

**RE-MID SEMESTER EXAMINATION-2018**

**DISCRETE MATHEMATICAL STRUCTURES**

**Subject Code: MA-2003**

Full Marks: 20 Time: 1.5 Hours

*Answer any five questions including question No. 1 which is compulsory.*

*The figures in the margin indicate full marks.*

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| Q-1 | Answer all the following:- | 1X4=4 |
| (a) | Express the sentence "Everyone in your class has a cellular phone " into logical expression using predicates and quantifier. |  |
| (b) | State the converse, inverse and contrapositive of the following statements:  "I will go to beach whenever it is a sunny summer day." |  |
| (c) | How many reflexive and symmetric relations are there on a set A with n elements? |  |
| (d) | Let be the equivalence relation on a set of positive integers defined by if and only if . Then find the equivalence class . |  |
| Q-2 |  | 2X2=4 |
| (a) | If for all and then prove by mathematical induction for all |  |
| (b) | Using truth table prove that . |  |
| Q-3 |  | 2X2=4 |
| (a) | Show that s is a valid conclusion from the premises and |  |
| (b) | Prove the validity of following argument. "If I get the job and work hard then I will be promoted. If I get promoted then I will be happy. I will not be happy. Therefore, either I will not get the job or I will not work hard". |  |
| Q-4 |  | 2X2=4 |
| (a) | Find the number of positive integers not exceeding 100 that are not divisible by 5 or by 7 ? |  |
| (b) | Prove that the relation “divides” on the set of positive integers is a partial order relation. |  |
| Q-5 |  | 2X2=4 |
| (a) | List the ordered pairs in the equivalence relation *R* produced by the partition  and of . |  |
| (b) | Give an example of relation which is  (i) both symmetric and antisymmetric; (ii) irreflexive, antisymmetric and transitive |  |
| Q-6 |  | 2X2=4 |
| (a) | Find the truth value of is the statement if  (i) the domain consists of all real numbers; (ii) the domain consists of all integers. |  |
| (b) | Show that the relation R = on the set A={1,2,3,4} is transitive. |  |

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