quescol.com

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 997302

Roll No.

B. Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

DISCRETE STRUCTURES

Time : 3 Hours] [Total Marks : 100

Note : Attempt all the questions. Each question carry equal marks.

1 Attempt any **FOUR** questions : **5×4=20**

(a) Out of 450 students in a school, 193 students read Science and 200 students read Commerce, 80 Students read neither. Find out how many read both?

(b) Define distributive lattice and complimented lattice. Show that the lattice $(L^3, \leq)$ of 3 tuples of 0 and 1 is complemented.

(c) Let R be relation given by on set A= {1, 2, 3, 4, 5}. R={(1,1),(1,4),(1,5),(2,3),(2,5),(3,1),(3,2),(3,3),(4, 2),(4,3),(5,3)}. Find the reflexive, Symmetric and transitive closure of R.

https://quescol.com | Free PYQs, Solutions, Syllabus, Notes etc

(d) Let f , g and $h: R \to R$ be defined by f(x)=x+2, $g(x)=1/(x^2+1)$, h(x)=3
Compute (i) $f^{-1}(g(x))$ (ii) hf $(gf^{-1}).h(f(x))$.

(e) Prove by the principle of mathematical induction

$$P(n): P(n) = 1+4+7+.....+(3n-2) = \frac{n(3n-1)}{2}.$$

2 Attempt any **TWO** questions : **10×2=20**

(a) Let (G,*) be a group, where * is usual multiplication operation on G. Then show that for any x,y ∈ G, following equation holds
(i) $(x^{-1})^{-1} = x$
(ii) $(xy)^{-1} = y^{-1}x^{-1}$.

(b) (i) Prove that the set S= {0, 1, 2, 3} forms a ring under addition and multiplication modulo 4 but not a field.
(ii) Define the following with suitable example: Cyclic group, Zero divisor of ring.

(c) Let G= {1,-1, i, -i} with the binary operation multiplication be an algebraic structure, where $i^2 = -1$,
(i) Determine whether G is an abelian.
(ii) If G is cyclic group, then determine the generator of G.

3 Attempt any **TWO** questions : **10×2=20**

(a) Define a Boolean function of degree n. Simplify the following Boolean expression using K- maps
xyz + x~yz + ~x~yz + ~xyz + ~x~y~z.

(b) Draw hasse diagram for divisibility relation on following set A = {3, 4, 12, 24, 48, 72}.

(c) How are sequential circuits different from combinational circuits? Draw the logic circuit corresponding to Boolean expression Y = A + BC +B.

4 Attempt any **TWO** questions : **10×2=20**

(a) (i) Differentiate between tautology and contradiction with suitable examples.
(ii) Show that the statements :
$P \to Q$ and $\neg Q \to \neg P$ are logically equivalence.

(b) Prove the validity of the following argument :
If I get the job and work hard then I will get promoted. if I will get promoted , then I will be happy. I will not be happy therefore either I will not get the job or I will not work hard.

(c) The contrapositive of a statement S is given as "If x<2 then x+4 < 6" Write the statement S and its converse.

5 Attempt any **FOUR** questions : **5×4=20**

(a) Solve the recurrence relation.
f(k)=f(k-2)+f(k-1) f(0) = 0 f(1)=1

(b) What is recursion and recurrence relation? Solve the following recurrence relation
$a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$,
with the conditions a0 = 2, a1 = 5, a2 = 15

(c) Determine the G.F of a numeric function a_r where

$$a_r = \begin{cases} 2^r \text{ if } r \text{ is even} \\ -2^r \text{ if } r \text{ is odd} \end{cases}$$

(d) Find the number of integer solutions of the equation
X1 + X2 + X3 + X4 + X5 = 30
Where X1>=2, X2>= 3, X3>= 4, X4>= 2, X5>= 0

(e) What is a binary search tree? Form a binary search tree for the words vireo, warbler, egret, grosbeak, nuthatch, and kingfisher.

https://quescol.com | Free PYQs, Solutions, Syllabus, Notes etc