**18CS502**

**Hall Ticket Number:**

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| **III/IV B.Tech(Regular) DEGREE EXAMINATION** | | | |
| **February, 2021** | **Computer Science and Engineering** | | |
| **Fifth Semester** | **Automata Theory and Formal Languages** | | |
| **Time:** Three Hours | | **Maximum:**50 Marks | |
| *Answer ALL Questions from PART-A.* | | | (1X10 = 10 Marks) |
| *Answer* ***ANY FOUR*** *questions from PART-B.* | | | (4X10=40 Marks) |
| **Part - A** | | | |

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| 1. | a) | Give formal definition of DFA. CLO-1 |  |
|  | b) | Define epsilon closure of the state. CLO-1 |  |
|  | c) | What is the use of epsilon moves? CLO-1 |  |
|  | d) | Define regular language and regular expression. CLO-2 |  |
|  | e) | List out closure properties of regular languages. CLO-2 |  |
|  | f) | State pumping lemma for regular languages. CLO-3 |  |
|  | g) | Give formal definition of CFG. CLO-3 |  |
|  | h) | Give formal definition of PDA. CLO-4 |  |
|  | i) | Define CNF. CLO-4 |  |
|  | j) | Give formal definition of Turing machines. CLO-4 |  |
| **Part - B** | | | |
| 2. | a) | Construct DFA that accepts the language which contains any number of a’s followed by at least 2 b’s followed by exactly 3 c’s followed by at most 2 d’s. CLO-1 | 5M |
|  | b) | Prove that if L is accepted by NFA then there is DFA that accepts same language L.CLO-1 | 5M |
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| 3. | a) | Convert the following NFA to DFA CLO-1  Conversion from NFA to DFA - GeeksforGeeks | 6M |
|  | b) | Construct NFA that accepts the language which contains set of strings with 10th symbol from the left end is 1 and 8th symbol from the left end is 0.CLO-1 | 4M |
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| 4. | a) | Find out the regular expression represented by the following DFA by using transitive closure method. CLO-2  Deterministic finite automaton - Wikipedia | 5M |
|  | b) | Give epsilon NFA for the regular expression **(abb+ba)(a+b)\***. CLO-2 | 5M |
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| 5. | a) | Prove that **L={an bn | n≥0 }** is not regular. CLO-2 | 4M |
|  | b) | Give regular expressions for the following languages. CLO-2   1. Set of strings contains any number of a’s followed by at least one b followed by exactly 2 c’s. 2. Set of strings contains even number of a’s followed by odd number of b’s 3. Set of strings end with 10. | 6M |
|  | | | |
| 6. | a) | Give left most and right most derivations of the string “aabbabba” to the following grammar  S 🡪 aB | bA CLO-3  A🡪 a | aS | bAA  B 🡪 b | bS | aBB | 5M |
|  | b) | Convert the following grammar to PDA. CLO-3  I 🡪 a | b | Ia | Ib | I0 | I1  E 🡪 E+E | E\*E | (E) | I | 5M |
| **P.T.O.**  **18CS502** | | | |
| 7. | a) | Construct CFG for the language **L = { aibjck | i=j or j=k }** CLO-3 | 5M |
|  | b) | Construct PDA to accept the language **L ={ wcwR | w∈{a,b}\*}**  CLO-3 | 5M |
|  | | | |
| 8. |  | Convert the following grammar into CNF. CLO-3  S 🡪 AACD  A 🡪 aAb | ∈  C 🡪 aC | a  D 🡪 aDa | bDb | ∈ | 10M |
|  | | | |
| 9. | a) | Write short notes on closure properties and decision properties of CFLs. CLO-4 | 4M |
|  | b) | Construct Turing machine to the language **L = { anbncn | n>0}** CLO-4 | 6M |

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