Printed page: …. **Subject Code: ABT0101**

Roll No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B. Tech

SEM: I - THEORY EXAMINATION (2022-2023)

Subject - Elementary Mathematics

Time: 3 Hours **Max. Marks:100**

General Instructions:

IMP: Verify that you have received question paper with correct course, code, branch etc.

1. *This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. *Maximum marks for each question are indicated on right hand side of each question.*
3. *Illustrate your answers with neat sketches wherever necessary.*
4. *Assume suitable data if necessary.*
5. *Preferably, write the answers in sequential order.*
6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION – A 20

1. Attempt all parts:-

1-a. System $x-y=10$ and $2x-2y=20$ has (CO1) 1

(a) a unique solution.

(b) exactly two solutions.

(c) an infinite solution

(d) no solution.

1-b. The roots of the equation $(x-2)^2=36$ are _____ (CO1) 1

1-c. Which of the following is true? (CO2) 1

(a) $f(x)=\dfrac{x^2-1}{x^2-9}$ is continuous at $x=3$.

(b) $f(x)=\dfrac{x^2-1}{x^2-9}$ is continuous at $x=-3$.

(c) $f(x)=|x|$ is differential at $x=0$.

(d) $f(x)=|x|$ is differential at $x=1$.

1-d. The value of $\lim_{x\to 0}\frac{\sin 2x}{x}$ is _____ (CO2) 1

1-e. If $I=\int 101x^{100}dx$, then (CO3) 1

(a) $I=\frac{x^{100}}{100}$

(b) $I=\frac{x^{101}}{101}$

(c) $I=x^{101}$

(d) $I=x^{100}$

1-f. The value of $\int_{-1}^{1} e^x$ dx is …… (CO3) 1

1-g. Solution of $\frac{dy}{dx}+1=0$ is (CO4) 1

(a) $x+y=c$

(b) $x-y=c$

(c) $\frac{y}{x}+1=0$

(d) $\frac{y}{x}-1=0$

1-h. The order of $\left(\frac{d^2y}{dx^2}\right)-\left(\frac{dy}{dx}\right)^3=0$ is (CO4) 1

(a) 1

(b) 2

(c) 3

(d) 4

1-i. Which of the following is true? (CO5) 1

(a) $Profit = Cost\ price - Selling\ price$

(b) $Loss = Cost\ price + Selling\ price$

(c) $Profit = Selling\ price - Cost\ price$

(d) None of the above

1-j. Mr. X bought an AC for 12160 rupees and paid 340 rupees for transportation. Then he sold it for 12875 rupees. Find his profit: _____ (CO5) 1

2. Attempt all parts:-

2.a. State fundamental theorem of algebra. (CO1) 2

2.b. Find the value of the function $(x-1)(x-2)^2$ at its maxima? (CO2) 2

2.c. Evaluate $\int \frac{1}{(x-1)(x-2)}dx$. (CO3) 2

2.d. Solve $\text{cosec}x\frac{dy}{dx}-\sec y=0$. (CO4) 2

2.e. Find the value of x in the following number series: $6,12,20,30,x.$ (CO5) 2

SECTION – B 30

3. Answer any <u>five</u> of the following-

3-a. Find the number of solutions in each case for $ax+by=1$ where x, y belong to set of real numbers and a,b belong to set of natural numbers. (CO1) 6

3-b. Show that $f(x)=|x-1|$ is differentiable at $x=0.5$ but not differentiable at $x=1.$ (CO2) 6

3-c. If $y=x^{\sin x}$ Find $\frac{dy}{dx}$. (CO2) 6

3-d. Find the area of the circle whose center at origin and radius is 1 using integration.(CO3) 6

3-e. Find the differential equation corresponding to $y=ae^{3x}+be^{x}$. (CO4) 6

3-f. Solve $\frac{dy}{dx}+(\sec x)y=7$. (CO4) 6

3-g. Mr. X buys some paper wind fans at 4 per rupee. He then buys same number of paper wind fans from another shop at 5 per rupee. He puts them all together and sells them at 4 per rupee. Will he make a profit or incur a loss? How much? (CO5) 6

SECTION – C 50

4. Answer any <u>one</u> of the following-

4-a. (i) Find the values of x if $4x^2<100$ where x belongs to the set of natural numbers

(ii) Solve the system $\begin{cases} ax+by=1 \\ ax+dy=-1 \end{cases}$ for x and $y.$ (CO1) 10

4-b. Solve the system graphically $\begin{cases} 5x+7y=2000 \\ x-7y=400 \end{cases}$ (CO1) 10

5. Answer any <u>one</u> of the following-

5-a. Check the continuity and differentiability of $f(x)=\begin{cases} x\sin\frac{1}{x}, & x\neq 0 \\ 0, & x=0 \end{cases}$ at $x=0$. (CO2) 10

5-b. Find maximum and minimum values of $f(x)=\frac{3}{4}x^4+8x^3+\frac{45}{2}x^2+250$. (CO2) 10

6. Answer any <u>one</u> of the following-

6-a. Evaluate $\int \frac{x^2+1}{x^2-5x+6}dx$. (CO3) 10

6-b. Show that the area bounded by the following curves: $y = x^2 - 4, y = 0, x = 4$ is $\frac{32}{3}$ square units. (CO3) 10

7. Answer any <u>one</u> of the following-

7-a. Solve $x\frac{dy}{dx} + 2y = x^2 \log x$ (CO4) 10

7-b. Solve $\left(1 - x^2\right)\frac{dy}{dx} + 2xy = x\sqrt{1 - x^2}, x^2 < 1.$ (CO4) 10

8. Answer any <u>one</u> of the following-

8-a. (i) Find the value of x in the following number series: $0, \frac{3}{2}, 4, \frac{15}{2}, 12, x.$ 10

(ii) If MACHINE is coded as 19-7-9-14-15-20-11, how will code DANGER (CO5)

8-b. (i) A person buys a horse for 15 pounds. After one year, he sells it for 20 pounds. After one year, again he buys the same horse at 30 pounds and sells it for 40 pounds. What is the overall profit percent for that person over both the transactions? 10

(ii) Find value of x if the average of $x+1$, 3, $5x+2$ is 52. (CO5)