Reg. No. : | | | | | | | | | | |

Question Paper Code: 31254

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fifth Semester

Computer Science and Engineering

01UCS504 – THEORY OF COMPUTATION

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Prove that "If *p* is a prime number bigger than 2, then *p* is odd".
2. Define NFA with ϵ transition.
3. Differentiate L^* and L^+.
4. Write the RE to denote a language *L* over the input set *{a, b}* such that 3rd character from the right end of the string is always *a*.
5. Construct a CFG for the language *L={an, bn} n>=1*.
6. Define Pushdown Automata.
7. Is it possible that a TM could be considered as a computer of function from integer to integer? If yes justify your answer.
8. Can you say the language generated by a CFG in CNF is finite or infinite? If so how? If not why?
9. What is a multi-tape Turing machine?
10. Define reducibility.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Prove by mathematical induction that for every integer n≥0 the number $4^{2n+1}+ 3^{n+2}$ is multiple of 13. (6)

(ii) Show that a language L is accepted by some DFA if and only if L is accepted by some NFA. (10)

Or

(b) Convert the given NFA to DFA NFA $M= \{\{p, q, r, s\}, \{0, 1\}, \delta \{p\}, \{s\}$. (16)

states	0	1
p	*{ p, q}*	*p*
q	*r*	*r*
r	*s*	-
s	*s*	*s*

12. (a) Let *r* be a regular expression. Then prove that there exists a NFA with ϵ transition that accept *L(r).* (16)

Or

(b) Construct a DFA with reduced state equivalent to the regular expression 10 + (0+1) 0 * 1. (16)

13. (a) (i) Find the language generated by the grammar G with variable S, A, B terminal a, b and productions S → aB, B → b, B → bA, A → ab. (8)

(ii) If G is a grammer S → Sba | a Prove that G is a ambiguous. (8)

Or

(b) Construct a PDA accepting *{a n b m a n | m, n >= 1}* by empty stack. (16)

14. (a) Convert given CFG to GNF where *V={S,A}, T={0,1}* and *P* is $S \rightarrow AA / 0 \;\; A \rightarrow SS / 1$. (16)

Or

(b) (i) Show the context free language are closed under union operation but not under intersection. (10)

(ii) Design a Turing machine to accept L = $\{a^n b^n \mid n>=1\}$. (6)

15. (a) Explain Post Correspondence Problem with an example. (16)

Or

(b) Explain in detail about class P and class NP with neat examples. (16)
