Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BVOC- SEMESTER–II EXAMINATION – WINTER 2022**

**Subject Code:21120204 Date:01-03-2023**

**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)** | Let $U=\{a, b, c, d, e, f, g, h, i, j\}$, $A=\{a, b, f, g, i\}$, $B=\{b, d, f, i, j\}$, $C=\{c, e, f, g\}$ then show that (i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ (ii) $(A \cap B \cap C)$. | **05** |
| | **(b)** | Give an example of a relation which is Reflexive, Symmetric but not Transitive. | **05** |
| **Q.2** | **(a)** | Define: Graph and Sub graph with an example. | **05** |
| | **(b)** | Solve the equation: $2x^2 - 5x + 3$ | **05** |
| | | **OR** | |
| | **(b)** | Express the complex number $\frac{(2-8i)(7+8i)}{1+i}$ in the form of $a + ib$. | **05** |
| **Q.3** | **(a)** | If $A = \{2, 3, 4, 5\}$ and B= $\{4,\ 5,\ 9, 25\}$ and $R: A \to B$ defined by aRb, if $b = a^2$. Find the domain and Range. | **05** |
| | **(b)** | If $A = \begin{bmatrix} 1 & 2 \\ -1 & -4 \\ 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -3 & 5 \\ 2 & 0 & 1 \end{bmatrix}$ then find$(AB)^T$. | **05** |
| | | **OR** | |
| **Q.3** | **(a)** | Find the Inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -1 \\ -2 & 2 & -1 \end{bmatrix}$ | **05** |
| | **(b)** | If $\bar{x} = (-1, -2, 3)$, $\bar{y} = (-3, 7, 9)$, $\bar{z} = (-2, 1, 3)$ then find $\bar{x} \cdot (\bar{y} + \bar{z})$ | **05** |
| **Q.4** | **(a)** | Find the mean deviation about the mean for the following frequency distribution. | **05** |

| Marks | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|
| Student | 3 | 7 | 12 | 15 | 8 | 3 | 2 |

| | | | |
|---|---|---|---|
| | **(b)** | A card is drawn from a well-shuffled pack of 52 cards. Find the probability of (i) getting a king card, (ii) getting a face card. | **05** |
| | | **OR** | |
| **Q.4** | **(a)** | Calculate the standard deviation of the following data: | **05** |

| Size of the items | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|
| frequency | 2 | 7 | 11 | 15 | 10 | 4 | 1 |

| | | | |
|---|---|---|---|
| | **(b)** | A class consists of 6 girls and 10 boys. If a committee of three is chosen at random from the class, find the probability that (i) three boys are selected and (ii) exactly two girls are selected. | **05** |

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Design a Boolean function of AB + CD using logic gates. | **05** |
| | **(b)** | State De Morgan's Law. What is De Morgan's Law in Boolean Algebra. | **05** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Write the truth table for the compound proposition $p \vee (q \wedge r) \leftrightarrow [(p \vee q) \wedge (p \vee r)]$. | **05** |
| | **(b)** | State Boolean Algebra with an example. | **05** |

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