Code No: 181AC **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year I Semester Examinations, March/April - 2023
BASIC MATHEMATICS
(Bio Technology)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a) Define a square matrix. [1]
b) Find the root of the equation $3x + 6 = 0$. [1]
c) Multiply $3+4i$ by $7-3i$. [1]
d) Write the number of quadrants and octants in a courtesan coordinate system. [1]
e) Define tanx in terms of sinx and cos x. [1]
f) Find A and B in $\frac{A}{1+x}+\frac{B}{1-x}=\frac{1}{1-x^2}$. [1]
g) Write the domain of the function $f:\{(1,2),(2,3),(3,4),(4,5)\}$. [1]
h) Find the differentiation of sinx. [1]
i) Write an example of a first order and first degree differential equation. [1]
j) Define an event of a random experiment. [1]

PART - B

(50 Marks)

2.a) If $A=\begin{bmatrix}2 & 3 & -1\\ 7 & 8 & 5\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0 & 1\\ 2 & -4 & -1\end{bmatrix}$ then find $A+B$ and $A-B$.
b) Solve the equation $x^4+4x^3+6x^2+4x+5=0$ given one root is i. [6+4]

OR

3. If $A=\begin{bmatrix}2 & -1 & 2\\ 1 & 3 & -4\end{bmatrix}$ and $B=\begin{bmatrix}1 & -2\\ -3 & 0\\ 5 & 4\end{bmatrix}$ then verify that $(AB)'=B'A'$. [10]

4.a) If $z=\cos\theta+i\sin\theta$ prove that $\frac{1+z}{1-z}=i\cot\frac{\theta}{2}$.

b) Evaluate $\left(\frac{1+\sin\alpha+i\cos\alpha}{1+\sin\alpha-i\cos\alpha}\right)^n$. [5+5]

OR

5. If $\bar{a}=a_1i+a_2j+a_3k$ and $\bar{b}=b_1i+b_2j+b_3k$ then find $\bar{a}.\bar{b}$ and $\bar{a}\times\bar{b}$. [10]

6.a) Prove that $\sin^2\theta+\sin^2\left(\theta+\frac{\pi}{3}\right)+\sin^2\left(\theta-\frac{\pi}{3}\right)=\frac{3}{2}$.

b) Explain the graph of $y=\cos x$. [5+5]

OR

7. Resolve $\frac{2x+3}{x(x+1)(x-2)}$ into partial fractions. [10]

8. If $f(x)=\begin{cases}3x-2, x>3,\\ x^2-2, -2\le x\le 2,\\ 2x+1, x<-3\end{cases}$ then find $f(4)$, $f(2.5)$, $f(-2)$, $f(-4)$, and $f(-7)$. [10]

OR

9.a) Find the differentiation of a function x^2+2x+3.

b) Find the integration of a function $e^{2x}+25$. [5+5]

10.a) Form a differential equation by the elimination of arbitrary constant from $y=mx+c$.

b) Solve the differential equation $xdx+ydy=0$. [5+5]

OR

11.a) Write the axioms of probability.

b) State and prove addition theorem of probability. [5+5]

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