4. (a) If the total cost function is $TC = 11x - 2x^2 + \frac{x^3}{2}$, identify the level of output at which average cost will be minimum. (CO2)

OR

(b) (i) If $2x^2 + 2y^2 = a^2$ where $a \neq 0$ is a real constant, show that $\frac{dy}{dx} = -\frac{x}{y}$.

(ii) If the demand function $D = 20 - 3Q$, find the marginal revenue when level of output produced Q is 3. (CO2)

5. (a) The salary of an employee in 2005 was ₹ 11,000. In 2007 it was ₹ 12,750. Express salary as a linear function of time and estimate his salary in 2019. (CO2)

OR

(b) Find maximum and minimum values of the function $f(x) = 2x^3 - 24x + 107$ in the interval [1, 3]. (CO2)

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H Roll No. .....

BCH–106

B. COM. (HONS.) (FIRST SEMESTER)

MID SEMESTER

EXAMINATION, Nov., 2022

BUSINESS MATHEMATICS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any ***one*** of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) If matrix A is represented by

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & 7 \end{bmatrix}$$, prove that :

$$A^3 + 2A^2 - A - 20I = 0$$

hence obtain A^{-1}. (CO1)

OR

(b) Solve the following equations by inverse matrix method : (CO1)

$$x - 2y + z = 4$$
$$x - y - z = -2$$
$$2x + y + z = 5$$

2. (a) Thunderbolt is a transport company having three different types of trucks. Three different types of products P_1, P_2 and P_3 are transposed by a transport company by using three types of trucks T_1, T_2 and T_3. The capacity of each truck (in tons) of the three types of products is as under :

		Product		
		P_1	P_2	P_3
Trucks	T_1	1	3	2
	T_2	2	2	3
	T_3	3	2	2

Apply G-J method to find :

(i) The number of trucks of each type required to transport 1700, 2100, 2265 MT of products.

(ii) The number of products of each type that can be transported if thunderbolt has 20, 25 and 34 trucks of T_1, T_2 and T_3 respectively. (CO1)

OR

(b) By applying the properties of determinants show that : (CO1)

$$\begin{vmatrix} p+q & q+r & r+p \\ r & p & q \\ 1 & 1 & 1 \end{vmatrix} = 0$$

3. (a) (i) Let 'f' be a function defined by :

$$f(x) = 5x^2 + 2, x \in \mathbf{R}$$

(A) Find $f(3) \times f(2)$

(B) Find x such that $f(x) = 22$

(ii) Find the domain of the following function $x \in \mathbf{R}$: (CO1)

(A) $y = \dfrac{1}{(x-3)(x-5)}$

(B) $y = +\sqrt{(2-x)(4+x)}$

OR

(b) Define exponential and log arithmetic function. Write their properties and draw the graphs. (CO2)