

*…… Sem (Regular & Back)*

Subject & code

(Branch)

**SPECIAL SUPPLIMENTARY END SEMESTER EXAMINATION-2019**

………… Semester B.Tech & B.Tech Dual Degree

**DISCRETE MATHEMATICAL STRUCTURES**

**MA 2003**

(-……..Admitted Batch & Back)

Time: 3 Hours Full Marks:50/ 60

***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. |  |  | [1 X 10] /[2 X 10| |
|  | (a) | Find the negation of the statement:“If n is divisible by 30 then n is divisible by 2 and by 3 and by 5.” |  |
|  | (b) | Using truth table prove that |  |
|  | (c) | What is the universal quantification of the sentence: is even integer where is an odd integer? Is the universal quantification is a true statement? |  |
|  | (d) | Let denote the set of all positive divisor of 20. Draw the Hasse diagram of the divisibility relation of the POSET |  |
|  | (e) | Find the number of positive integers not exceeding that are either odd or square of an integer. |  |
|  | (f) | Find generating functions corresponding to the numeric function |  |
|  | (g) | Find the values of the Boolean function represented by |  |
|  | (h) | Give example of a zero-divisors in a ring. |  |
|  | (i) | Define the following terms:   1. Spanning tree. (ii) Bipartite graph |  |
|  | (j) | Define Regular graph. If a complete graph has degree for each vertex, then how many edges are there? |  |
| 2. |  |  |  |
|  | (a) | Show that is a tautology |  |
|  | (b) | Show that the argument form with premises and and conclusion is valid. |  |
| 3. |  |  |  |
|  | (a) | Prove for by method of induction. |  |
|  | (b) | If then using strong induction show that . |  |
| 4. |  |  |  |
|  | (a) | Let be a relation on the set Find the transitive closure of R using Warshall’s algorithm. |  |
|  | (b) | Let *R* be a reflexive relation on a set A such that  Show that R is an equivalence relation. |  |
| 5. |  |  |  |
|  | (a) | Find the numeric solution of the recurrence relation with using generating function. |  |
|  | (b) | Solve the following recurrence relation  ; for  with the initial condition by substitution method. |  |
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| 6. |  |  |  |
|  | (a) | Find the sum-of-products expansion for the Boolean function |  |
|  | (b) | For any Boolean algebra , prove that |  |
| 7. |  |  |  |
|  | (a) | Let be a group and Then show that   1. (ii) |  |
|  | (b) | Determine whether the set of positive integers with the binary operation defined by is a semigroup, monoid or nither. If it is monoid specify the identity |  |
| 8. |  |  |  |
|  | (a) | Define degree of a vertex , bipartite graph and adjacency matrix with examples. |  |
|  | (b) | Using Dijkstra’s algorithm find the shortest path from vertex a to z from the following weighted graph. |  |
|  |  | \*\*\*\*\*\* |  |