B.TECH. SEM -V INFO. TECH. 2014 COURSE (CBCS) :
SUMMER - 2018

SUBJECT: THEORY OF AUTOMATA AND FORMAL LANGUAGES

Day : **Monday** | **S-2018-2357** | Time : **10.00 AM TO 01.00 PM**
Date : **21/05/2018** | Max.Marks:60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data if necessary

Q.1 **a)** Construct DFA equivalent to NFA ({P,Q,R,S} {0,1}, δ, P, {Q,S}) where δ is **(06)**

∑ / States	0	1
P	{Q,R}	Q
Q	R	{Q,R}
R	S	P
S	-	P

b) Design a finite Automata to accept string starting with '00' and ending with '1' consider ∑ = {0.1} **(04)**

OR

Q.1 **a)** Construct Mealy machine for the Moore machine given below **(06)**

Present State	Next state		Output
	a=0	a=1	
Q1	Q1	Q2	0
Q2	Q1	Q3	0
Q3	Q1	Q3	1

b) Design a finite automata over ∑={0,1} to accept even number of 0's and even number 1's. **(04)**

Q.2 **a)** Draw NFA with ε-moves for the regular expression given as $a.(a+b)^*(b+a)^+$ **(06)**

b) Write a short note on pumping lemma for regular expression. **(04)**

OR

Q.2 **a)** Prove that the language $L = \{ a^n b^{n+1} \mid n>0 \}$ is non-regular using pumping lemma. **(06)**

b) Write regular expression for **(04)**
i) String starting with a and ending with bb.
ii) String with even number of a's and even number of b's

Q.3 Write grammar generating all strings consisting of a's and b's with at least two a's. **(10)**

OR

Q.3 **a)** Find CFL associated with the CFG given below **(06)**
S ⟶ aB | bA
A ⟶ a | aS |bAA
B ⟶ b | bS |aBB

b) State and explain grammar simplification methods. **(04)**

Q.4 Construct PDA accepting palindrome strings of a's and b's. **(10)**

OR

Q.4 Construct PDA for 0^n10^{n+2} where ∑={0,1} **(10)**

Q.5 Design a Turing machine to replace string 110 by 101 in a binary input string. **(10)**

OR

Q.5 Write a short note on applications of Turing machines **(10)**

Q.6 Describe application of regular expression in text editor. **(10)**

OR

Q.6 Give applications of automata theory in compiler construction. **(10)**

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