

10. (a) If L is accepted by an NFA with ϵ -transitions prove that L is accepted by an NFA without ϵ -transitions.

Or

(b) Show that the Boolean expressions are equivalent to one another. Obtain their sum-of-products of canonical form :

(i) $(x \oplus y) * (x' \oplus z) * (y \oplus z)$

(ii) $(x * z) \oplus (x' * y).$

11. (a) Prove that CFL $L = \{a^n b^n c^m d^m / n_1 m \geq 1\}u$ $\{a^n b^m c^m d^n / n_1 m \geq 1\}$ is inherently ambiguous.

Or

(b) Prove that if L is a language for some PDA M then L is a context - free language.

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCES

(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) Show that

$$\neg(P \vee (Q \wedge R)) \iff ((P \vee Q) \wedge (P \vee R))$$

Or

(b) Obtain the principal disjunctive normal forms of $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R).$

2. (a) Show that

$$((P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)))$$

Or

(b) Show that $\sum (\neg Q \wedge (P \rightarrow Q)) \rightarrow \neg P$

3. (a) For any commutative monoid $\langle M, * \rangle$ prove that the set of idempotent element of M forms a submonoid.

Or

(b) Define Homomorphism with an example.

4. (a) Prove that every row or column in the composition table of a group $\langle G, * \rangle$ is a permutation of the element of G .

Or

(b) Let $S = \{a, b, c\}$. Draw a Hanediagram with $\langle P(S), \subseteq \rangle$.

5. (a) In a Boolean algebra, prove that

$$(a + b)(a' + c) = ac + a'b = ac + a'b + bc.$$

Or

(b) In a lattice, prove that

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

6. (a) Let $M = (\{q_0, q_1\}, \{0, 1\}, \delta, q_0, \{q_1\})$ be an NFA where $\delta(q_0, 0) = \{q_0, q_1\}$, $\delta(q_0, 1) = \{q_1\}$, $\delta(q_1, 0) = \emptyset$, $\delta(q_1, 1) = \{q_0, q_1\}$. Find DFN.

Or

(b) Construct finite state automata equivalent to the regular expression $01[(10)^* + 111]^* + 0]1$.

7. (a) Prove that the class of regular sets is closed under quotient with arbitrary sets.

Or

(b) Consider the grammar $G = (V_1, T_1, p, s)$ where $V = \{s\}$, $T = \{a, b\}$ and $p = \{S \rightarrow asb, s \rightarrow ab\}$ Find the language $L(G)$.

PART B — (4 × 10 = 40 marks)

Answer ALL questions.

8. (a) Show that

$$\begin{aligned} & ((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))) \vee \\ & (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R) \end{aligned}$$

is a tautology.

Or

(b) Show that

$$(x)(P(x) \vee Q(x)) \Rightarrow (x) P(x) \vee (\exists x)Q(x).$$

9. (a) If $f : G \rightarrow G'$ is a homomorphism, prove that the Kernel of f is a normal subgroup of G .

Or

(b) Let H be a subgroup of a group G . Define Left and right cosets of H and prove that any two left cosets of H are either identical or disjoint.

ACCOUNTING AND FINANCIAL MANAGEMENT

(For those who joined in July w.e.f 2006 and after)

Time : Three hours

Maximum : 75 marks

SECTION A — (7 × 5 = 35 marks)

Answer ALL questions.

1. (a) “Every debit has got a credit and vice-versa” explain the significance of this statement and give suitable examples.

Or

- (b) Differentiate Journal from Ledger.

2. (a) What are closing entries?

Or

- (b) Explain the various types of ratios.

3. (a) Differentiate between “Financial accounting and cost accounting”.

Or

(b) Explain the elements of costing in a brief manner.

4. (a) Journalise the following:

(i) Arul commenced business with Rs. 21,000

(ii) Bought goods for cash Rs. 9,200

(iii) Sold goods to Kannan on credit Rs. 5,600

(iv) Purchased goods from Mani Rs. 3,300

(v) Received cash from kannan Rs. 3,600

Or

(b) From the following particulars, prepare a bank reconciliation statement as on 31st December, 2000.

(i) Bank balance as per cash book as on 31.12.2000 Rs. 5,400.

