Tribhuvan University
Institute of Science and Technology
2073

Bachelor Level/ Second Year/ Forth Semester/ Science Full Marks: 80
Computer Science and Information Technology (CSc. 251) Pass Marks: 32
(Theory of Computation) Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

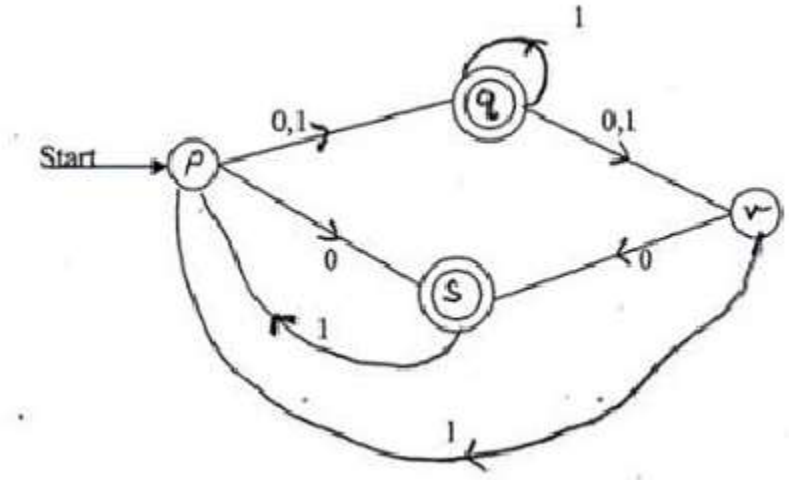
Attempt all the questions.

Group A (8×4=32)

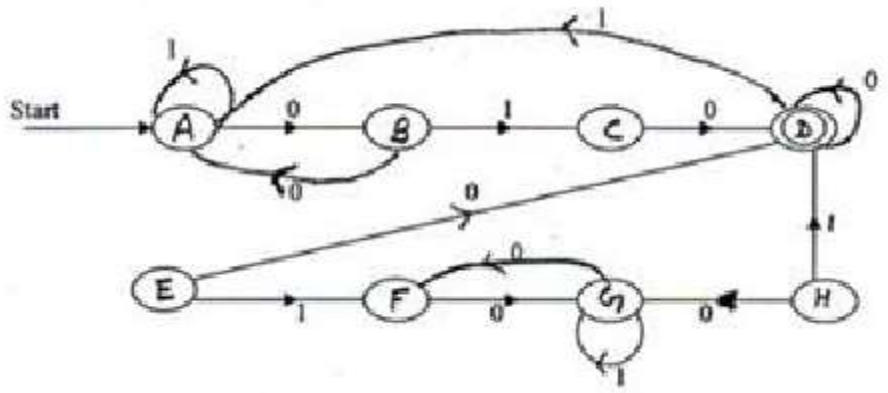
1. What is finite automata? Define DFA with suitable example.
2. Differentiate DFA with NFA. Design an NFA accepting all strings over {0, 1} that end in 01.
3. Give formal notation for an ∈-NFA with example.
4. Write regular expression for the set of strings of 0'S and 1'S with at most one pair of consecutive 1's.
5. What is CFG? Design CFG for palindromes with alphabet {0, 1}.
6. What PDA? How is it different from finite automata?
7. Design a Turing machine that accepts the language $\{0^n1^n|\geq 1\}$ over {0, 1}.
8. What is recursive language? Explain.

Group B [6×8=48]

9. Convert the following NFA into equivalent DFA.



10. How do you convert a regular expression to automata? Convert the regular expression (0+1)* 1(0+1) to automata.
11. Convert the following DFA into minimum state equivalent DFA.



12. Convert the following CFG to CNF.

S → aAa|bBb|∈

A → c|a

B → c|a

C → CDE|∈

D → A|B|ab

13. Discuss the equivalence of PDA and CFG convert the grammar to PDA that accept the same language by empty stack.

S → aAA

A → aS|bS|a

14. Write short notes on:

a. Turing maching

b. Classes P and NP