1127
M.Sc. (Bio-Informatics)-3rd Semester
MBIN-8002: Mathematics

Time allowed: 3 Hours

Max. Marks: 60

NOTE: *Attempt* **five** *questions in all including Q. No.-1 which is compulsory and selecting atleast* **one** *question from each Unit.*

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I.   Attempt the following: -

(a)   Examine whether: $\sqrt{2}+21, \pi-2$ are irrational numbers or not. Justify.

(b)   Express:

$\dfrac{5+\sqrt{2i}}{1-\sqrt{2i}}$ in the form a+ib

(c)   Define modulus function and draw its graph.

(d)   Evaluate: $\displaystyle\lim_{x \to 1} \dfrac{x^3-1}{x-1}$

(e)   Show that $f(x)=x^2$ in differentiable at x=1 and find $f'(1)$.

(f)   Evaluate: $\displaystyle\int 3^{x+2}\,dx$

(g)   Evaluate the determinant: $\begin{vmatrix} 2 & 3 & -2 \\ 1 & 2 & 3 \\ -2 & 1 & -3 \end{vmatrix}$ by expanding it along first

column.

(h)   In a Boolean algebra, prove that: x+(x.y)=x $(8\times1\tfrac{1}{2})$

UNIT-I

II.   (a)   Express the number: $-\sqrt{3}+i$ in the modulus-amplitude form.

(b)   Let U={1,2,3,4,5,6,}, A={2,3} and B={3,4,5}. Find $A', B', A'\cap B', A\cup B$ and hence show that $(A\cup B)' = A'\cap B'$.

(c)   Find the value of: $3\sin\dfrac{\pi}{6}\sec\dfrac{\pi}{3} - 4\sin\dfrac{5\pi}{6}\cot\dfrac{\pi}{4}$ (4+4+4)

III.   (a)   If the sum of a certain number of terms of the A.P.: 25, 22, 19, …….. in 116, then find the last term.

(b)   The 4th term of a G.P. in square of its second term, and the first term is -3. Determine its 7th term.

(c)   Expand and simplify: $\left(x+\dfrac{1}{x}\right)^6, x\neq 0$ (4+4+4)

P.T.O.

UNIT-II

IV. (a) If $y = x^x e^{2(x+3)}$, then find $\dfrac{dy}{dx}$

   (b) Find the maximum profit that a company can make, if the profit function in given by $P(x) = 41 + 24x - 18x^2$.   (6+6)

V. (a) Evaluate: $\int (\log x)^2\, dx$

   (b) A population grows at the rate of 8% per year. How long does it take for the population to double? Use differential equation for it.   (6+6)

UNIT-III

VI. (a) If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, find a and b.

   (b) Using determinant, find the area of the triangle whose vertices are (-2,4), (2,-6) and (5,4). Are the given points collinear?   (6+6)

VII. (a) Check whether the following statement in true or not?
   If $x, y \in z$ are such that x and y are odd, then xy is odd.

   (b) Convert: $(7261.664)_8$ to its equivalent binary and hex number.   (6+6)

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