UNIVERSITY OF NORTH BENGAL

B.Com. Honours 4th Semester Examination, 2021

CC9-COMMERCE

BUSINESS MATHEMATICS

Full Marks: 60

ASSIGNMENT

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

Answer *all* the questions 15×4 = 60

1. (a) A function is defined as follows: 5

$$f(x) = x - 1, \quad \text{when } 0 < x < 1$$
$$= 2x + 1, \quad \text{when } 1 \le x < 2$$
$$= 5, \quad \text{when } x \ge 2$$

Show that $f(x)$ is discontinuous at $x = 1$.

(b) Find $\lim_{x \to 2} \frac{x^2 + x - 6}{x^2 - x - 2}$ 5

(c) Find $\frac{d^2y}{dx^2}$ when $y = e^{x^2}$ 5

2. (a) Show that $f(x) = x^3 - 3x^2 + 6x + 3$ has neither maximum nor minimum. 7

(b) Solve by Matrix Method: 8

$$x + y + z = 6$$
$$x - y + z = 2$$
$$2x + y - z = 1$$

3. (a) Evaluate: $\int \frac{e^x(1 + \log x)\, dx}{x}$ 5

(b) Solve by Simplex method the following L.P. problem: 10

Maximize, $Z = 2x + 5y$

Subject to:
$$x + 4y \le 24$$
$$3x + y \le 21$$
$$x + y \le 9$$
$$(x \ge 0, y \ge 0)$$

4. (a) State Euler's theorem and verify for $u = x^3 + 3x^2y - 2y^3$ 5

   (b) if $u = \log(x^2 + y^2)$ show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ 5

   (c) Find $\frac{dy}{dx}$ when $x = \frac{2t}{1+t^2}$ and $y = \frac{1-t^2}{1+t^2}$ 5

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