* J B - 3 1 9 7 *

JB-3197

Second Year B. Sc. (For C.S.) Examination

April/May – 2013

CCM-402 Descrete Mathematics - II

Time : Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **S. Y. B. Sc. (For C.S.)**

Name of the Subject :

☛ **CCM-402 Descrete Mathematics - 2**

☛Subject Code No. : **3 1 9 7** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All the questions are compulsory.

(3) Digits to the right indicate marks of the questions.

1 Attempt any **five** out of eight : **10**

(1) Define reflexive relation with diagraph.

(2) Define symmetric relation with diagraph.

(3) Define Equivalence class with example.

(4) Define Bounded lattice with example.

(5) Define Boblean homorphism.

(6) Define Boblean isomorphism.

(7) Show that 1 is only complement of 0 and 0 is the only complement of 1.

(8) Define : Boolean Algebra.

2 (a) Let $S=\{2,3,4,6,8,9,12\}$ and let R be the relation on S defined by xRy. If x divides y then draw the diagraph of R. **5**

OR

(a) Let M be the relation matrix $\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$ then draw the diagraph of R. **5**

(b) Solve any **two** of the following four : **10**

(1) Let $S=\{1,2,3,4,5\}$ and let

$R=\{(1,1)(1,2),(2,3)(1,3)(1,4)(4,5)(5,1)(1,5)(4,1)\}$

then draw the diagraph and make a relation matrix.

(2) Define composition realation and let $A=\{a,b,c,d,e\}$ and let $R=\{(a,b)(a,a)(a,c)(c,c)(b,d)(b,b)(d,d)\}$. Draw a diagraph for R. Find the ordered pairs in RoR and draw a diagraph for RoR.

(3) Solve $2x\equiv 4(\text{mod}\, s)$.

(4) We define R_5 on the integer z as follows mR_5n if and only if m-n is divisible by s if and only if we can find an integer q such that m-n=59 then show that R_5 is an equivalence relation.

3 (a) Define poset and let $S=\{a,b,c\}$ then $p(s)$ is a poset under the relation inclusion then draw the Hasse diagram of $p(s)$. **5**

OR

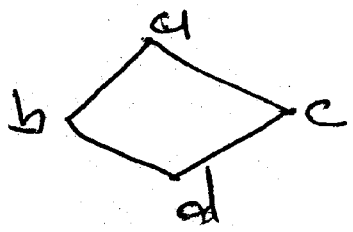
(a) Define : **5**

(1) Least element.
(2) Gretest element.
(3) Well ordered set.
(4) Upper bound.
(5) Lower bound.

(b) Attempt any **two** out of four. **10**

(1) Consider the poset defined by a Hasse diagram shown in figure.

Find lub {d,b}
glb {d,b}
lub {d,c}
glb {d,c}
lub {d,a}
glb {d,a}.



(2) Show that $\langle p(x),c\rangle$ is not a chain for any non-empty set x with at least two elements.

(3) Draw the Hasse diagram of $\langle S_{30},D\rangle$.

(4) If x is a non-empty set and then show that $\langle p(x),\underline{c}\rangle$ is a lattice under intersection and union.

4 (a) State prove De-Morgan's law. **5**

OR

(a) Define : **5**

(1) Lattice homomorphism.

(2) Lattice isomorphism.

(b) Solve any **two** of the following four : **10**

(1) Define equivalence class. Let R be the relation defination on the set $R=\{a,b,c,d,e,f\}$ the equivalence class are $E(a)=\{a,b,c\}$, $E(d)=\{d,e\}$, $E(f)=\{f\}$ then draw the diagraph of R.

(2) Define : Dual lattice. Write down the dual expression for following inequality

$s_1\ a\oplus(b*c)\leq(a\oplus b)*(a\oplus c)$

s_2

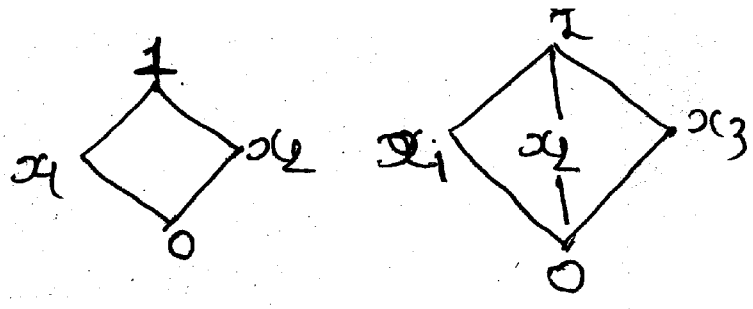
(3) Show that in a lattice $a\leq b\leq c$ then show that

(1) $a\oplus b=b*c$

(2) $(a*b)\oplus(b*c)=b=(a\oplus b)*(a\oplus c)$.

(4) Define : Sublattice. Let $\langle L,*,\oplus\rangle$ be a lattice for any two elements $a,b\in L$ such that $a<b$. The set $[a,b]=\{x\in L/a\leq x\leq b\}$ is a sublattice of L.

5 (a) Define complement of the bounded lattice $\langle L,*,\oplus,0,1\rangle$ and obtain complement of the each element of the following figure : **5**



OR

(a) Define : **5**

(1) Join irreducible element.

(2) Equivalent Boolean expression.

(b) Attempt any **two** out of four : **10**

(1) Find sum of product of $x_1 \oplus \left(x_2 * x_3^1\right)$.

(2) Find the product of sum $x_1 * x_2$.

(3) Find the minimum Boolean function by Karnaugh map.

$f(a,b,c) = \sum(0,1,4,6)$.

(4) Show that $\alpha(x_1, x_2, x_3) = x_1 * (x_2 * x_3)'$ and $\beta(x_1, x_2, x_3) = (x_1 * x_2) \oplus \left(x_1 * x_3'\right)$ are equivalent.