**C** **Reg. No. :** | | | | | | | | | | |

**Question Paper Code: 55204**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2018

Fifth Semester

Computer Science and Engineering

15UCS504- THEORY OF COMPUTATION

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Finite automata require minimum _____ number of stacks. CO1- R

   (a) 1 (b) 0 (c) 2 (d) None of the mentioned

2. Which of the following is NOT the set of regular expression CO2- U

   R = (ab + abb)* bbab)

   (a) ababbbbab (b) abbbab (c) ababbabbbab (d) abababab

3. Which of the expression is appropriate? For production p: a->b where CO3-U

   a∈V and b∈_____

   (a) V (b) S (c) (V+∑)* (d) V+ ∑

4. Which of the following pairs have DIFFERENT expressive power? CO4- R

   (a) Deterministic finite automata(DFA) and Non-deterministic finite automata(NFA)

   (b) Deterministic push down automata (DPDA) and Non-deterministic push down automata (NPDA)

   (c) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine

   (d) Single-tape Turing machine and multi-tape Turing machine

5 Which of the following is not true about RASP? CO5- R

(a) Binary search can be performed more quickly using RASP than a turing machine

(b) Stores its program in memory external to its state machines instructions

(c) Has infinite number of distinguishable, unbounded registers

(d) Binary search can be performed less quickly using RASP than a Turing machine

PART – B (5 x 3= 15Marks)

6. Differentiate NFA and DFA CO1- U

7. Differentiate L* and $L^+$ CO2- U

8. What is (a) Derivation (b) Derivation/parse tree (c) Subtree CO3- U

9. What is the difference between an Alphabet and an element of a set? Whether Alphabet is an element of a set or it is a set itself? CO4- R

10. What are the techniques used for Turing machine construction? CO5- R

PART – C (5 x 16= 80 Marks)

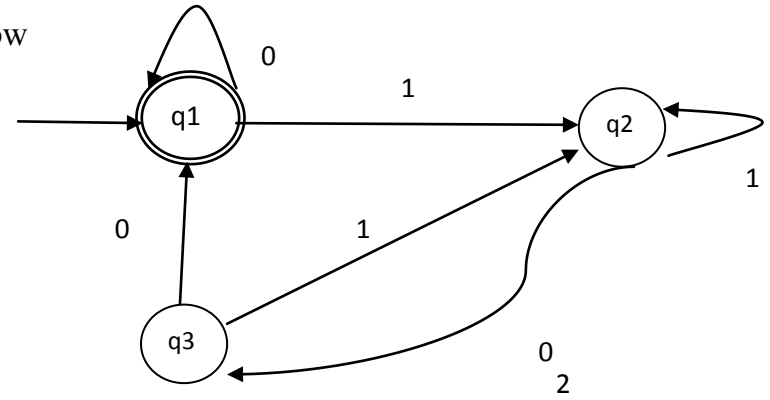
11. (a) If L is accepted by an NFA with ε-transition then show that L is accepted by an NFA without ε-transition. CO1- U (16)

Or

(b) Construct a DFA equivalent to the NFA defined by ({p,q,r,s}, {0,1}, delta, p, {s}), where delta is defined by the chart below. CO1- App (16)

| δ | 0 | 1 |
|---|---|---|
| p | {p,q} | {p} |
| q | {r} | {r} |
| r | {s} | - |
| s | {s} | {s} |

12. (a) Construct a regular expression corresponding to the automata given below CO2- App (16)



Or

(b) Construct min-state DFA for the regular expression (a/b)*abb. CO2- App (16)

13. (a) (i) Give a detailed description of ambiguity in Context free grammar? Check whether the grammar G with production rules − X → X+X | X*X |X| a is ambiguous or not. CO3-U (8)

(ii) Write the grammar for the language L={ $a^n b^{2n}$ / n≥ 1}. CO3-App (8)

Or

(b) Convert the following Context Free Grammar to Chomsky Normal Form? CO3-App (16)

S → ASB

A → aAS|a|ε

B → SbS|A|bb

14. (a) (i) Construct a PDA that accepts L = { $ww^R$ | w = (a+b)* } CO4-App (8)

(ii) Construct PDA for the grammar s→ asb/ab and validate the string aabb. CO4-App (8)

Or

(b) Show the equivalence of PDA by empty stack and PDA by final state. CO4-U (16)

15. (a) Design a Turing Machine that reads a string representing a binary number and erases all leading 0's in the string. However, if the string comprises of only 0's, it keeps one 0. CO5-App (16)

Or

(b) Draw a Turing machine which multiplies two numbers CO5-App (16)