**D.Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY,**

**KASABA BAWADA KOLHAPUR-416006**

**Q. Paper Code:**

**22SYAIML2014214**

**(An Autonomous Institute)**

S. Y. B. Tech, AIML, Sem-IV

**END SEMESTER EXAMINATION, JULY. – 2021-22**

Course Name: **Formal Automata and Applications**, Course Code: **201AIMLL214**

Seat No:

**Day and Date: Thursday, 23/06/2022**

**Time: 9.30 am to 1.15 pm Max. Marks- 100**

***Instructions:***

1. *Figure to the right indicate full marks.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BT** | **CO’s** | **Q. No.** |  | **Marks** |
|  |  | **Q.1** | **Attempt the following** | **40** |
| **6** | **CO1 CO4**  **CO1** | **a** | 1. Write Regular Expression for the given Regular language. and design its DFA where L={w| w∈(0,1)\* and w contains substring 00} 2. For the given transition diagram of NFA-˄ , calculate the following 3. ˄ (2,5) 4. ˄ (3,4) 5. Find whether string ababa is accepted or rejected using extended transition function of NFA-˄ | **4**  **6** |
| **2**  **3**  **3** | **CO2**  **CO2**  CO4 | **b** | 1. What is ambiguous grammar? Give an example. 2. Perform rightmost derivation for the string “baabb”, also draw the parse tree, where G is as follows   S🡪 aA | bC | b  A🡪 aS| bB  B🡪 aC | bA| a  C🡪 aB | bS   1. *Minimize the given DFA*   C:\Users\DYPCET-366\Desktop\Autonomus Exam\2021-2022 Sem II\20220608_094758.jpg | **3**  **3**  **4** |
| **3**  **2** | CO4  CO1 | **c** | 1. For the given DFAs construct L1 U L2 and L1 - L2.      1. State and prove the Kleens theorem Part I. | **5**  **5** |
| **3**  **3** | **CO2**  CO2 | **d** | 1. Convert given CFG to CNF   S🡪 AACD  A🡪aAb | ˄  C🡪 aC |a  D🡪 aDa | bDb | ˄   1. Write the grammar for the language L ={ anbm , n,m >=1} | **5**  **5** |
|  | | | | |
|  |  | **Q.2** | **Attempt (any one options are allowed for sub questions)** | **20** |
| **6**  **2** | **CO3 CO4**  CO2 | **a** | Construct top-down PDA for the given Grammar  S🡪 AaaA  A🡪 aA | bA| ˄  **OR**  Discuss the issues of Top-Down Parser. | **6** |
| **3** | **CO2** | **b** | Explain Bottom-up parsing and perform bottom-up parsing for the string id + id \* id where G is  E 🡪 E+T |T  T 🡪 T\*F |F  F🡪 id | **7** |
| **6** | **CO3**  **CO4** | **c** | Differentiate between DPDA and NPDA. Design PDA for the strings having more a’s than b’s. | **7** |
|  | | | | |
|  |  | **Q.3** | **Attempt (any four questions)** | **20** |
| **1** | **CO4** | **a** | Define Turing Machine and draw its working model. | 5 |
| **6** | **CO4** | **b** | Design TM for Copying a string where ∑ = (a, b) | 5 |
| **6** | **CO4** | **c** | Design TM for language of Palindromes where ∑ = (a, b) | 5 |
| **1** | **CO4** | **d** | List and explain Variants of TM. | 5 |
| **6** | **CO4** | **e** | Design TM for L ={ anbncn , n>=0} | 5 |
|  | | | | |
|  |  | **Q.4** | **Attempt (any one options are allowed for sub questions of a, b, c…….)** | **20** |
| **2** | **CO5** | **a** | Explain the Gamblers Ruin Problem | 4 |
| **2** | **CO5** | **b** | Describe the two types of Markov Chains | 4 |
| **2** | **CO5** | **c** | What are Markov chains and what are they used for.  **OR**  Explain randomized algorithm for 2-Satisfiability | 6 |
| **3** | **CO5** | **d** | For the given Matrix construct the Markov chain transition diagram. Also answer the question that “Starting from the state: sleep, what is the probability that Reena will be running (state: Run) at the end of a sad-2-day duration?  http://res.cloudinary.com/dyd911kmh/image/upload/f_auto,q_auto:best/v1523011817/transition_matrix_gj27nq.png | 6 |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*