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**B. TECH-II -II SEM (R-22) I MID Examinations- Mar-2025 Date:04/03/2025**

**Subject: Discrete Mathematics Time: 10:00 AM to12:00PM Branch: IT & CSD Marks: 30M**

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Answer all Questions in Part A & Answer any FOUR Questions in Part-B

**PART-A 5 x 2 M = 10 M**

1. Construct the truth table to show that (PVQ)→P is a Tautology. (CO1)
2. Explain Connectives with suitable Example.(CO1)
3. If A and B are sets then prove that (A ∪ B)’ = A’ ∩ B’. (C02)
4. Discuss the Equivalence and Transitive Relation. (CO2)
5. Explain the Closure and Associative Property in Algebraic System. (CO3)

**PART-B** **5 X 4M=20M**

1. Show that R→S can be derived from the premises P→(Q→ S), ¬RV P, Q.(CO1)
2. Find CNF for the given formula ¬(P⟺Q) with and without Truth Table.(CO1)
3. Let X= {2,3,6,12,24,36} and the relation ‘≤’ be such that x≤ y and if x divides y. Draw the Hasse Diagram. (CO2)
4. By using functions solve the following Let the function f: N→N and g: Z→N be defined as follows f(n)=3n+2 and g(n)=n2+1.

Find (i)f ◦ g (ii)g ◦ f (iii) f ◦ g (2) (iv) g ◦ f (3) (CO2)

1. a) A= {1,3,5,7,9….} set of odd +ve integers and ‘\*’ binary operation on multiplication, determine whether (A, \*) is Semigroup or not?

b) Set of +ve integers excluding zero with binary operation Addition is Semigroup or not? (CO3)

1. a) Explain about the Properties of Algebraic Systems with Example. (CO3)

b) find the product of permutation A.B and B.A



**SHEME OF EVALUATION**

**Part –A**

| **SNO** | **THEORY** | **MARKS** | **TOTAL** |
| --- | --- | --- | --- |
| **1** | Construct the truth table to show that (PVQ)→P is a Tautology. | **2** | **2** |
| **2** | Explain Connectives with suitable Example | **2** | **2** |
| **3** | If A and B are sets then prove that (A ∪ B)’ = A’ ∩ B’ | **2** | **2** |
| **4** | Discuss the Equivalence and  Transitive Relation. | **1**  **1** | **2** |
| **5** | Explain the Closure and  Associative Property in Algebraic System. | **1**  **1** | **2** |

**Part –B**

| **SNO** | **THEORY** | **MARKS** | **TOTAL** |
| --- | --- | --- | --- |
| **6** | 1. Show that R→S can be derived from the premises P→(Q→ S), ¬RV P, Q. | **5** | **5** |
| **7** | Find CNF for the given formula ¬(P⟺Q) with and  without Truth Table | **2**  **3** | **5** |
| **8** | Let X= {2,3,6,12,24,36} and the relation ‘≤’ be such that x≤ y and if x divides y. Draw the Hasse Diagram | **5** | **5** |
| **9** | By using functions solve the following Let the function f: N→N and g: Z→N be defined as follows f(n)=3n+2 and g(n)=n2+1.  Find (i)f ◦ g  (ii)g ◦ f  (iii) f ◦ g (2)  (iv) g ◦ f (3 | **1**  **1**  **1.5**  **1.5** | **5** |
| **10** | a) A= {1,3,5,7,9….} set of odd +ve integers and ‘\*’ binary operation on multiplication, determine whether (A, \*) is Semigroup or not?  b) Set of +ve integers excluding zero with binary operation Addition is Semigroup or not? (CO3) | **2**  **3** | **5** |
| **11** | 1. Explain about the Properties of Algebraic Systems with Example.   b)find the product of permutation A.B and B.A  ) | **3**  **2** | **5** |