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

Question Paper Code: 31524

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

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. Define finite automata.
2. Define NFA with ϵ transition.
3. Define regular expression with example.
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 acceptance of a PDA by empty stack. Is it true that the language accepted by a PDA empty stack or by that final state are different language.
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 you mean by universal TM?
10. Obtain the solution for the following system of posts correspondence problem. *A={100, 0, 1}, B={1, 100, 00}.*

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Prove $1^3+2^3+\ldots..+n^3 = \frac{n^2(n+1)^2}{4}$ by Mathematical Inductions. (8)

(ii) Design FA which checks whether the given unary number is divisible by 3. (4)

(iii) Design FA that accepts string that ends with abb. (4)

Or

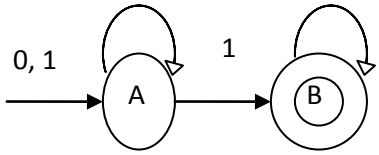
(b) Convert the given NFA to DFA NFA $M= \{\{p, q, r, s\}, \{0, 1\}, \delta\ \{p\}, \{s\}$. (16)

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) Obtain the regular expression *R* for the following DFA *A* such that *L(A) = L(R).* (16)



13. (a) (i) Let *G=(V, T, P, S)* be a CFG show that if *S* => α* Then there is a derivation tree in a grammar *G* with yield *α*. (8)

(ii) Check whether the given grammar is ambiguous or not *S → iCtS /iCtSeS /a, C→ b*. (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 → AA / 0 A → SS / 1*. (16)

Or

(b) Design a TM to compute *f(m, n) = m* n V m, n € N*. (16)

15. (a) Define universal language L u. Show that L u is recursively enumerable but not recursive. (16)

Or

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