

D 20626-A

(Pages : 2)

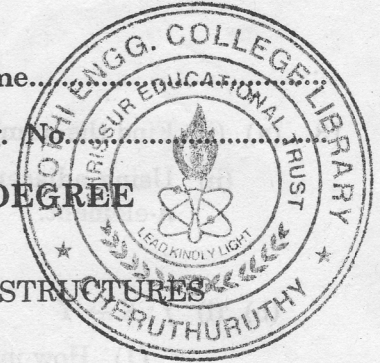
Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, OCTOBER 2011**

CS/IT 09 304/PTCS 09 303—DISCRETE COMPUTATIONAL STRUCTURES

(2009 admissions)



Time : Three Hours

Maximum : 70 Marks

Part A

Answer all questions.

1. Explain contrapositive.
2. Explain equivalence relation.
3. Explain inverse functions.
4. Define Hamming code.
5. Solve following recurrence relations. Assume n is even :

$$T(n) = T(n-2) + 1, T(0) = 1.$$

(5 × 2 = 10 marks)

Part B

Answer any four questions.

6. Prove that $-(p \wedge q) \Leftrightarrow -p \vee -q$.
7. Find the number of functions from m -element set to an n -element set.
8. Draw the Hasse diagram for the poset $(A, (\text{subset}))$, where A denotes the power set of set (a, b, c) .
9. Prove that G is a abelian group if and only if $(a \cdot b)^2 = a^2 \cdot b^2$ for all $a, b \in G$.
10. Show that $Z_7 = \{(1, 2, 3, 4, 5, 6), * \text{ mod } 7\}$ is cyclic group.
11. Solve $f(n) = f(n-1); f(0) = 1$.

(4 × 5 = 20 marks)

Part C

Answer section (a) or section (b).

12. (a) Show that any proposition can be transformed into CNF.

Or

- (b) Find disjunctive normal form of the following formula :

$$(P \wedge Q) \vee (7P \wedge Q) \vee (Q \wedge R).$$

Turn over

13. (a) (i) Find the number of symmetric relations that can be defined on a set with n elements.
 (ii) Using adjacency matrix, find the number of different reflexive relation on set A with n -element.

Or

(b) (i) $f: X \rightarrow Y$

(1) How many different functions are possible ?

(2) How many different one to one functions are possible ?

(ii) Define equivalence class. Find all equivalence classes of the congruence relation mod 5 on the sets of integer.

14. (a) Let S be the set of real numbers except -1 . Define $*$ on S by $a * b = a + b + ab$. Shw that $(S, *)$ is abelian group.

Or

(b) Let G be the set of all $2 * 2$ matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$, where a, b, c, d are real numbers, such that $(ad - bc) \neq 0$. Show that set G with matrix multiplication binary operation forms the group.

Let $H = \begin{pmatrix} a & b \\ 0 & d \end{pmatrix}$ be the set of $2 * 2$ matrix where a, b, d are real numbers, such that $ad \neq 0$.

Prove that H is a subgroup of G .

15. (a) Using generating function, solve $f(n) = f(n-1) + f(n-2)$; $f(0) = 1, f(1) = 1$.

Or

(b) Solve $f(n) - 5f(n-1) - 6f(n-2) = 2^n + n$.

(4 × 10 = 40 marks)