



‘समानो मन्त्रः समितिः समानी’

**UNIVERSITY OF NORTH BENGAL**  
BBA Honours 2nd Semester Examination, 2022

**CC3-BBA (202)**

**BUSINESS MATHEMATICS**

Time Allotted: 2 Hours

Full Marks: 60

*The figures in the margin indicate full marks.  
All symbols are of usual significance.*

**GROUP-A**

**Answer any two questions from the following**

12×2 = 24

1. (a) Find the maximum and minimum values of the following function:

5

$$f(x) = x^3 + x^2 - 4x + 6$$

- (b) A manufacturer can sell “x” items per month at a price  $p = 300 - 2x$ . Produced items cost the manufacturer “y” rupees where  $y = 2x + 1000$ . How much production will yield maximum profits and what will be the price?

7

2. Integrate the following:

6+6 = 12

(i)  $\int x^2 \sqrt{1+x^3} dx$

(ii)  $\int \frac{e^{5x} + e^{3x}}{e^{4x}} dx$ .

3. (a) If  $x^m * y^n = (x + y)^{m+n}$ , then show that  $\frac{dy}{dx} = \frac{y}{x}$ .

6

- (b) If  $y = [x + \sqrt{x^2 - 1}]^m$  then show that  $(x^2 - 1)y_2 + xy_1 = m^2 y$ .

6

4. (a) If the present value of an annuity for 10 years at 6% p.a. compound interest is Rs. 15,000, what is the annuity?

4

- (b) Solve the following equations using matrix inversion method:

8

$$4x + 2y + 3z = 49$$

$$3x + 3y + 2z = 45$$

$$4x + 3y + 4z = 58$$

**GROUP-B**5. Answer any **four** questions:

6×4 = 24

(a) Total cost function of a firm is given as below

$$C = 1200 + 200Q - 9Q^2 + 0.25Q^3$$

$C$  denotes total cost and  $Q$  stands for level of output. You are required to find the optimum level of output.

(b) If  $y = \log(x + \sqrt{x^2 + a^2})$ , show that  $\frac{dy}{dx} = \frac{1}{\sqrt{x^2 + a^2}}$ .

(c) Solve using Cramer's Rule

$$x + y - z = 1$$

$$4x - 2y - z = 1$$

$$3x + 2y + z = 6$$

(d) Given  $A = \begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix}$  show that  $A^3 + A^2 - 24A + 36I = 0$ 

Where  $I$  is the identity matrix.

(e) Given,  $3x^4 + 4y^3$  find  $\frac{dy}{dx}$ .

(f) The difference between compound interest and simple interest on a certain sum of money for 3 years at 5% p.a. is Rs. 228.75. If the sum is invested at 5% compound interest, what will be the amount at the end of 2 years?

**GROUP-C**6. Answer any **four** questions:

3×4 = 12

(a) Integrate:  $\int x \, dx$  using integration by parts.(b) Given  $A = \begin{vmatrix} 4 & 1 & 0 \\ 1 & -2 & 2 \end{vmatrix}$  and  $B = \begin{vmatrix} 2 & 0 & -1 \\ 3 & 1 & 4 \end{vmatrix}$  find the value of  $x$  such that  $3B - 2A + 2x = 0$ .(c) Find:  $\lim_{x \rightarrow \infty} \frac{5 - 2x^2}{3x + 5x^2}$ .(d) Find the derivative of  $\sqrt{x}$  from the 1st principle.(e) Evaluate:  $\int_3^5 (x^2 + 2x) \, dx$ .

(f) Find the amount if Rs. 1,000 put out for 4 years @ 5% p.a. C. I.

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