

ACADEMIA INTERNATIONAL COLLEGE

(Affiliated to Tribhuvan University)

E N D T E R M E X A M I N A T I O N - 2 0 7 0

CLASS: B.Sc. CSIT FOURTH SEMESTER
SUBJECT: THEORY OF COMPUTATION/ CSC-251
TIME: 3 HOURS

FULL MARKS: 80**PASS MARKS: 32**

All questions are compulsory. Use your own words as far as practicable.

SET B**Group A****[8 X4 = 32]**

1. What is regular expression? Explain. Write the applications of regular expression.
2. Construct a DFA that accepts all the strings over $\Sigma = \{a, b\}$ that do not end with ba.
3. Give the regular expression for the following sets of binary strings.
 - a. odd length.
 - b. starts with 0 and has odd length, or starts with 1 and has even length.
4. Convert following grammar into a equivalent PDA
 $S \rightarrow aAA$
 $A \rightarrow aS | bS | a$
5. Design the turing machine for language $L = \{a^n b^n c^n | n > 0\}$.
6. Prove that $\{0^n 1^n | n \geq 1\}$ is not regular language using pumping lemma.
7. Give the formal definition of Turning Machine. How does it differ from PDA?
8. What is an algorithm? Explain on the basis of Church Hypothesis.

Group B**[6 X8 = 48]**

1. How a ϵ - NFA can be converted into DFA? Explain with a suitable example.
2. What is regular expression? Explain. Prove that every language defined by a regular expression is also defined by finite automata?
3. Find the minimum state DFA equivalent to the following DFA.

State	a	b
$\rightarrow q_1$	q_2	q_3
q_2	q_3	q_5
$*q_3$	q_4	q_3
q_4	q_3	q_5
$*q_5$	q_2	q_3

4. Define deterministic PDA. Design a PDA that accept a language $L = \{wcw^R | w \in (0+1)^*\}$.
5. Explain about multi tape TM. Show that every language accepted by a multi-tape Turning Machine is also accepted by one tape Turning Machine.
6. Write short notes on:
 - a. Decidable Vs Un-decidable problems.
 - b. Unrestricted Grammar.
 - c. NP-completeness.
 - d. Big O notation.