**18CS502**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **January, 2022** | **Computer Science & Engineering** | | |
| **Fifth Semester** | **Automata Theory & Formal Languages** | | |
| **Time:** Three Hours | | **Maximum:** 50 Marks | |
| *Answer Question No.1 compulsorily.* | | | (1X10 = 10 Marks) |
| *Answer ONE question from each unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Design DFA for accepting all strings end with 01. | CLO-1 |  |
|  | b) | Differentiate DFA and NFA. | CLO-1 |  |
|  | c) | Write transition functions for DFA and NFA. | CLO-1 |  |
|  | d) | (P\* + Q\*)\* = ? | CLO-2 |  |
|  | e) | (r\*)\*=? | CLO-2 |  |
|  | f) | Give the definition of a regular expression. | CLO-2 |  |
|  | g) | Define Context Free Grammar. | CLO-3 |  |
|  | h) | Define ambiguous grammar. | CLO-3 |  |
|  | i) | State decision properties of CFL’s. | CLO-4 |  |
|  | j) | Give formal definition of Turing Machine. | CLO-4 |  |
| **Unit -I** | | | | |
| 2. | a) | Convert the following NFA into equivalent DFA. (\* refers the final state)   |  |  |  | | --- | --- | --- | | δ | 0 | 1 | | → p | {p,r} | {q} | | q | {r,s} | {p} | | \*r | {p,s} | {r} | | \*s | {q,r} | ∅ | | CLO-1 | 7M |
|  | b) | Construct DFA for even number of 0’s and odd number of 1’s. | CLO-1 | 3M |
| **(OR)** | | | | |
| 3. | a) | Construct an equivalent DFA for the following ϵ-NFA. | CLO-1 | 7M |
|  | b) | Design a DFA for the language of strings those begin and end with different symbol over the alphabet Σ = {a, b}. | CLO-1 | 3M |
| **Unit -II** | | | | |
| 4. | a) | State and prove pumping lemma for regular languages. | CLO-2 | 5M |
|  | b) | Prove the language L={ an | p is a prime number } is not regular. | CLO-2 | 5M |
| **(OR)** | | | | |
| 5. | a) | Convert the regular expression (0+1)\*00 (0+1)\* to FA. | CLO-2 | 5M |
|  | b) | Convert the following DFA to regular expression. (\* refers the final state)   |  |  |  | | --- | --- | --- | | δ | a | b | | →\*P | S | P | | Q | P | S | | R | R | Q | | S | Q | R | | CLO-2 | 5M |
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| **Unit -III** | | | | |
| 6. | a) | Convert the following grammar to Chomsky Normal Form.  S → bA| aB  A → bAA | aS | a  B → aBB | bS | b | CLO-3 | 7M |
|  | b) | Remove useless symbols from the following CFG.  S → aB | aCD | aE  B → bC  C→ aB | b  D → aE  E → bCD | CLO-3 | 3M |
| **(OR)** | | | | |
| 7. | a) | Construct PDA for the language L = { an bn| n>=1 }. | CLO-3 | 5M |
|  | b) | Give left most and right most derivations and parse tree for the string "id + id \* id" to the following grammar.  E → E + E | E \* E | id. | CLO-3 | 5M |
| **Unit -IV** | | | | |
| 8. | a) | Find Construct TM for the language L={ 0n1n2n| n>=0} | CLO-4 | 10M |
| **(OR)** | | | | |
| 9. | a) | State and prove the closure properties of CFL’s. | CLO-4 | 5M |
|  | b) | Explain the Post Correspondence Problem with suitable example. | CLO-4 | 5M |

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