

*3rd Sem B.Tech & B.Tech Dual Degree*

DMS MA 2013

(CSE, IT, CSSE)

**AUTUMN END SEMESTER EXAMINATION-2019**

**3rd Semester B.Tech & B.Tech Dual Degree**

**DISCRETE MATHEMATICAL STRUCTURES**

**MA 2013**

**(For 2019 (L.E) & 2018 Admitted Batches)**

Time: 3 Hours Full Marks: 50

***Answer any SIX questions.***

***Question paper consists of four sections-A, B, C, D.***

***Section A is compulsory.***

***Attempt minimum one question each from Sections B, C, D.***

*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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| --- | --- | --- | --- |
|  |  | **SECTION-A** |  |
| 1. | (a) | Find the inverse and converse of the following statement:  “Good foods are not cheap” | [110] |
|  | (b) | Let “T” be a tautology and “p” be an arbitrary proposition then find the truth value of |  |
|  | (c) | Determine the truth value of each of the following statements if the domain consists of all integers.  (i) (ii) |  |
|  | (d) | Find the equivalence relation corresponding to the partition set {a,b}, {c}, {d,e}} of the set |  |
|  | (e) | Find the number of positive integers not exceeding that are divisible by either 4 or 9. |  |
|  | (f) | Find generating functions corresponding to the numeric function |  |
|  | (g) | Write all the permutations defined in the set |  |
|  | (h) | Give example of a zero-divisor in a ring. |  |
|  | (i) | Find the inverse of each of the elements of the group . |  |
|  | (j) | Define normal subgroupwith an example. |  |
|  |  |  |  |
|  |  | **SECTION-B** |  |
| 2. | (a) | Show that is a tautology. | [4] |
|  | (b) | Show that the argument with the premises and and conclusion is valid. | [4] |
|  |  |  |  |
| 3. | (a) | Use mathematical induction to prove that is divisible by 3 for all positive integer n. | [4] |
|  | (b) | Let be a relation on the set Find the transitive closure of R using Warshall’s algorithm. | [4] |
|  |  |  |  |
|  |  | **SECTION-C** |  |
| 4. | (a) | Let *R* be a reflexive relation on a set A such that  Show that R is an equivalence relation. | [4] |
|  | (b) | Let . Show that is a complemeted lattice? Draw its Hasse diagram. | [4] |
|  |  |  |  |
| 5. | (a) | Find the numeric solution of the recurrence relation with using generating function. | [4] |
|  | (b) | Find the numeric solution of the recurrence relation ; for with | [4] |
|  |  |  |  |
| 6. | (a) | Prove that the set of positive Integers with divisibility relation is a poset | [4] |
|  | (b) | Show that is a group, where is the set of all permutations on a set containing 3 elements, by constructing the composition table. | [4] |
|  |  |  |  |
|  |  | **SECTION-D** |  |
| 7. | (a) | Let be a group. Then show that   1. and | [4] |
|  | (b) | Let be the set of all nonzero real numbers and  Show that is an abelian group. | [4] |
|  |  |  |  |
| 8. | (a) | State and prove Lagrange’s theorem. | [4] |
|  | (b) | Determine whether the set of positive integers with the binary operation defined by is a semigroup or monoid. If it is monoid, specify the identity. | [4] |
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**MAPPING OF QUESTIONS WITH COURSE OUTCOMES AND LEARNING LEVELS**

The paper setter /Moderator will provide mapping of Question with Course Outcomes and learning levels in the following format:

Course Name:

Course code:

Examination:

|  |  |
| --- | --- |
| CO1 | *Fill in statement* |
| CO2 | *Fill in statement* |
| CO3 | *Fill in statement* |
| CO4 | *Fill in statement* |
| CO5 | *Fill in statement* |
| CO6 | *Fill in statement* |

Rows may be added or deleted as necessary

|  |  |  |
| --- | --- | --- |
| Question number | Course Outcome number | Learning Level (Blooms taxonomy) |
| ***Section A*** | | |
| Q1a |  |  |
| 1b |  |  |
| 1c |  |  |
| 1d |  |  |
| 1e |  |  |
| 1f |  |  |
| 1g |  |  |
| 1h |  |  |
| 1i |  |  |
| 1j |  |  |
| ***Section B*** |  |  |
| Q2a |  |  |
| 2b |  |  |
| Q3a |  |  |
| 3b |  |  |
| ***Section C*** | | |
| Q4a |  |  |
| 4b |  |  |
| Q5a |  |  |
| 5b |  |  |
| Q6a |  |  |
| 6b |  |  |
| ***Section D*** | | |
| Q7a |  |  |
| 7b |  |  |
| Q8a |  |  |
| 8b |  |  |

***Signature of Paper Setter/Moderator***