GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

M.Sc. (First Semester - Regular) Examinations, February – 2025

24MBIPC11006 – Basics of Mathematics and Statistics

(Biotechnology)

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

	Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a.	State $5x^{-3}$ is a polynomial or not with reason.	CO1	K1
b.	Integrate $\int x \sin x \, dx$.	CO2	K2
c.	Define species, complexes and reactions in chemical reaction network.	CO3	K1
d.	How many ways can you draw 4 cards from a deck of 52 cards?	CO4	K1
e.	Find the value of $\lim_{x\to 0} \frac{\log\left(1+\frac{2}{5}x\right)}{x}$.	CO2	K1

PART – B **(10 x 5 = 50 Marks)**

	Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a.	Find the value of $\lim_{x\to 0}(x^3 - 3x^2 + 6x - 3)$.	5	CO1	K2
b.	Find the values of k such that the equation $\frac{p}{x+r} + \frac{q}{x-r} = \frac{k}{2x}$ has two equal roots.	5	CO1	K1
	(OR)			
c.	If $A = \begin{bmatrix} 2 & 5 & 7 \\ 2 & -1 & 0 \\ 3 & 4 & 8 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 4 & 9 \\ 3 & -2 & 4 \\ -5 & 6 & 8 \end{bmatrix}$ verify that (a) $(A+B)^T = A^T + B^T$ (b) $(AB)^T = B^T A^T$	10	CO1	K2
3.a.	Solve: $\int \frac{x^3-1}{x^2} dx$	5	CO2	K2
b.	Find derivative of $f(x) = x^3 - 27$ from first principle.	5	CO2	K2
	(OR)			
c.	Solve: $\int \frac{1-\sin x}{cos^2 x} dx$	5	CO2	K2
d.	Find derivative of $f(x) = (x-1)(x-2)$ from first principle.	5	CO2	K2
4.a.	What are the types of probability sampling? Discuss about them.	10	CO4	K1
	(OR)			
b.	You toss a fair coin three times: a. What is the probability of three heads, HHH? b. What is the probability that you observe exactly one heads? c. Given that you have observed at least one heads, what is the probability that you observed at least two heads?	6	CO4	K2
c.	Write the difference between population and sample.	4	CO4	K1
5.a.	Calculate the coefficient of correlation from the following data:	10	CO3	K2

X	105	104	102	101	100	99	98	96	93	92
y	101	103	100	98	95	96	104	92	97	94

(OR)

b. Determine the regression equation from the following data: 10 CO3 K2

X	10	12	13	16	17	20	25
y	10	22	24	27	29	33	37

6.a. Find the value of $\lim_{z\to 0}\left(\frac{2z^2-17z+8}{8-z}\right)$. 5 CO1 K2

b. Find the derivative of $f(x)=\frac{2x-1}{2x+1}$ 5 CO1 K2

(OR)

c. If $A=\begin{bmatrix}6 & -3 & 7\\ 1 & 4 & 2\\ 0 & 5 & 4\end{bmatrix}$ and $B=2A, C=B+3A-5I$. Find matrix D such that $D=2A+B-C$. 5 CO1 K2

d. Find the multiplicative inverse of the complex number $4-5i$. 5 CO1 K2

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