

2020

ADVANCED BUSINESS MATHEMATICS — HONOURS

Sixth Paper

(A-32-A)

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 **any four** questions :

5×4

(a) Find the domain of definition of the function $\log(x^2 - 5x + 6)$

Or,

If $f(x) = [x - 1] - x$, then find $f(0)$ and $f(1)$.

(b) Draw the graph of the function $f(x) = |x|$.

(c) If $f(x) = \frac{x-1}{x+1}$, then show that $\frac{f(a)-f(b)}{1+f(a)f(b)} = \frac{a-b}{1+ab}$

Or,

If $3f(x) - 2f(-x) = 10x-1$, find $f(x)$ and hence find $f(2-3x)$.

(d) Find $\lim_{x \rightarrow -4} \left[\frac{1}{x+4} + \frac{8}{x^2-16} \right]$

(e) Differentiate $e^{\sqrt{x}}$ with respect to x .

Or,

If $x^2 + y^2 = 2\log(x+y)$, find $\frac{dy}{dx}$.

Please Turn Over

Group - B

2. Answer *any two* questions : 10×2

(a) Evaluate :

(i) $\lim_{x \rightarrow 0} \frac{e^{ax} - e^{bx} + kx}{x}$

(ii) $\lim_{x \rightarrow \infty} \frac{4x^4 - 3x + 2}{5x^4 + 2x^2 + 3}$ 5+5

(b) If $x = \frac{1-t}{1+t}$ and $y = \frac{2t}{1+t}$, then show that $\frac{d^2y}{dx^2} = 0$ 10

(c) Show that the maximum value of $x + \frac{1}{x}$ is less than its minimum value. 10

Or,

The sum of two positive numbers is 24. Find the two numbers if the sum of their squares is minimum. 10

(d) Prove that (without direct expansion) 10

$$\begin{vmatrix} x & a & b \\ a & x & b \\ a & b & x \end{vmatrix} = (x-a)(x-b)(x+a+b)$$

Or,

Solve by matrix inversion method : 10

$$x + y + z = 3; \quad x - y + z = 1; \quad x + y - z = 1$$

(e) If $A = \begin{bmatrix} 2 & -1 & 1 \\ -2 & 3 & -2 \\ -4 & 4 & -3 \end{bmatrix}$, find $A^2 - A$. 10

Or,

Express the following in a single matrix : 10

$$\begin{bmatrix} 3 & 2 & 5 \\ 2 & -4 & 0 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ 2 & -1 \\ 0 & 5 \end{bmatrix} - \begin{bmatrix} 7 & 29 \\ -6 & 8 \end{bmatrix}$$

Group - C

3. Answer *any one* question : 10×1

(a) Evaluate

(i) $\int \frac{2x+3}{3x+2} dx$ (ii) $\int \frac{2x dx}{2+x-x^2}$ 10

(b) A number is chosen at random from the first 50 positive integers. Find the probability that the chosen number is divisible by 3 or 5. 10

(c) If 10 consecutive days are chosen at random, what is the probability that two of them will be Saturdays? 10
