TCS-301(DS) 339 Printed Pages : 4

Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | |

Odd Semester Examination-2016

B.Tech (Semester-III)

DISCRETE STRUCTURES

[Time : 3 Hours] **[Maximum Marks : 100]**

Note : All questions are compulsory.

1. Attempt **any four** questions : [5×4=20]

(a) For any Set A & B, prove that

$$P(A \cap B) = P(A) \cap P(B)$$

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(b) In a group of 52 persons, 16 drink tea but not coffee and 33 drink tea.

(i) How many drink tea and coffee both?

(ii) How many drink coffee but not tea?

(c) Consider a function f:A $\rightarrow$ B and g:B $\rightarrow$ C prove that if f, g, and gof are one to one and onto then $(gof)^{-1}=f^{1}\,og^{-1}$.

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(d) Prove that $A-(BUC)=(A-B)\cap(A-C)$.

(e) Prove that intersection of two equivalence relations is also an equivalence relation.

2. Attempt **any four** questions : [5×4=20]

(a) Show that the set of cube root of unity is an abelian group with respect to multiplication.

(b) Show that the set of N natural numbers is a semi group under the operation $x*y = \max(x, y)$.

(c) Prove that the set $G = \{0, 1, 2, 3, 4, 5\}$ is a finite abelian group of order 6 with respect to addition modulo 6 as the composition in G?

(d) Prove that the order of each subgroup of finite group G is a divisor of the group G.

(e) If (G,*) is a group then prove that $(a * b)^{-1} = a^{-1} * b^{-1}$ where $a, b \in G$.

3. Attempt **any two** questions : [10×2=20]

(a) What is meant by Hasse Diagram? Draw the Hasse diagram of relation R on A where A = {1,2,3,4} and

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

(b) What is complemented lattice and bounded lattice? Explain by taking a suitable example.

(c) Prove that the Dual of Lattice is also lattice?

Attempt **any two** questions : [10×2=20]

(a) Give the symbolic form of the following statements :

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(i) Some men are genius.

(ii) For every x, there is a greater positive integer.

(iii) Given any positive integer, there is a greater positive integer.

(iv) Everyone who likes fun will enjoy each of these plays.

(v) All healthy people eat an apple a day.

(b) Differentiate between tautology and contradiction.

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(c) Given that the value of $p \rightarrow q$ is false, determine the value of $(\sim p \vee \sim q) \rightarrow q$?

5. Attempt **any two** questions : [10×2=20]

(a) Solve the recurrence relation $y_{n+2}-2y_{n+1}+y_n=0$ by using generating function with the boundary condition y0=2, y1=4.

(b) Show that Maximum number of edges in a simple graph with n vertices is n(n-1) /2 ?

(c) Prove that by mathematical induction that $6^{n+2}+7^{2n+1}$ is divisible by 43 for each positive integer.

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