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| Image result for adamas university logo | **ADAMAS UNIVERSITY**  **END SEMESTER EXAMINATION**  (Academic Session: 2020 – 21) | | |
| **Name of the Program:** | M.Tech | **Semester:** | I |
| **Paper Title:** | Foundation of Computing Science | **Paper Code:** | ECS61101 |
| **Maximum Marks:** | 50 | **Time Duration:** | 3 Hrs |
| **Total No. of Questions:** | 17 | **Total No of Pages:** |  |
| *(Any other information for the student may be mentioned here)* | 1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam. 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. 3. Assumptions made if any, should be stated clearly at the beginning of your answer. | | |

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| **Group A**  **Answer All the Questions (5 x 1 = 5)** | | | |
| 1 | Define partial order relation on a nonempty set. | **R** | **CO1** |
| 2 | List the truth table for conjunction of two propositional variables. | **R** | **CO2** |
| 3 | Find the set of all strings of {0, 1} having exactly two 0’s is   1. 1\*01\*01\* b) ( 0 + 1)\*1 2. (11 + 0)\* d) (00 + 11)\* | **R** | **CO3** |
| 4 | A grammar where all productions are in the form A —>Bα or A —>α is called \_\_\_\_\_\_\_\_\_\_. | **R** | **CO4** |
| 5 | Translate the following REs in English language.  a (a + b)\* abb | **U** | **CO5** |
| **Group B**  **Answer All the Questions (5 x 2 = 10)** | | | |
| 6 a) | What is the necessary and sufficient condition for a subgroup of a group? | **R** | **CO1** |
| **(OR)** | | | |
| 6 b) | For what condition two left cosets should be same. | **R** | **CO1** |
| 7 a) | Show the truth table for the statement . | **R** | **CO2** |
| **(OR)** | | | |
| 7 b) | Find whether the statement is a tautology or not. | **R** | **CO2** |
| 8 a) | Define NFA. | **R** | **CO4** |
| **(OR)** | | | |
| 8 b) | Compare NFA and DFA | **Ana** | **CO3, CO4** |
| 9 a) | Define Arden’s theorem. | **R** | **CO3** |
| **(OR)** | | | |
| 9 b) | Define Pushdown Automata. | **R** | **CO4** |
| 10 a) | What are the components of PDA? | **R** | **CO4** |
| **(OR)** | | | |
| 10 b) | What is the language generated by the grammar G = (V, T, P, S) where P={S -> aSb, S -> ab}? | **R** | **CO5** |
| **Group C**  **Answer All the Questions (7 x 5 = 35)** | | | |
| 11 a) | Show that every chain is a distributive lattice. | **R** | **CO1** |
| **(OR)** | | | |
| 11 b) | Show that the order of each subgroup of a finite group is a divisor of the order of the group. | **R** | **CO1** |
| 12 a) | Show that the following arguments are valid or not: . | **R** | **CO2** |
| **(OR)** | | | |
| 12 b) | Find the PCNF of . | **R** | **CO2** |
| 13 a) | Show that the set G of all ordered pairs with of real numbers forms a group with respect to the operation ‘.’ Defined as, . | **R** | **CO1** |
| **(OR)** | | | |
| 13 b) | Find the Hasse diagram of the poset (A, where A={1,2,3,4,5} and relation given by the matrix, . | **R** | **CO1** |
| 14 a) | Construct a DFA from the given NFA.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Next State  -----------------------------------------  Present State 0 1  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  q0 q0, q3  q0, q1  q1 Ø q2  q2 q2 q2  q3 q4 Ø  q4 q4 q4  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Here q0 is the initial state and q4 is the final state) | **Cr** | **CO4** |
| **(OR)** | | | |
| 14 b) | From the identities of RE, prove that  10 + (1010)\* [^ + (1010)\*] = 10 + (1010)\*. | **Eva** | **CO4, CO5** |
| 15 a) | Construct an RE from the given FA by the algebraic method using Arden’s theorem.  Finite Automata | **Cr** | **CO3** |
| **(OR)** | | | |
| 15 b) | Construct an FA equivalent to the RE, L = (0 + 1)\* (10) + (00)\*(11)\*. | **Cr** | **CO4** |
| 16 a) | Design a CFG for {anbncmdm | n, m >= 1}. | **Cr** | **CO3, CO4** |
| **(OR)** | | | |
| 16 b) | Identify whether the following grammar is ambiguous or not.  S —> a / Sa / bSS / SSb / SbS | **App** | **CO3** |
| 17 a) | Modify the following grammar into CNF.  E —> E + T/T  T —> (E)/a | **Cr** | **CO3** |
| **(OR)** | | | |
| 17 b) | Design a PDA to accept the language L = {WCWR, where W ε (a, b)+ and WR is the reverse of W} by the empty stack. | **Cr** | **CO4** |