

11. (a) If  $L$  is accepted by a DFA, then  $L$  is denoted by a regular expression.

Or

- (b) Let  $G = \{V, T, P, S\}$  be a context-free grammar. Then  $S^* \Rightarrow \alpha$  iff there is a derivation tree in grammar  $G$  with yield  $\alpha$ .

**4666/R10**

**MAY 2010**

**MATHEMATICAL FOUNDATIONS OF COMPUTER  
SCIENCES**

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(For those who joined in July 2006 and after)

Time : Three hours

Maximum : 75 marks

**PART A — (7 × 5 = 35 marks)**

Answer ALL questions.

1. (a) Construct the truth table of the following formula

$$\neg(P \vee Q) \Leftrightarrow (\neg P \wedge \neg Q).$$

Or

- (b) Write short notes on Well-Formed Formula and give an example.

2. (a) Test the validity of the argument  $(P \rightarrow Q) \rightarrow R, P \wedge S, Q \wedge \pi, R$ .

Or

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

3. (a) Define Equivalence relation and give an example.

Or

- (b) Prove that the Ker  $(g)$ , where  $g$  is a homomorphism from a group  $\langle G, * \rangle$  to  $\langle H, \Delta \rangle$  is a subgroup of  $\langle G, * \rangle$ .

4. (a) Draw the Hasse diagram of the poset  $\langle X, \leq \rangle$ , where  $X = \{2, 3, 6, 12, 24, 36\}$ .

Or

- (b) Define Lattice and give an example.

5. (a) Prove that the direct product of any two distributive lattices is a distributive lattice.

Or

- (b) Draw the transition diagram of Finite Automata.

6. (a) Let  $r$  be a regular expression. Then there exists an N DFA with  $\epsilon$  moves that accepts  $L(r)$ .

Or

- (b) Consider the grammar  $G = \{V, T, P, S\}$  where  $V = \{S\}$ ,  $T = \{a, b\}$  and  $P = \{S \rightarrow ass, S \rightarrow ab\}$  find the language  $L(G)$ .

7. (a) Prove that the regular sets are closed under intersection.

Or

- (b) Show that  $L$  is recursive iff  $L$  is generated in canonical order.

PART B — (4 × 10 = 40 marks)

Answer ALL questions.

8. (a) Obtain the PCNF of  $(P \wedge Q) \vee (\neg P \wedge R)$ .

Or

- (b) Show that  $\neg P$  follows from  $\neg Q \wedge (P \rightarrow Q)$ .

9. (a) A subset  $T \neq \emptyset$  of  $G$  is a subgroup of  $\langle G, * \rangle$  iff  $\forall a, b \in T, a * b^{-1} \in T$ .

Or

- (b) Prove that every chain is a distributive lattice.

10. (a) Let  $\langle L, \leq \rangle$  be a lattice. For any  $a, b, c \in L$ ,

$$\text{we have } b \leq c \Rightarrow \begin{cases} a * b \leq a * c \\ a \oplus b \leq a \oplus c \end{cases}$$

Or

- (b) If the language  $L$  is accepted by N DFA with  $\epsilon$ -transitions, then  $L$  is accepted by an N DFA without  $\epsilon$ -transitions.

**ACCOUNTING AND FINANCIAL MANAGEMENT**

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(For those who joined in July 2006 and after)

Time : Three hours

Maximum : 75 marks

**PART A — (7 × 5 = 35 marks)**

Answer ALL questions.

1. (a) What are the different kinds of Accounts?

Or

- (b) Explain the important principles of Cost Accounting.

2. (a) State the uses of Funds Flow Statement.

Or

- (b) What are the factors determine the profit?

3. (a) Explain the system of Standard Costing.

Or

- (b) State the limitations of Ratio Analysis.

