2023

ADVANCED BUSINESS MATHEMATICS — HONOURS

Paper : 3.2 HA

(A-32-A)

[Accounting and Finance Group]

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Group - A

1. Answer the following questions : 2×5

(a) Draw the graph of the function : $y = f(x) = |x|$.

(b) If $y = \log(7x^2 - 3x + 1)$, then find $\dfrac{dy}{dx}$.

Or,

Show that $f(x, y) = \dfrac{x^2 y}{x + y}$ is a homogeneous function of degree 2 in x, y.

(c) If $A + B = \begin{pmatrix} 1 & -2 \\ 0 & 3 \end{pmatrix}$ and $A - B = \begin{pmatrix} 7 & 2 \\ 1 & 5 \end{pmatrix}$, then find A.

(d) Evaluate $\displaystyle \int \dfrac{\left(\sqrt{x} + 1\right)^2}{\sqrt{x}}\, dx$.

Or,

Evaluate $\displaystyle \int \dfrac{2x - 3}{x - 1}\, dx$.

(e) Find : $\displaystyle \lim_{x \to \infty} \dfrac{5 - 2x^2}{3x + 2x^2}$.

Or,

Find : $\displaystyle \lim_{x \to 1} \dfrac{x^2 - 3x + 2}{x^2 - 4x + 3}$.

Please Turn Over

Group - B

2. Answer the following questions :

(a) Evaluate the following limits :

(i) $\lim\limits_{x \to 0} \dfrac{\sqrt{2 + x^2} - \sqrt{2 - x^2}}{x^2}$

(ii) $\lim\limits_{x \to 0} \dfrac{e^{3x} - e^{2x} + 2x}{x}$. 3+3

(b) Show that the maximum value of $x^3 + \dfrac{1}{x^3}$ is less than its minimum value. 6

Or,

Find two positive numbers whose product is 64 having minimum sum. 6

(c) Solve the following system of linear equations by Cramer's rule : 6

$$x - y + 2z = 6$$
$$x + 2y - z = -3$$
$$3x + y + z = 4$$

Or,

If $x + y + z = 0$, show that $\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = 0$. 6

(d) Find $\dfrac{dy}{dx}$ when $x^y + y^x = 2$. 6

(e) If $A^{-1} = \begin{bmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & -1 \end{bmatrix}$, find A. 6

Or,

Find the inverse of the matrix A when $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & -2 & -3 \\ 3 & 1 & 6 \end{bmatrix}$ and hence solve the equation

$2x + 3y + 4z = 4;\ 5x - 2y - 3z = 4;\ 3x + y + 6z = 1.$ 6

Group - C

3. Answer the following questions :

   (a) Evaluate (*any one*) : 4×1

   (i) $\int \dfrac{4x-2}{x^3-x^2-2x}\,dx$

   (ii) $\int \dfrac{(x-2)(x-4)}{(x-1)(x-5)}\,dx$

   (b) What is probability of getting 3 white balls in a draw of 3 balls from a box containing 5 white and 4 black balls? 6

   Or,

   Two unbiased dice are thrown. Find the probability that the sum of the faces is not less than 10. 6

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