**20CB/DS/CS/IT501**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **December, 2023** | **Common to CB, DS, CSE & IT** | | |
| **Fifth Semester** | **Automata Theory And Formal Languages** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | Define Language? | CO 1 | L2 | 1M |
|  | b) | What is finite automaton | CO 1 | L4 | 1M |
|  | c) | Write the formal definition of NFA | CO 1 | L2 | 1M |
|  | d) | Define epsilon closure | CO 1 | L2 | 1M |
|  | e) | Write any two laws of algebraic expression | CO 2 | L4 | 1M |
|  | f) | Define regular language with an example | CO 2 | L2 | 1M |
|  | g) | Write the closure properties of regular languages | CO 2 | L4 | 1M |
|  | h) | Define ambiguous grammar | CO 3 | L2 | 1M |
|  | i) | Write the grammar rules for chomsky normal form | CO 3 | L4 | 1M |
|  | j) | Define push down automata with proper notation | CO 3 | L2 | 1M |
|  | k) | List closure properties of context free languages | CO 4 | L1 | 1M |
|  | l) | Define turing machine | CO 4 | L2 | 1M |
|  | m) | What is undedicidable problem of finite automata | CO 4 | L4 | 1M |
|  | n) | What is recurssive and recurssively enumarable language | CO 4 | L4 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | Construct a DFAwhich accept all strings starts with ‘a’ and ends with ‘b’ over the alphabet {a,b} | CO 1 | L2 | 7M |
|  | b) | Differntiate between NFA and DFA with an example | CO 1 | L1 | 7M |
| **(OR)** | | | | | |
| 3 | a) | Convert the given ε - NFA to DFA | CO 1 | L3 | 8M |
|  | b) | Write the extended transition function of DFA and NFA with an example | CO 1 | L2 | 6M |
| **Unit-II** | | | | | |
| 4 | a) | Write the regular expressions for the following languages  i)regular expression for the language L which accepts all strings begin or end with either 00 or 11 over the alphabet {0,1}  ii)regular expression for the language L which accepts all strings in which from right hand side 4th character is always ‘b’ over the alpahabet {a,b} | CO 2 | L4 | 6M |
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|  | b) | Minimize the following DFA    **0** | CO 2 | L2 | 8M |
| **(OR)** | | | | | |
| 5 | a) | Construct the regular expression for the given DFA | CO 2 | L2 | 7M |
|  | b) | Define pumping lemma and prove language L={ap/p is prime number} | CO 2 | L4 | 7M |
| **Unit-III** | | | | | |
| 6 | a) | i) Find the language generated by grammar G=({S},{0,1},{S🡪0S1,S🡪},S)  ii)Construct the CFG for the regular expression (a+b)\* aa (a+b)\* | CO 3 | L4  L2 | 8M |
|  | b) | Derive the string 1000111 by using left most derivation and righ most derivation for the grammar G=({S,T},{0,1},{S🡪T00T,T🡪0T/1T/},S) | CO 3 | L2 | 6M |
| **(OR)** | | | | | |
| 7 | a) | Constuct the push down automata for language L={anbncm/m,n>=1} | CO 3 | L2 | 8M |
|  | b) | Explain pumping lemma for context free language | CO 3 | L1 | 6M |
| **Unit-IV** | | | | | |
| 8 | a) | Define closure properties and decision properties of CFL | CO 4 | L2 | 6M |
|  | b) | Construct the turing machine for the language L={0n1n2n/n>=1} | CO 4 | L2 | 8M |
| **(OR)** | | | | | |
| 9 | a) | Explain undecidable problem about turing machine | CO 4 | L3 | 7M |
|  | b) | Explain is Post Correspondant Problem with an example | CO 4 | L3 | 7M |

