

Feb, 2022

**B.Tech. (IT/CE) 5th SEMESTER**

Formal Languages Automata &amp; Compiler Design PCC-CS-502

**Time: 90 Minutes****Max. Marks:75**

**Instructions:**

1. It is compulsory to answer all the questions (1 marks each) of Part -A in short.
2. Answer any four questions from Part -B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART -A**

Q1 (a) Define DFA and NDFA. [CO1] (1.5)

(b) Define PDA and TM. [CO1] (1.5)

(c) Define Melay and Moore Machine. [CO1] (1.5)

(d) Enumerate strings of exactly length five for the regular expression  $0(0 + 10)^*$ . (1.5) [CO2]

(e) Write the regular expression for the language  $\{0,01,001,0001,00001, \dots\}$  (1.5) [CO2]

(f) What is the use of Arden's theorem? [CO2] (1.5)

(g) What do you mean by Non-Deterministic TM? [CO3] (1.5)

(h) Name all the phases of Compilers. [CO3] (1.5)

(i) Differentiate between Compiler and interpreter. [CO3] (1.5)

(j) What do you mean by ambiguous grammar? [CO4] (1.5)

**PART -B**

Q2 (a) Prove that  $\{a^p \mid p \text{ is prime number and } a \in \Sigma\}$  is not regular. [CO1] (7.5)

(b) Design DFA which will accept a substring 0100. [CO2] (7.5)

Q3 (a) Design DFA which will accept all strings whose length is multiple of three. (5) [CO1]

(b) Minimize the following DFA  $M = (\{q_0, q_1, q_2, q_3, q_4, q_5, q_6\}, \{a, b\}, \delta, q_0, \{q_4\})$  (10) where  $\delta$  is given as:  $\delta(q_0, a) = q_1, \delta(q_0, b) = q_3, \delta(q_1, a) = q_2, \delta(q_1, b) = q_5, \delta(q_2, a) = q_3, \delta(q_2, b) = q_4, \delta(q_3, a) = q_0, \delta(q_3, b) = q_5, \delta(q_4, a) = q_0, \delta(q_4, b) = q_6, \delta(q_5, a) = q_1, \delta(q_5, b) = q_4, \delta(q_6, a) = q_1, \delta(q_6, b) = q_3$ . [CO3]

Q4 Design a TM for the language  $M = \{0^n 1^n 2^n \mid n > 0\}$  and specify the given language (15) is recursive enumerable or recursive language. [CO4]

Q5 (a) Design a TM for deciding the language  $M = \{w\#w^r \mid w \in (a + b)^*\}$  [CO4] (7.5)

(b) Design DPDA which will recognize the elements of following set (7.5)  $\{0^n 1^m 2^n \mid n \geq 0, m > 0\}$  [CO4]

Q6 Define following [CO3] (7.5)  
(a) Left linear grammar and right linear grammar (7.5)  
(b) Define Context Sensitive Grammar (7.5)

Q7 Write short notes on [CO4] (5)  
(a) Symbol Table (5)  
(b) Intermediate Code Generation (5)  
(c) Machine Code Generation and Optimization (5)

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