



B.Tech V Semester Regular Examinations, February 2021

THEORY OF COMPUTATION
(Computer Science and Engineering)

Maximum Marks: 70

Date: 22.02.2021 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

- 1 Define transition diagram.
- 2 Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings ending in 00.
- 3 Define Regular expression. Give an example.
- 4 State the pumping lemma for Regular languages
- 5 Define the term Ambiguity in grammars
- 6 Define derivation tree for a CFG(or) Define parse tree.
- 7 What are useless symbols in a grammar?
- 8 Define instantaneous description of a Turing Machine.
- 9 Define PDA.
- 10 Differentiate between recursive and recursively enumerable languages.

Part-B

Answer All the following questions. (10M X 5=50Marks)

- 11 a) Construct a DFA equivalent to the NFA.
 $M = (\{p, q, r\}, \{0, 1\}, \delta, p, \{q, s\})$ Where δ is defined in the following table. (5M)

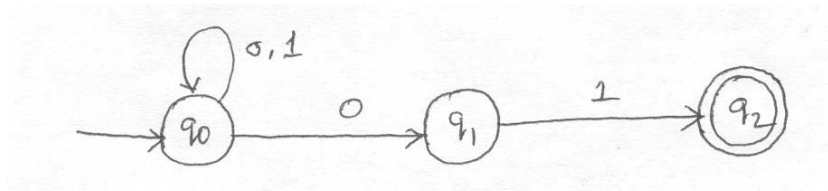
δ	0	1
p	{q,s}	{q}
q	{r}	{q,r}
r	{s}	{p}
s	-	{p}

- b) Prove that a language L is accepted by some DFA if L is accepted by some NFA. (5M)
OR

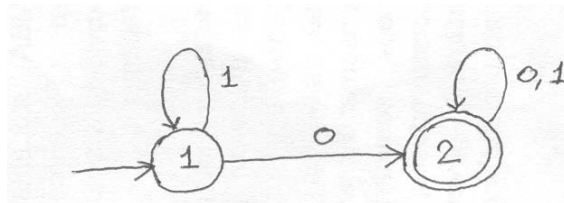
- 12 a) Consider the following ϵ -NFA. Compute the ϵ -closure of each state and find its equivalent DFA. (5M)

	ϵ	A	b	C
p	$\{q\}$	$\{p\}$	Φ	Φ
q	$\{r\}$	ϕ	$\{q\}$	Φ
*r	Φ	ϕ	ϕ	$\{r\}$

b) Construct DFA equivalent to the NFA given below: (5M)



- 13 a) Obtain the regular expression that denotes the language accepted by the following DFA. (5M)

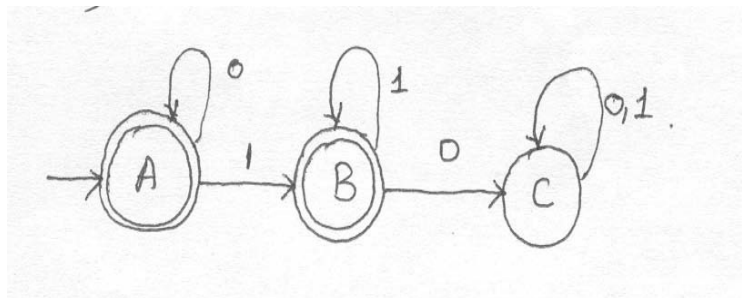


b) Show that the set $E = \{0^i 1^i \mid i \geq 1\}$ is not Regular. (5M)

OR

- 14 a) Construct an NFA equivalent to $(0+1)^*(00+11)$ (5M)

b) Find the regular expression corresponding to the finite automaton given below. (5M)



15 a) Let G be a grammar $s \rightarrow OB/1A$, $A \rightarrow O/OS/1AA$, $B \rightarrow 1/1S/OBB$. For the string 00110101 find its leftmost derivation and derivation tree. (5M)

b) Construct PDA for the language $L = \{ww^R \mid W \text{ in } (a+b)^*\}$ (5M)

OR

16 Construct a PDA that recognizes the language (10M)

$\{a^i b^j c^k \mid i, j, k > 0 \text{ and } i=j \text{ or } i=k\}$.

17 a) Design a Turing Machine to accept the language $L = \{0^n 1^n \mid n \geq 1\}$ (5M)

b) Is $L = \{a^n b^n c^n \mid n \geq 1\}$ a context free language? Justify Your answer. (5M)

OR

18 a) Convert the following CFG to CNF $S \rightarrow ASA \mid aB$ $A \rightarrow B \mid S$ $B \rightarrow b \mid \epsilon$ (5M)

b) Explain about Greibach Normal Form. (5M)

19 a) Explain Chomsky hierarchy of languages and their respective recognizers and grammars. (5M)

b) Define Post correspondence problem with an example. (5M)

OR

20 a) Show that halting problem of Turing Machine is undecidable. (5M)

b) Explain P and NP classes of problems. (5M)