

Unit -V

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Roll No

5. a) Define posets and lattices.
 b) Define Eulerian and Hamiltonian paths.
 c) How many variable names of 8 letters can be formed from the letters a, b, c, d, e, f, g, i and h if no letter is repeated.
 d) Solve the difference equation:

$$a_r + 5a_{r-1} + 6a_{r-2} = 3r^2.$$

Or

Explain binomial theorem in detail.

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CS/IT - 302**B.E. III Semester**

Examination, June 2015

Discrete Structure*Time : Three Hours**Maximum Marks : 70*

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
 ii) All parts of each question are to be attempted at one place.
 iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
 iv) Except numericals, Derivation, Design and Drawing etc.

Unit -I

1. a) Explain Countable and Uncountable sets with example.
 b) Let A and B any two subsets of universal set U, then $(A \cup B)' = A' \cap B'$.
 c) If R is a relation on the set of integers such that $(a,b) \in R$ if and only if ' $3a + 4b = 7n$ ' or some integer n. Prove that R is an equivalence relation.
 d) By principle of mathematical induction prove that $7^{2n} + 2^{3n-3}3^{n-1}$ is divisible by 25.

Or

Let function f and g defined by $f(x) = 2x+1$, and $g(x) = x^2 - 2$ respectively.

Find:

- i) $(g \circ f)(4)$
 ii) $(f \circ g)(4)$

- iii) $(gof)(a+2)$
- iv) $(fog)(a+2)$
- v) fof (some, times denoted by t^2)
- vi) (gog)

Unit -II

2. a) Define Ring.
- b) Explain Abelian group.
- c) Show that a semigroup with more than one idempotent element cannot be a group.
- d) If R is the additive group of real numbers and R_+ the multiplicative group of positive real numbers, prove that the mapping $f: R \rightarrow R_+$ defined by $f(x) = e^x$ for all $x \in R$ is an isomorphism of R onto R_+ .

Or

Is the set of integers, $I = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$ a group for the binary operation defined as $a * b = a - b$ for all $a, b \in I$?

Unit -III

3. a) "If $4x-2=10$ then $x = 3$ ". Find converse, inverse and contrapositive.
- b) Explain one - place and n - place predicate with example.
- c) Prove that: $(P \vee Q) \cap \neg Q \rightarrow P$ is a logical implication.
- d) Explain the following terms and also give examples to explain them:
 - i) Quantifier
 - ii) Universal quantifier
 - iii) Existential quantifier
 - iv) Negation of a quantifier
 - v) Normal form
 - vi) Tautology.

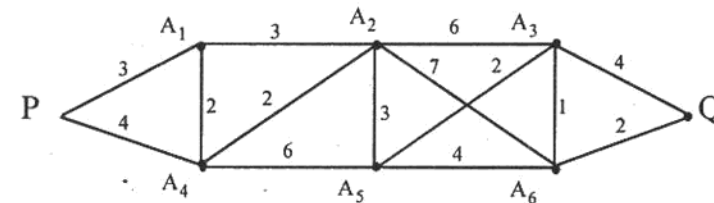
Or

Minimize the following automata machine given below. With initial state S_0 and final state S_3 .

State	Input	
	0	1
S_0	S_1	S_0
S_1	S_0	S_2
S_2	S_3	S_1
S_3	S_3	S_0
S_4	S_2	S_5
S_5	S_6	S_4
S_6	S_5	S_6
S_7	S_6	S_3

Unit -IV

4. a) Define Isomorphic graph.
- b) Explain Eulerian paths and circuits.
- c) Explain adjacency and incidence matrix to represent graph.
- d) Apply Dijkstra algorithm to find the shortest path from vertex P to Q in graph shown in fig.



Or

Explain minimum spanning tree with their applications. Also give algorithm to find minimum spanning tree of a weighted graph.