**Sri SivasubramaniyaNadar College of Engineering, Kalavakkam – 603 110**

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

Department of Information Technology

**Assignment – II**

**Regulations – R2021**

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| **Degree**  B.E. / B. Tech. | B.Tech | **Branch** | IT |
| **Semester** | III | **Date of**  **Assignment** | 25-06-2023 |
| **Subject Code & Name** | UIT2404 & Automata Theory and Compiler Design | | |
|  | **Answer All Questions** | | **Maximum: 50 Marks** |

(K1: Remembering, K2: Understanding, K3: Applying, K4: Analyzing, K5: Evaluating)

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| CO1: | Construct automata, regular expression for any pattern. |
| CO2: | Write Context free grammar for any construct. |
| CO3: | Build the different Phases of compiler and apply the various optimization techniques. |
| CO4: | Design Turing machine for a given language |
| CO5: | Explain decidability, semi-decidability, and undecidability |

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|  |  | KL | CO | PI |
| 1. | 1. State whether the following statement is true or false. Justify your answer.   Let *M* be a DFA and *q* a particular state of *M*, such that *δ(q,a)=q* for all input symbols *a*. Then, for all input strings *w* of arbitrary length, *(q,w)=q*. | K3 | CO4 | 1.1.1  1.4.1  2.1.3  13.1.1 |
| 2. | Let R be the regular expression b. Select all the statements that describe the language of this regular expression.  Statement 1: *{n≥0}*  Statement 2: Set of all strings that end with *a b*  Statement 3: Set of all strings with an even number of *a's* followed by an odd number of *b's*  Statement 4: *{∣n≥0 and m≥0}* | K3 | CO4 | 1.1.1  1.4.1  2.1.3  13.1.1 |

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| 3. | 1. Consider the following ϵ-NFA.  |  |  |  |  | | --- | --- | --- | --- | | 𝛿 | ε | a | b | | 🡪p | {r} | {q} | {p,r} | | q | ϕ | {p} | ϕ | | \*r | {p,q} | {r} | {p} |   Give the set of all strings of length 3 or less accepted by this automaton. | K3 | CO5 | 1.1.1  1.4.1  2.1.3  13.1.1 |
| 4. | 1. Consider the following ϵ-NFA  |  |  |  | | --- | --- | --- | | 𝛿 | 0 | 1 | | 🡪p | {p,r} | {q} | | q | {r,s} | {p} | | \*r | {p,s} | {r} | | \*s | {q,r} | ϕ |   Compute the ε-closure of each state. | K3 | CO5 | 1.1.1  1.4.1  2.1.3  13.1.1 |
| 5 | Generate words for the following languages: (i)  𝐿 = {𝑎𝑛𝑏𝑛𝑎𝑛𝑏𝑛 | 𝑛 ≥ 0 }  (ii) 𝐿 = { 𝑤 ∈ {0,1}∗ | |𝑤| 𝑖𝑠 𝑎 𝑚𝑢𝑙𝑡𝑖𝑝𝑙𝑒 𝑜𝑓 3 }  Provide the following for the given language.   1. Grammar 2. RE 3. DFA | K3 | CO4 | 1.1.1  1.4.1  2.1.3  13.1.1 |
|  | PREFIX EXPRESSION Grammer is ambigous or not?  Write grammar and test with a sample |  |  |  |