2018

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 the following questions :–   5×2

   (a) If $P(A) = \dfrac{3}{4}$, $P(B) = \dfrac{3}{5}$, and $P(A|B) = \dfrac{9}{10}$, find the value of $P(B|A)$.

   Or

   If $P(A) = \dfrac{2}{3}$, $P(B) = \dfrac{1}{3}$ and $P(A \cup B) = 1$; state whether A and B are mutually exclusive. Give reasons.

   (b) If $A = \begin{bmatrix} 9 & 1 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 5 \\ 7 & 12 \end{bmatrix}$ and $C = \begin{bmatrix} 32 & 28 \\ 47 & 69 \end{bmatrix}$

   Show that $3A + 5B - C = O$.

   (c) Find the derivative of $\sqrt{3x^2 - 7}$.

   Or

   Find $\dfrac{dy}{dx}$ if $y = 2^x x^5$.

   (d) If $f(x) = \dfrac{2x+1}{2x^2+1}$, and $\phi(x) = 2f(2x)$, then find $\phi(2.5)$.

   (e) Find the domain of $f(x) = \dfrac{x^2 + x + 5}{x^2 - 6x + 8}$

   Or

   Show that the function $f(x) = x \cdot \dfrac{3^x - 1}{3^x + 1}$ is an even function.

[Turn Over]

Group – B

2. Answer the following questions :–   6×5

   (a) If $x^m.y^n = (x+y)^{m+n}$, show that $\dfrac{dy}{dx} = \dfrac{y}{x}$.

   (b) If x>0, y>0 and xy = 25; find the minimum value of (x+y).

                                          Or

   Show that the difference between the maximum and minimum values of the function $x^3-27x+108$ is 108.

   (c) Solve by Cramer's rule :

        x+2y–z = 9, 2x–y+3z = –2, 3x+2y+3z = 9

                                          Or

   Prove that $\begin{vmatrix} (b+c)^2 & c^2 & b^2 \\ c^2 & (c+a)^2 & a^2 \\ b^2 & a^2 & (a+b)^2 \end{vmatrix} = 2(ab+bc+ca)^3$

   (d) Evaluate the following :

        (i) $\displaystyle\lim_{x\to 2}\dfrac{x-\sqrt{3x-2}}{x^2-4}$

        (ii) $\displaystyle\operatorname*{Lt}_{x\to\infty}\left(\sqrt{x^2+ax}-x\right)$

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

                                          Or

   If $P =\begin{bmatrix} -1 & 3 & 5 \\ 1 & -3 & -5 \\ -1 & 3 & -5 \end{bmatrix}$ show that, $P^2 = P$; hence find the matrix Q

   where $3P^2-2P+Q=I$, I is the identity matrix.

Group – C

3. Answer the following :–

   (a) Evaluate (*any one*) :–   4

        (i) $\displaystyle\int \dfrac{(x^2+3)^2}{\sqrt{x}}dx$

        (ii) $\displaystyle\int \dfrac{\log(\log x)}{x\log x}dx$

   (b) Find the probability that a leap year contains 53 Sundays: 6

                                          Or

   A committee of 5 members is to be formed from 6 men and 4 ladies. Find the probability that the ladies may be a majority in the committee.   6