**Q.P. Code: 16CS517** **R16**

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

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech III Year I Semester Supplementary Examinations July-2022**

**FORMAL LANGUAGES AND AUTOMATA THEORY**

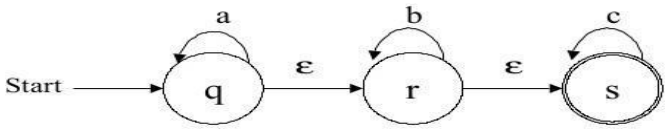
(Common to CSE & CSIT)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

**UNIT-I**

**1** **a** Convert the following NFA with ε moves to DFA without ε moves. **L2** **10M**




**b** Define Grammar? What are the tuples? **L1** **2M**

**OR**

**2** **a** Define relations on set and explain its property with an example. **L1** **5M**

**b** Define NFA and DFA. Construct DFA for the given NFA **L2** **7M**

| | Next state | |
|---|---|---|
| | 0 | 1 |
| → q0 | q0,q1 | q0 |
| q1 | q2 | q1 |
| q2 | q3 | q3 |
| (q3) | - | q2 |

**UNIT-II**

**3** **a** Consider the below finite automata and check the strings are accepted or not. **L3** **6M**

| States (Q) | Input Alphabtes | |
|---|---|---|
| | 0 | 1 |
| →q0 | q1 | q3 |
| q1 | q0 | q2 |
| (q2) | q3 | q1 |
| q3 | q2 | q0 |

(i) 1110 (ii) 0001 (iii) 1010

**b** Construct an equivalent FA for the given regular expression (0+1)*(00+11)(0+1)* **L1** **6M**

**OR**

| | | | | |
|---|---|---|---|---|
| **4** | **a** | Explain how equivalence between two FA is verified with an example. | **L2** | **6M** |
| | **b** | List out the identities of Regular expression.<br>i) 10+(1010)*[^+(1010)*]=10+(1010)*<br>ii)(0+011*)+(0+011*)(01+0100*)(01+0100*)*=01*(010*)* | **L2** | **6M** |

**UNIT-III**

| | | | | |
|---|---|---|---|---|
| **5** | **a** | Remove Left recursion from the grammar S→Sab/T<br>T→Tcd/F<br>F→Fa/G | **L2** | **6M** |
| | **b** | Perform left factor from the grammar A→abB/aB/cdg/cdeB/cdfB | **L3** | **6M** |

**OR**

| | | | | |
|---|---|---|---|---|
| **6** | | Simplify the following context free grammar. (Here, Λ stands for epsilon (ϵ)).<br>S→TU\|V<br>T→aTb\|Λ<br>U→cU\| Λ<br>V→aVc\|W<br>W→bW\| Λ | **L4** | **12M** |

**UNIT-IV**

| | | | | |
|---|---|---|---|---|
| **7** | **a** | Define Instantaneous description (ID) in PDA. | **L2** | **6M** |
| | **b** | Explain about the graphical notation of PDA. | **L2** | **6M** |

**OR**

| | | | | |
|---|---|---|---|---|
| **8** | **a** | Construct a PDA which recognizes all strings that contain equal number of 0's and 1's. | **L2** | **6M** |
| | **b** | A PDA is more powerful than a finite automaton. Justify this statement. | **L2** | **6M** |

**UNIT-V**

| | | | | |
|---|---|---|---|---|
| **9** | **a** | Design a multi head Turing Machine for checking whether a binary string is a palindrome or not. Show the ID for 1001. | **L3** | **6M** |
| | **b** | Explain conversion of regular Expression to TM with example. | **L3** | **6M** |

**OR**

| | | | | |
|---|---|---|---|---|
| **10** | | Construct a Turing machine that recognizes the language L= {$a^n b^n$, n>1}. Show an ID for thestring 'aabb' with tape symbols. | **L2** | **12M** |

*** END ***