Code No. BTS 003(A)

B.Tech. Degree III Semester Examination in Information Technology/ Computer Science and Engineering, January 2001

IT/CS 303 DISCRETE MATHEMATICAL STRUCTURES

Time: 3 Hours *Max. Marks: 100*

(All questions carry equal marks)

I a) If A = {a, b, c, d} and B = {a, c, e, f, g}, what is their symmetric difference ? Represent the symmetric difference of A and B by Venn diagram.

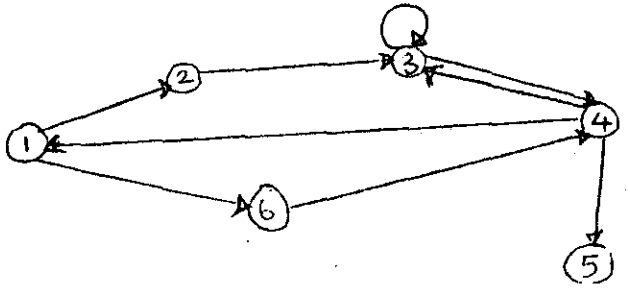
b) Prove that $\sim(p \leftrightarrow q) \equiv \left(\left(p \wedge \sim q\right) \vee \left(q \wedge \sim p\right)\right)$

OR

II a) Give the negation of the following statements.
(1) p: 2 + 3 > 1 (2) q: it is cold.
Also make a truth table of $p \wedge q$

b) Let n be an integer. Prove that if n^2 is odd, then n is odd.

III a) Let R be the relation whose digraph is given below. Find a cycle starting at vertex 2. Draw the digraph of R^2. Compute M_R^2.



OR

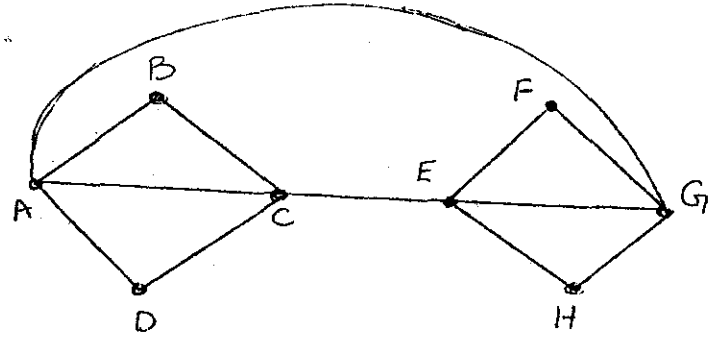
IV a) Let A = {a, b, c, d, e} and R be the symmetric relation given by R = {(a, b), (b, a), (a, c), (c, a), (b, c), (c, b), (b, e), (e, b), (e, d), (d, e), (c, d), (d, c)}.
Draw the digraph of R.

b) Let A = Z and

$$R=\left\{(a,b)\in A\times A \middle| a\equiv r(\mathrm{mod}_2)\ \textit{and}\ b\equiv r(\mathrm{mod}_2)\right\}$$

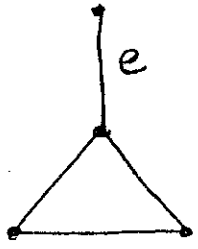
show that congruence mod 2 is an equivalence relation.

V Use Fleury's algorithm to construct an Euler circuit for the following graph.



OR

VI For the graph G shown below, compute $P_G(x)$ and hence find X(g).



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VII Let A = {a,. b}. Which of the following tables define a semi group on A? Which define a monoid on A ?

(i)

*	a	b
a	a	b
b	a	a

(ii)

*	a	b
a	a	b
b	b	b

(iii)

*	a	b
a	b	a
b	a	b

(iv)

*	a	b
a	a	a
b	b	b

OR

VIII a) Define Abelian group; given an example to it.

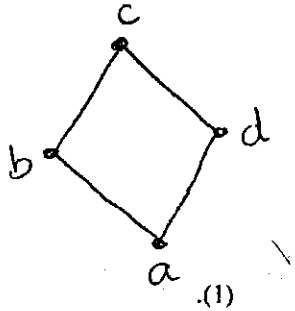
b) Let G be a group and a and b be elements of G. Then show that the equation ax = b has a unique solution in G.

IX Let S = {a, b, c} and A = P(S). Draw the Hasse diagram of the poset A with partial order $\subseteq$ (set inclusion).

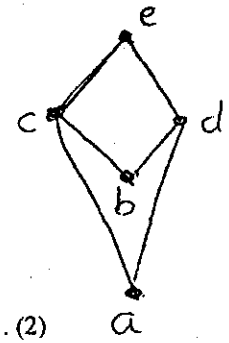
OR

X a) Define a lattice.

b) Determine whether the following diagrams (1 & 2) represent a lattice; justify your answer.



.(1)



. (2)

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