# GUJARAT TECHNOLOGICAL UNIVERSITY
B.VOC- SEMESTER–II EXAMINATION – WINTER 2024

Subject Code:21120204   **Date:30-12-2024**

Subject Name: Basic Mathematics

Time:02:30 PM TO 04:30 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.

                                                               Marks

Q.1 **(a)** If $A = \{1,2,3,4\}$, $B = \{3,4,9,11\}$ and $C = \{2,11,18,22\}$ then find (i) $(A \cap B)$, (ii) $(B \cap C)$, (iii) $(A \cap C)$, (iii) $(A \cap B \cap C)$.   **05**

(b) Find edges, vertices, parallel edges, loops, degree of vertices from the following graph   **05**
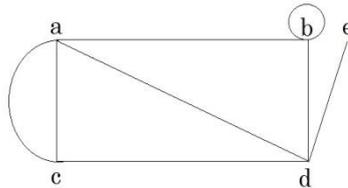
Q.2 **(a)** Solve the equation $3x^2 + 5x = 2$.   **05**

(b) Find real and imaginary part of $\dfrac{3-4i}{5+7i}$.   **05**

OR

(b) Let $f: A \to B$ where A={1,2,3} ; B={1,2,3,4,5,6,7} $f(x) = 2x$ then find domain, co-domain and range of f.   **05**

Q.3 **(a)** Let $u = (2, 3, -4)$ and $v = (1, -5, 8)$. Then find $u + v$, $5u$, $-v$, $2u - 3v$, $u \cdot v$ **05**

(b) If $\begin{vmatrix} 11 & 40 & 28 \\ 3 & 12 & 8 \\ a & 2 & 2 \end{vmatrix} = 0$ Then find a **05**

OR

Q.3 **(a)** Consider the following relation on $\{1, 2, 3, 4, 5, 6\}$ $R = \{(i,j): |i - j| = 2\}$. Is R reflexive, symmetric or transitive ?   **05**

(b) Find AB and BA, where A $= \begin{bmatrix} 1 & -1 & 1 \\ -3 & 2 & -1 \\ -2 & 1 & 0 \end{bmatrix}$, B $= \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 1 & 2 & 3 \end{bmatrix}$ **05**

Q.4 **(a)** Find standard deviation of the following data   **05**

x	10	11	12	13	14	15	16	17	18
f	2	7	10	12	15	11	10	6	3

(b) Three unbiased coins are tossed. Find the probability of getting (i) exactly two heads (ii) atleast one tail   **05**

OR

Q.4 **(a)** Find the quartile deviation from the following data: **05**

Class	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
Frequency	5	6	15	10	5	4	2	3

(b) If A and B are two events such that $P(A) = 0.3$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$, find (i) $P(A \cup B)$ (ii) $P(\bar{A})$ (iii) $P(\bar{B})$ (iv) $P(\bar{A} \cup B)$ (v) $P(\bar{A} \cap \bar{B})$ **05**

Q.5 **(a)** State De Morgan's Law and prove it using postulates   **05**

(b) Check whether F_2 is a minimization of F_1, where,   **05**

$$F_1 = \bar{x} \cdot \bar{y} \cdot z + \bar{x} \cdot y \cdot z + \bar{x} \cdot y \text{ and } F_2 = x \cdot \bar{y} + \bar{x} \cdot z.$$

OR

Q.5 **(a)** Use truth table to prove that   **05**

$$(A + B)\Box(A + C) = A + (B \Box C)$$

(b) Design a Boolean function of $AB + CD$ using logic gates   **05**

****