



End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: B. Com (H), 1st Semester

Name of the Paper: Business Mathematics

Paper Code: BCH-106

Time: 3 Hours

Maximum Marks: 100

Note:

- All the questions are compulsory.
- Answer any two sub questions from a, b and c in each main question.
- Total marks for each question is 20 (twenty).
- Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks) (CO1)

a. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, then find $A^2 - 5A + 6I$.

b. Solve the following equations.

$$2x - y + 3z = 9, x + y + z = 6, x - y + z = 2.$$

c. Define with the help of examples.

- Matrix,
- Row and column matrix,
- Diagonal matrix,
- Skew-symmetric matrix,
- Upper and lower triangular matrix.

Q2.

(2X10=20 Marks) (CO2)

a. Find the domain and range of a function:

$$f(x) = \begin{cases} x+2 & x < 0 \\ x^2 & 0 \leq x \leq 2 \\ \frac{1}{x-1} & x > 2 \end{cases}$$

Also find $f(0)$, $f(1)$, $f(3)$, $f(5)$.

b. Determine $\frac{dy}{dx}$ for each of the following:

- $y = (x^4 - 4x^3 + 9) \tan x$,
- $y = \log \sin x$,
- $y = \log \log x$,
- $y = \frac{e^x}{x}$.

c. If $y = x \tan x$, prove that $x \sin^2 x \frac{dy}{dx} = x^2 + y \sin^2 x$.

Q3.

(2X10=20 Marks) (CO3)

a. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ for each of the following functions,

- $z = x^3 + 3x^2y - y^3$,
- $z = \log(x^2 + y^2)$,
- $z = 3x^2y^2 + y^2$.



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- b. Examine for maximum and minimum values of the function $f(x, y) = xy(a - x - y)$.
c. If $u = x^2 + y^2 + z^2$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 2u$.

Q4. (2X10=20 Marks) (CO4)

- a. A company has **three factories** (F_1, F_2, F_3) and **four warehouses** (W_1, W_2, W_3, W_4).
The cost of transporting one unit (in ₹) and the availability/demand are given below:

Factory/Warehouse	W_1	W_2	W_3	W_4	Supply
F_1	4	8	8	6	100
F_2	6	4	3	5	125
F_3	5	7	6	8	75
Demand	80	90	100	30	

Then solve the above transportation problem.

- b. Use the graphical method to solve the following Linear Programming Problem.

$$\text{Minimize } Z = 3x_1 + 2x_2$$

Subject to constraints

$$5x_1 + x_2 \geq 10$$

$$x_1 + x_2 \geq 6$$

$$x_1 + 4x_2 \geq 12$$

$$\text{and } x_1, x_2 \geq 0.$$

- c. Solve the following Assignment problem.

	JOBS				
		I_1	I_2	I_3	I_4
Members	1	12	30	21	15
	2	18	33	9	31
	3	44	25	24	21
	4	23	30	18	14

Q5. (2X10=20 Marks) (CO5)

- a. Describe the following with a mathematical formula;
(i) Simple interest and compound interest,
(ii) Rate of interest nominal.
b. Find the compound interest (CI) on Rs. 12,600 for 2 years at 10% per annum compounded annually.
c. If the principal amount is Rs. 5000 and the rate of interest is 7% compounded half-yearly. Find
Interest for 6 months.
(i) Amount after 6 months.
(ii) Interest for the next 6 months.