23528

Name: ....

Reg. No. ....

THIRD SEMESTER B.TECH. DEGREE EXAMINATION, DECEMBER, 2011

CS/IT.04.303 – Discrete Computational Structures

Time: Three hours **Maximum : 100 marks**

(Answer all questions)

PART – A

I.
1. Give an indirect proof of theorem 'If 3n+2 is odd, then n is odd'.
2. Obtain the disjunctive normal form of PA (P--1 > Q).
3. Show that the set of odd positive integers is a countable set.
4. Show that the 'divides' relation on the set of positive integer is not an equivalence relation.
5. Define and explain about cyclic group and subgroups.
6. Prove that the intersection of two subgroups of a group is subgroup.
7. Define and explain about field and integral domain.
8. Give an example of a ring without zero divisors.

(8x5=40 marks)

PART – B

II. a. i). Verify the validity of the following argument
"All men are mortal
Socrates is a man
Therefore Socrates is a mortal". **(7 marks)**

ii). Prove the $P \rightarrow S$ can derived from the premises $\neg P \vee Q \neg Q \vee R, R \rightarrow S$. **(8 marks)**

OR

b. i). Show that $V\, x(P(x) \vee Q(x)) \Rightarrow (V\, x\, P(x)) \vee (\exists\, x\, Q(x)$ by indirect method of proof.

ii). Show that the statement "Every positive integer is the sum of the squares of three integers" is false. **(7 marks)**

III. a. i). Solve the recurrence relation $a_{n+1} - a_n = 3n^2 - n$, $n \geq o$, $a_o = 3$. **(8 marks)**

ii). Draw the Hasse diagram for the power set of the set X=1, 2, 3 with the set inclusion relation. **(7 marks)**

OR

b. a). i). If f: ZxZ—1>Z, where Z is the set of integers and f(x, .1) = x *Y=X+.1 –xy, show that the binary operation * is commutative and associative. **(7 marks)**

ii). If R is the relation on the set of integers such that (a,b) E R if f 3a+4b = 7n for some integer, prove that R is an equivalence relation. **(8 marks)**

Turnover

IV. a. i). State and prove Lagrange's Theorem. **(7 marks)**

ii). Prove that the set of all n nth roots of unity forms a finite abelian group of order n with respect to multiplication. **(8 marks)**

OR

b. i). State and prove the fundamental on homomorphism. **(7 marks)**

ii). Prove that every group of order is n is isomorphic to a permutation group of degree "n". **(8 marks)**

V. a. i). Show that every field is an integral domain. **(7 marks)**

ii). Show that the set of all 2 x 2 non-singular matrices over rationals is not a ring under matrix addition and multiplication. **(8 marks)**

OR

b. i). Prove that every Euelidean domain is a principal ideal domain. **(8 marks)**

ii). Prove that x^3-9 is irreducible over the filed of integer module 11. **(7 marks)**

(4x15=60 marks)

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