

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
BCA/MCA INTEGRATED - SEMESTER - II EXAMINATION - SUMMER 2025

Subject Code: BC02001051

Date: 10-06-2025

Subject Name: Mathematics-2

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

- | | Marks |
|--|--------------|
| Q.1 (a) Show that $(p \rightarrow (q \vee r)) \equiv ((p \rightarrow q) \vee (p \rightarrow r))$ | 07 |
| (b) Define Tautology and Show that the compound proposition is Tautology.
$\sim (p \wedge q) \not\equiv ((\sim p) \vee (\sim q))$ | 07 |
| Q.2 (a) Find the Disjunctive normal form for the formula
$(\sim p \vee q) \rightarrow (p \not\equiv q)$ | 07 |
| (b) State Baye's Theorem and In a certain assembly plant, three machines X, Y&Z make 30%, 45% & 25% respectively of the products. It is known from the past experience that 2%, 3% & 2% of the products made by each machine respectively are defective. Now, suppose that a finished product is randomly selected. What is the Probability that it is defective? | 07 |
| OR | |
| (b) If $A = \{1, 2\}$, $B = \{1, 2, C\}$, $C = \{a, b, c\}$ then Prove that | 07 |
| <ol style="list-style-type: none">1. $(A \cap B) \times C = (A \times C) \cap (B \times C)$2. $(A \cup B) \times C = (A \times C) \cup (B \times C)$ | |
| Q.3 (a) Define Extended pigeonhole principle and using it Show that any 30 people are selected then at least 5 people must have been born on the same day of the week. | 07 |
| (b) A Menu card in a restaurant displays four soups, five main courses, three desserts and five beverages. How many different menus can a customer select if | 07 |
| <ol style="list-style-type: none">1. 1) He selects one item from each group without omission.2. 2) He chooses to omit the beverages but selects one each from the other groups.3. 3) He chooses to omit the desserts but decides to take a beverage and one item each from the remaining groups. | |

OR

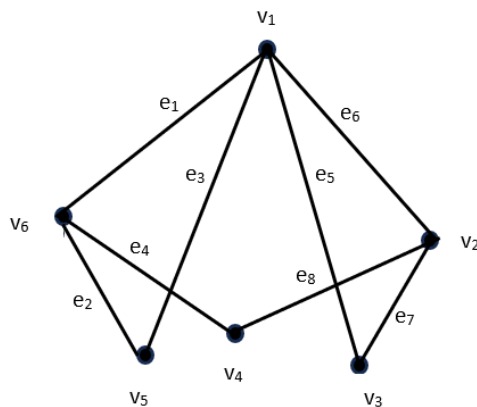
- (a) 1) A box contains 6 red balls, 4 white balls, 5 black balls. A person draws 4 balls from the box at random find the probability that among the balls drawn there is at least one ball of each color. 07
- 2) A card is drawn from a well shuffled deck of 52 cards and then second card is drawn, find the probability that one card is a spade and then second card is club if the first card is not replaced.

- (b) Define Combination. Then Show that 07
- $$n_{c_1} + 6(n_{c_2}) + 6(n_{c_3}) = n^3$$

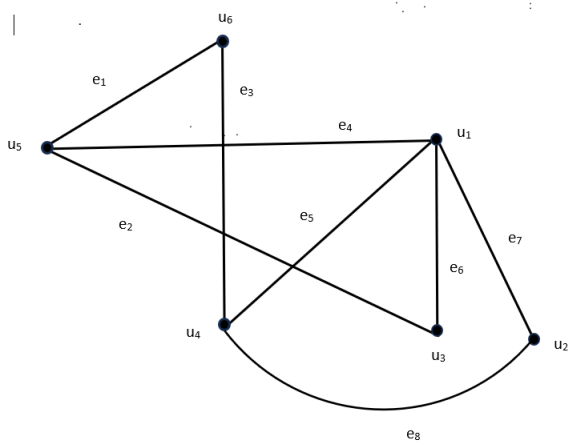
- Q.4 (a) Explain the following terms with proper illustration. 07

1. 1) Mixed graph
2. 2) Multiple graph
3. 3) Simple Graph
4. 4) Path

- (b) Define Isomorphic graphs. Determine wheather the following graphs are Isomorphic or not. 07



G₁

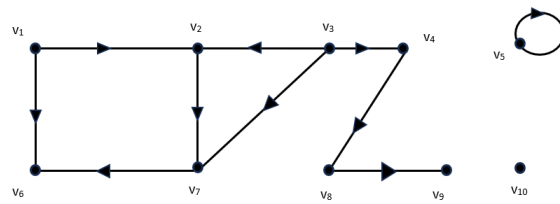


G₂

OR

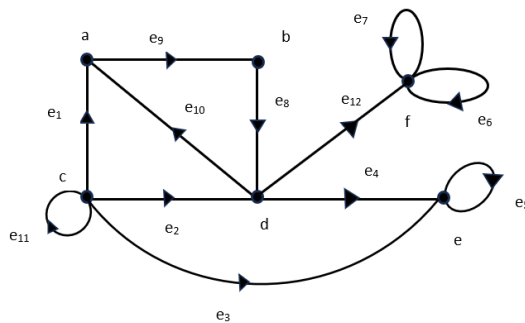
- (a) Define Reachable set of a Vertex. Find all the Reachable set of a vertex.

07



- (b) Find the Indegree ,Outdegree and total degree of each vertex in the given graph.

07



- Q.5 (a) Show that $(P(s), \subseteq)$ is Poset.

07

- (b) $A = \{1, 2, 4, 8\}$ $a R b$ iff a/b (a divides b) then find the digraph of relation and relation matrix.

07

OR

- (a) Let $X = \{1, 2, \dots, 7\}$ and $R = \{(x, y) \mid x - y \text{ is divisible by } 3\}$ Show that R is equivalence relation.

07

- (b) Let $S_8 = \{1, 2, 4, 8\}$, $S_{15} = \{1, 3, 5, 15\}$, $S_{30} = \{1, 2, 3, 5, 6, 10, 15, 30\}$ Draw the Hasse diagram of (S_8, D) , (S_{15}, D) & (S_{30}, D) , where D denotes the relation “divides”.

07
