

**SPECIAL SUPPLEMENTARY MID SEMESTER EXAMINATION-2019**

**DISCRETE MATHEMATICAL STRUCTURES**

**[MA-2003]**

**Full Marks: 20 Time: 1Hr, 30 Mins**

**(Answer any five questions including question No. 1)**

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| 1. |  | Answers all. | [1x5] |
|  | a. | Find is the contrapositive of the conditional statement “If n is divisible by 30 then n is divisible by 2 and by 3 and by 5.” |  |
|  | b. | What rule of inference is used in the following argument?  If it is rainy, then the pool will be closed. It is rainy. Therefore, the pool is closed. |  |
|  | c. | Let be the statement: “6 is an even integer”, be the statement: “9 is a prime integer”, and be the statement: “the moon is made of green cheese.” Then what are the truth values of and ? |  |
|  | d. | Let and Find and. |  |
|  | e. | Find the adjacency matrix for the relation  . |  |
| 2. |  |  | [2x2.5] |
|  | a. | Constructing the truth table, show that is a tautology. |  |
|  | b. | Translate each of the following statements into predicated logical expressions.  (i) All of your friends are perfect; (ii) Some mushrooms are poisonous. |  |
| 3. |  | Using rules of inference, show that the hypotheses “It is not sunny this afternoon and it is colder than yesterday”, “We will go swimming only if it is sunny,” “ If we do not go swimming , then we will take a canoe trip”, “If we take a canoe trip, then we will be home by sunset” lead to the conclusion “We will be home by sunset.” | [ 5] |
| 4. |  |  | [2x2.5] |
|  | a. | Use mathematical induction to prove that is divisible by 3 whenever *n* is a positive integer. |  |
|  | b. | Find the number of positive integers not exceeding 100 that are divisible by 2 or 5 or 7. |  |
| 5. |  |  | [2x2.5] |
|  | a. | What are the reflexive and symmetric closures of the relation on the set ? |  |
|  | b. | Show that the relation is an equivalence relation on the set of all integers. |  |