APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION
Computer Science and Engineering
(Computer Science and Systems Engineering)
04 CS 6405 - Automata Theory and Computability

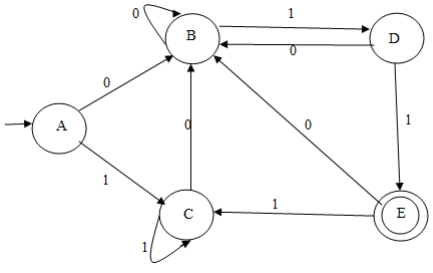
Time: 3 hrs Max. Marks: 60

PART A
(Answer all questions. Each question carry 3 marks).

1. Design a DFA for the language containing "else" as a substring. (3)
2. Give a regular expression for the language L=2 mod 3. (3)
3. What is Ultimately Periodic Set? (3)
4. What are Unit Productions?What is their effect on deciding whether a given string is present in a given language or not of Context Free Language? (3)
5. Give a brief note on the formal definition of Turing Machine. (3)
6. With the help of neat diagram explain how the Universal Turing Machine works? (3)
7. State the theorem which shows that an accepting the empty language is undecidable. (3)
8. State Rice's second theorem. (3)

PART B
(Each full question carries 6 marks).

9. Obtain the unique minimal DFA corresponding to the canonical MN relation representing the language recognized by the following DFA. (6)



OR

10. Design an NFA for the language over (0,1) which contains set of all strings that end with 01 and convert it into equivalent DFA. (6)
11. Prove that the language L=$\{ww^R\}$ where w^R is the reverse of w is not regular with the help of Pumping Lemma. (6)

OR

12. Prove using Pumping Lemma,the language L=$\{ww\}$ is not regular. (6)

13. Convert the given CFG to CNF. (6)

$$S->aSb/bSa/SS/\epsilon$$

OR

14. Using Pumping Lemma show that L=$\{a^n b^n c^n | n \geq 0\}$ is not Context Free. (6)

15. Give a PDA(accepts by final state) accepting the language L=$\{a^{m+n} b^m c^n | m, n \geq 1\}$.(It is enough to give the set of transitions or the transition graph). (6)

OR

16. Give a PDA(accepts by final state) accepting the language L=$\{a^n b^{m+n} c^m | m, n \geq 1\}$.(It is enough to give the set of transitions or the transition graph). (6)

17. Design a Turing Machine to recognise the language L=x*y where * is the multiplication operator. (It is enough to give the set of transitions or the transition graph). (6)

OR

18. Design a Turing Machine to recognise the language L=$\{a^n b^n c^n | n \geq 0\}$. (It is enough to give the set of transitions or the transition graph). (6)

19. State and prove Rice's First Theorem. (6)

OR

20. State and prove the the theorem which shows M such that M accepts a regular language is undecidable. (6)