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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Sub. Code :** | **12CS230** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **THEORY OF COMPUTATION** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A (10X1=10 MARKS)** | | |
| 1. | When a grammar is said to be regular? | (1) |
| 2. | Draw a DFA that accepts the sets consisting of all strings with exactly one a for ∑ = {a, b} | (1) |
| 3. | Differentiate an accepter and transducer. | (1) |
| 4. | What are primitive regular expressions? | (1) |
| 5. | Define Non-Deterministic Pushdown Accepter. | (1) |
| 6. | Let ∑ = { 0,1} and Γ = {a,b,c} and h is defined by  h(0) = bbcaa  h(1) = aacbb  Find the homomorphic image of the language L = {01,10} | (1) |
| 7. | The moves of a turing machine are as shown in the figure. Write the transition from figure (a) to figure (b) | (1) |
| 8. | All LL(1) grammars are Context Free Grammars. Write true or false. | (1) |
| 9. | Schematically represent Pushdown Automata. | (1) |
| 10. | What is P-class? | (1) |

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| **PART - B (5 X 3= 15 MARKS)** | | |
| 11. | Which of the strings 0001, 01001, 00001100 are accepted by the DFA given below? | (3) |
| 12. | With the assist of suitable transition diagram, differentiate DFA from NFA. | (3) |
| 13. | Remove useless production from the following grammar.  S 🡪 aSb | B | λ  B 🡪 bB | (3) |
| 14. | Write the moves for the string “abb” based on the transitions of the pushdown automata  δ (q0, λ, z) = {(q1, Sz)}  δ (q1, a, S) = {(q1, A), (q1, λ)}  δ (q1, b, A) = {(q1, B)}  δ (q1, b, B) = {(q1, λ)}  δ (q1, λ, z) = {(q2, λ)} | (3) |
| 15. | Define Turing thesis | (3) |

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| **PART - C (5 X 15= 75 MARKS)** | | | |
| 16. | a. | Construct the DFA for the following languages  L1={ab5wb2:wε{a,b}\*}  L2= {w: |w| mod 3 = 0} | (10) |
|  | b. | Minimize the DFA given below | (5) |
| (OR) | | | |
| 17. | a. | Find L1/L2 such that L1=L(a\*baa\*) and L2=(aba\*). | (8) |
| b. | Find the regular expression for the language accepted by the finite automata. | (7) |
| 18. | a. | Construct an NFA accepting (ab)\*a and convert the resulting NFA to DFA. | (10) |
| b. | Find an NFA with four states for L={bn : n≥0}U{an b : n≥0} | (5) |
| (OR) | | | |
| 19. | a. | Construct DFA for the string over ∑ = {a,b} for (a+b)\* baab. | (10) |
|  | b. | Discuss ambiguity with an example | (5) |
| 20. | a. | Construct leftmost derivation, rightmost derivation and parse tree for the string “a+b\*c” using the grammar  E-> E+T | T  T -> T\*F | F  F -> (E) | I  I -> a | b | c. | (10) |
|  | b. | Find the s-grammar for L=(ab\*(a+b)) | (5) |
| (OR) | | | |
| 21. | a. | Determine whether the string w = aabbb is in the language generated by the grammar:  S -> AB  A -> BB | a  B -> AB |b  Write all the steps associated using CYK algorithm. | (7) |
|  | b. | Remove all unit-productions, all useless productions, and all λ-productions from the grammar  S -> aA | aBB  A -> aaA | λ  B -> bB | bbC  C -> B | (8) |
| 22. |  | Construct NPDA for the language L={anbmcn+m; n≥0, m≥0}and check whether string “aabbcccc” is a member of the language L. | (15) |
| (OR) | | | |
| 23. |  | Show that L(ambm:m>=0) is deterministic and write the moves for checking whether the string “aabb” is accepted by the grammar. | (15) |
| 24. |  | Construct turing machines that will accept the language  L1=L(aba\*b)  L2=L(anb2n) | (15) |
| (OR) | | | |
| 25. |  | Elaborate on Chomsky’s Hierarchy. | (15) |

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