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Name ....

Reg. No..................

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, FEBRUARY 2013

(CUCSS)

Computer Science

CSC 1C 01—DISCRETE MATHEMATICS

(2010 Admissions)

Time : Three Hours

Maximum : 36 Weightage

I. Answer *all* questions.

1 $(A \cup \overline{B}) =$

2 State Pigeon-hole principle.

3 Let $U = \{a, b, c, e, f, g\}$, $A = \{c, e\}$ $B = \{a, f\ g\}$. Find the bit string corresponding to $A \cup B$.

4 Give examples of symmetric and asymmetric relation.

5 Find the inverse of $f : \mathbb{R}$ R 3 $f(x) = 2x^3 — 1$.

6 What is (i) linear homogenous relation, (ii) Characteristic equation ?

7 Define semigroup and give an example.

8 $*$ is an operation on a two element set given by :

	x	y
x	y	x
y	x	y

Show that $*$ is associative. What is identity element ?

9 Let A :{2, 4, 8,16, 32} R : {(a, b)/ a b}. Draw the Hasse diagram.

10 Define Modus ponens and Modus Tollens.

1 Let S $\{a, b, c\}$ and A be the power set of S. Draw Hasse diagram of A with partial order $\subset$.

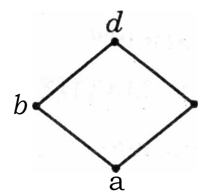
a Describe the set of strings denoted by the regular expression $(0V1)^*01$.

(12 x 1 = 12 weightage)

Turn over

II. Answer any *six* questions.

13 Prove that (X –   – Z = (X – Z) – Y.

14 Determine whether the poset 

is Boolean algebra.

15 Find the explicit form of the recurrence relation $g_n = 4g_{n-1} - 2g_{n-2}$ given g1 = 2, $g_2 = 5$.

16 Classify types of recurrence relations with examples.

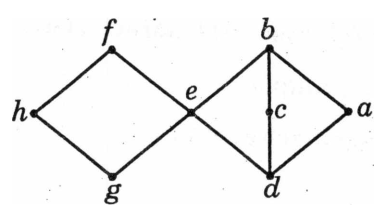
17 Prove that $x * y = e^{x+Y}$ is not a semi group.

18 State the theorem on number of errors detected by an encoding fraction. Define $e : B^3 \quad B^{\prime}$.

Verify if it is a group code.

19 Define Lattice. Give examples of Hasse diagrams that is (a) lattice (b) not a lattice.

20 Is the Hasse diagram given, a Boolean algebra ? Why ?



21 Consider the Boolean polynomial P (x1, x2, x3) = (x1 A x2) v (x, v x2 A x3)). Find the truth table.

(6 x 2 = 12 weightage)

III. Answer any *three* questions.

22 State extended Pigeon-hole principle. Hence prove the following :

(a) At least 8 bicycles will be of same colour if 7 colours used to paint 50 bicycles.

(b) At least 90 ways to choose six numbers from 1 to 15 so that all choices have same sum.

23 (a) Prove by induction 2 + 4 + 6 +   + 2n = n (n + 1).

(b) Find the explicit formula for the sequence 0, 3, 8, 15, 24, 35, ... Identify the type of recurrence.

24 Let S= $\{x / x$ is an integer). Define relation $*$ 3 $a * b$ if a/b. Derive all properties of $*$.

25 (a) $S = \{1, 2, 3, 6, 9, 18\}$. Defne $*$ so that $a * b = \text{LCM}(a, b)$. Characterize the set S as semigroup or monoid or group.

(b) Consider the finite state machine with transition table given below :

	0	1
S_o	S_o	S_1
S_i	S_i	S_2
S_2	S_2	S_3
S_3	S_3	S_o.

S_o be the start state. Find the state with the string 00101.

26 Let d be (6, 2) decoding function. Determine $d(y)$ for the following y : (a) y = 111011 ; (b) y = 010100.

27 Discuss using examples the following :—

Distributive, complemented, dual lattices.

(3 x 4 = 12 weightage)