

Feb, 2022

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

Formal Languages Automata & 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 $\{a^p | p \text{ is prime number and } a \in \Sigma\}$ 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 δ 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 $M = \{0^n 1^n 2^n | n > 0\}$ and specify the given language (15)
is recursive enumerable or recursive language. [CO4]
- Q5 (a) Design a TM for deciding the language $M = \{w\#w^r | w \in (a + b)^*\}$ [CO4] (7.5)
- (b) Design DPDA which will recognize the elements of following set (7.5)
 $\{0^n 1^m 2^n | n \geq 0, m > 0\}$ [CO4]

- Q6 Define following [C03]
- (a) Left linear grammar and right linear grammar (7.5)
 - (b) Define Context Sensitive Grammar (7.5)
- Q7 Write short notes on [C04]
- (a) Symbol Table (5)
 - (b) Intermediate Code Generation (5)
 - (c) Machine Code Generation and Optimization (5)
