Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.VOC- SEMESTER–II EXAMINATION – SUMMER 2025

Subject Code:BV02009021 **Date:26-05-2025**

Subject Name: Mathematics

Time:10:30 AM TO 12:30 PM **Total Marks:50**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1 **(a)** Let $A = \{1, 5, 6, 7, 8, 10\}$, $B = \{1, 4, 5, 9\}$ and $C = \{1, 4, 6, 7, 9\}$ then verify that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ **05**

(b) Express $\frac{5+\sqrt{2}\,i}{1-\sqrt{2}\,i}$ in the form $a + ib$. **05**

Q.2 **(a)** Let $f: A \to B$, where $A = \{1, 2, 3\}, B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, and $f(x) = x^2 - 2x + 3$; find the domain, co-domain, and range of f. **05**

(b) Solve: $x^2 + 2x + 4 = 0$ **05**

OR

(b) Define: 1) Regular graph
2) Complete graph **05**

Q.3 **(a)** List various types of matrices with appropriate examples for each. **05**

(b) Solve the system of equations using the matrix method: **05**

$$2x + 5y = 1$$
$$3x + 2y = 7$$

05

OR

(a) Find the unit vector in the direction of $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} + \hat{k}$.

(b) State and prove D'Morgan's laws in Boolean algebra. **05**

Q.4 **(a)** Find the area of the triangle with vertices $(3, 8), (-4, 2)$ and $(5, 1)$. **05**

(b) Find the values of x such that: **05**

$$\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$$

OR

(a) Calculate the mean deviation from the mean for the given data. **05**

Markes obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of students	2	3	8	14	8	3	2

(b) Explain combination and permutations with examples. **05**

Q.5 **(a)** Explain the concept of the degree of vertex in detail with a suitable example. **05**

(b) A committee of people is chosen from two men and two women. What is the probability that the committee will have: **05**
(a) no man?
(b) one man?
(c) two men?

OR

(a) **05**
Use a truth table to prove that $(\mathrm{A}+\mathrm{B}).(\mathrm{A}+\mathrm{C})=\mathrm{A}+(\mathrm{B}.\mathrm{C})$

(b) Write the truth table for the compound proposition $p \wedge (q \vee r) \leftrightarrow [(p \wedge q) \vee (p \wedge r)]$. **05**

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