 Semester-3RD

(Regular & Back)(Back)

Sub & Code-DMS(MA-2003)

Branch(s)-CSE & IT

**AUTUMN END SEMESTER EXAMINATION-2015**

**DISCRETE MATHEMATICAL STRUCTURES**

**[MA-2003]**

**Full Marks:60 Time:03 Hours**

Answer any six questions including question No.1 which is compulsory.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and

all parts of a question should be answered at one place only.

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| 1. | Answers all. | (2x10) |
| a. | Translate each of the following statements into predicated logical expressions:  (i) At least one of your friends is perfect .  (ii) Every ships have captains . |  |
| b. | Let be the statement . If the domain consists of all integers, then find the truth values of  (i; and (ii) . |  |
| c. | Find the equivalence relation corresponding to the partition set {a,b}, {c}, {d,e}} of the set |  |
| d. | Find the least upper bound and greatest lower bound of the POSET with divisibility relation? |  |
| e. | Find generating functions corresponding to each of the following numeric functions.  (i) and (ii) |  |
| f. | Find the number of positive integers not exceeding that are either odd or square of an integer. |  |
| g. | Let be the binary operation defined on the set of natural number as, Is it a monoid? If yes, find its identity element. |  |
| h. | Define a Ring. Give an example of a finite field. |  |
| i. | Define Regular graph. If a complete graph has degree for each vertex, then how many edges are there? |  |
| j. | State the necessary and sufficient conditions for a graph to be an Eulerian graph. |  |
| 2. |  | (2x4) |
| a. | Prove is divisible by for by method of induction. |  |
| b. | Construct the truth table for Is it a tautology? |  |
| 3. |  | (2x4) |
| a. | For the relation on the set find its corresponding reflexive, symmetric and transitive closures by matrix operation. |  |
| b. | Does under divisibility relation is a complemented lattice? If yes, Draw its Hasse diagram and find complements of each of its elements; where is the set of all positive divisors of 30. |  |
| 4. |  | (2x4) |
| a. | Solve the following recurrence relation by substitution method.  ; for |  |
| b. | Solve the following recurrence relation using generating function.  . |  |
| 5. |  | (2x4) |
| a. | Show that is a group under the binary operation multiplication. Is it cyclic? If yes, find all of its generators. Here . |  |
| b. | Let be an abelian group. Show that for any and |  |
| 6. |  | (2x4) |
| a. | Write down all the permutations on four symbols and . How many of them are even? Which of these permutations are odd? |  |
| b. | Show that is a field where , and are addition and multiplication modulo operations on integers respectively. |  |
| 7. |  | (2x4) |
| a. | State and prove D' Morgan's rules of Boolean algebra. |  |
| b. | Express the following Boolean function in conjunctive and disjunctive normal form.   |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |
| 8. |  | (2x4) |
| a. | Are these following graphs Isomorphic? Justify your answer. |  |
| b. | Using Dijkstra’s algorithm find the shortest path from vertex S to T from the  following weighted graph. |  |

**Paper Setter:**  Dr. Manoranjan Sahoo

**Moderator:** Dr. P. K. Mohanty.