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| **B. E. Degree (Autonomous) Fifth Semester End Examination (SEE)** | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | |
| **AUTOMATA THEORY AND COMPILER DESIGN** | | | | | | | | | | | | | | | | | | | | | |
| **(Model Question Paper - I)** | | | | | | | | | | | | | | | | | | | | | |
| **Time: 3 Hours ]** | | | | | | | | | | |  | | | | **[ Maximum Marks: 100** | | | | | | |
|  | | | | | | | **Instructions to students: Answer 5 full questions.** | | | | | | | | | | | |  | | |
|  | | | | | | | | | | | | | | | | **Marks** | | **Course**  **Outcomes** | | **BTL\* Cognitive Level** | |
| **1** | **a)** | | What is an automaton? Discuss why study automaton? | | | | | | | | | | | | | **[06 M]** | | **CO1** | | **L2** | |
|  | **b)** | | Design DFA for the following languages over ∑ = { a, b}   * Set of all string that either begins or ends or both with substring ab. * Set of all strings that end with substring abb. * L= {w: |w| mod 5 ≠ 0} | | | | | | | | | | | | | **[09 M]** | | **CO1** | | **L5** | |
|  | **c)** | | Explain the applications of Finite Automata? | | | | | | | | | | | | | **[05 M]** | | **CO1** | | **L3** | |
|  |  | | **OR** | | | | | | | | | | | | |  | | | | | |
| **2** | **a)** | | Convert to a DFA, the following NFA   |  |  |  | | --- | --- | --- | | **δ NFA** | **0** | **1** | | P | {P,Q} | {P} | | Q | {R} | {R} | | R | {S} | φ | | \*S | {S} | {S} | | | | | | | | | | | | | | **[10 M]** | **CO1** | | | | **L2** |
|  | **b)** | | Prove that a language is Regular if and only if it is accepted by a Finite Automata. | | | | | | | | | | | | | **[10 M]** | **CO1** | | | | **L3** |
| **3** | **a)** | | State and prove pumping lemma for Regular Languages | | | | | | | | | | | | | **[08 M]** | **CO2** | | | | **L3** |
|  | **b)** | | Minimize the following DFA, given A = Start state. States C, F and I are final states.   |  |  |  | | --- | --- | --- | | **δ** | **0** | **1** | | **🡪A** | **B** | **E** | | **B** | **C** | **F** | | **\* C** | **D** | **H** | | **D** | **E** | **H** | | **E** | **F** | **I** | | **\*F** | **G** | **B** | | **G** | **H** | **B** | | **H** | **I** | **C** | | **\*I** | **A** | **E** | | | | | | | | | | | | | | **[12 M]** | **CO2** | | | | **L4** |
|  |  | | **OR** | | | | | | | | | | | | |  | | | | | |
| **4** | **a)** | | Write the Table filling algorithm to find the distinguishable pairs in a DFA 'M'. | | | | | | | | | | | | | **[08 M]** | **CO2** | | | | **L2** |
|  | **b)** | | Show that the language L = { 0n / n is prime } is not regular. | | | | | | | | | | | | | **[06 M]** | **CO2** | | | | **L3** |
|  | **c)** | | Using identities prove that the regular languages are closed under intersection. | | | | | | | | | | | | | **[06 M** | **CO2** | | | | **L3** |
|  |  | |  | | | | | | | | | | | | |  | | | | | |
| **5** | **a)** | | Define the following terms with examples  1.Parse tree  2.Ambiguity  3.Rightmost derivation | | | | | | | | | | | | | **[08 M]** | **CO3** | | | | **L1** |
|  | **b)** | | Show that following grammar is ambiguous. Obtain unambiguous grammar for this: E→E+E/E\*E/E/E-E/(E)/a/b. | | | | | | | | | | | | | **[06 M]** | **CO3** | | | | **L3** |
|  | **c)** | | Write CFG for the language  1.L = { 0n 1n | n>=1}  2. L = {w wR | w ε{a,b}\*, wR is the reversal of w} | | | | | | | | | | | | | **[06 M]** | **CO3** | | | | **L2** |
|  |  | | **OR** | | | | | | | | | | | | |  | | | | | |
| **6** | **a)** | | Write context free grammars for the following i) L(G) = {a n b m c m d n : m, n ≥ 1}  ii) L(G) = { a n b n+1 : n ≥ 0 }  iii) L(G) = {w: na(w) = nb(w)}  iv) L(G) = {w: na(w) > nb(w)} | | | | | | | | | | | | | **[12 M]** | **CO3** | | | | **L2** |
|  | **b)** | | Write a note on Chomsky hierarchy. | | | | | | | | | | | | | **[08 M]** | **CO3** | | | | **L2** |
|  |  | |  | | | | | | | | | | | | |  | | | | | |
| **7** | **a)** | | With neat diagram explain the working of PDA and define the language accepted by PDA by both methods. | | | | | | | | | | | | | **[12 M]** | **CO4** | | | | **L2** |
|  | **b)** | | Design a PDA to accept the language L = {w wR : w ԑ{0,1}\*} by empty stack method. | | | | | | | | | | | | | **[08 M]** | **CO4** | | | | **L5** |
|  |  | | **OR** | | | | | | | | | | | | |  | | | | | |
| **8** | **a)** | | Give the formal definition of a PDA. | | | | | | | | | | | | | **[06 M]** | **CO4** | | | | **L2** |
|  | **b)** | | Obtain a PDA to accept the language L = { an bn | n≥0} by a final state. Give the graphical representation for PDA obtained. Show the moves made by the PDA for the string aaabbb. | | | | | | | | | | | | | **[14 M]** | **CO4** | | | | **L3** |
| **9** | **a)** | | Explain various phases of compiler. Show the translation for an Assignment statement.  Position= Initial + rate \* 60.  Clearly indicate the output of each phase. | | | | | | | | | | | | | **[12 M]** | **CO5** | | | | **L5** |
|  | **b)** | | What are the applications of compiler? Explain. | | | | | | | | | | | | | **[08 M]** | **CO5** | | | | **L1** |
|  |  | | **OR** | | | | | | | | | | | | |  |  | | | |  |
| **10** | **a)** | | With a neat diagram, explain a typical language processing system | | | | | | | | | | | | | **[08 M]** | **CO5** | | | | **L1, L2** |
|  | **b)** | | Explain the need for intermediate code generation and code optimization phases in the design of a compiler | | | | | | | | | | | | | **[10 M]** | **CO5** | | | | **L1** |
|  | **c)** | | Write a note on compiler construction tools | | | | | | | | | | | | | **[04 M]** | **CO5** | | | | **L1** |