8$ is 1120, find k . (3)
5. (a) If $f(x) + 2f(-x) = x^2$, show that $f(3) = 3$. (3)
- (b) Evaluate: $\lim_{x \rightarrow \infty} \left\{ \sqrt{x^2 + 3x + 1} - \sqrt{x^2 - x - 2} \right\}$. (3)
- (c) Show that $f(x) = |x - 1|$ is continuous at $x = 1$. (3)
6. (a) If $y = ae^{2x} + be^{-2x}$, show that $\frac{d^2y}{dx^2} - 4y = 0$. (3)
- (b) If $x^y = e^{x-y}$, show that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$. (3)
- (c) Using the first principle formula, find the derivative of $\frac{1}{x}$. (3)

GROUP - B

BUSINESS STATISTICS

[40 Marks]

Answer Question No 7 and ANY THREE from the rest.

7. Answer ANY FIVE questions: (5 x 2 = 10)
- (a) Differentiate between Primary and Secondary Data.
- (b) The A.M. of two observations is 25 and their G.M. is 15. Find their H.M.
- (c) If the mean and mode of a distribution are 3.48 and 2.30 respectively, find the median.
- (d) Find the variance of $(5 - 2x)$, if the A.M. of x be 10 and the coefficient of variation of x be 50%.
- (e) If the coefficient of skewness of a distribution is 0.45 when standard deviation and mode are respectively known as 7.58 and 26.67, find the mean.
- (f) Find \bar{x} and \bar{y} if two regression equations are $2x - 5y - 9 = 0$ and $3x - 2y = 8$.
- (g) What is meant by a Quantity Index Number?
- (h) If $2x + 3u = 9$ and $3y - 4v = 6$, find r_{uv} when $r_{xy} = 0.2$.

8. (a) Draw the cumulative frequency diagram (both less than and more than type) from the following data and hence find the median:

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of Students	4	8	11	15	12	6	3

(6)

- (b) Find the measure of kurtosis from the following:

Values (in cm.)	0-10	10-20	20-30	30-40
Frequency	1	2	4	3

(4)

9. (a) The median of the following distribution is 8.53. Calculate the missing frequency:

Class	5.1-6.0	6.1-7.0	7.1-8.0	8.1-9.0	9.1-10.0	10.1-11.0	11.1-12.0
Frequency	3	8	27	-	17	11	9

(6)

- (b) In a class test $\frac{3}{4}$ th of the students got 1 mark each and the rest got 0 each. Find the Standard deviation of the marks obtained by all the students of the class.

(4)

10. (a) Find the value of y at $x = 10$ from the following table using suitable interpolation formula:

x	5	7	9	11
y	33	57	89	129

(6)

- (b) What are regression lines in a bivariate distribution? Why is it necessary to consider two regression lines?

(4)

11. (a) Calculate Laspeyres' and Paasche's Price Index Numbers from the following data and hence find Fisher's Ideal Index number:

Items	Base year Price (Rs.)	Base year Quantity (Kg.)	Current year Price (Rs.)	Current year Quantity (Kg.)
A	5	50	10	56
B	3	100	4	120
C	4	60	6	60
D	11	30	14	24
E	7	40	10	36

(6)

- (b) Prove that the correlation coefficient in a bivariate distribution has -1 as the lower limit and $+1$ as the upper limit.

(4)

12. (a) The lines of regression of y on x and x on y are respectively $y = x + 5$ and $16x = 9y - 94$.
Find the variance of x if the variance of y is 16. Also find the covariance of x and y . (6)

(b) If $y = 2x^3 - 3x$, show that $\Delta^4 y = 0$. (4)
