REGISTRATION NUMBER | | | | | | | | | | |

SRINIX COLLEGE OF ENGINEERING

2nd INTERNAL EXAMINATION-2021-22

Subject-**FLAT** Semester-**5th** Branch-**CSE**

Full Mark-**100** Time-**2.30Hrs**

ANSWER ALL THE QUESTIONS (GROUP-A) [2*10]

1. What do you mean by non-deterministic finite automata ?
2. Compare NFA and PDA.
3. Differentiate between grammar and language with an example.
4. Discuss the significance of a stack in PDA
5. Define TM with its tuple specifications.
6. Find out the regular expression for the following languages.
   i) Regular expression containing even number of 0s
   ii) Regular expression to generate a string with any number of zeros followed by any number of ones but starts with 00
7. Consider ∑ ={0,1} ,Enlist all possible strings present in third power of this alphabet.
8. What is the formal definition of DFA?
9. Write down any four closure properties of regular expression.
10. Which language is recognized by PDA? Also mention the name of automata which accepts all regular languages.

ANSWER ANY EIGHT QUESTIONS (GROUP-B) [6*8]

1.Convert the following context free grammar to Chomsky's Normal Form (CNF)

S → ASA/ aB`

A → B/ S

B → B/ €

2. Design a PDA for the following language, L= { $a^n b^n$ / n>0 }

3. Design a DFA over the alphabet {a,b}accepting strings that does not contain exactly two a's.

Show the transition diagram and transition table.

4.Explain the Chomsky's hierarchy with a suitable diagram.

5. Let G be the grammar, S → 0B / 1A

A ⟶ 0 / 0S / 1AA

B ⟶ 1 / 1S / 0BB

For the string 00110101, find (a) the left most derivation

(b) the right most derivation

(c)the derivation tree

6. Define Ackerman's function. Find out the values of A(1,2) and A(1,1) .

7. i) Design a Turing machine that accepts the language of all strings which contain aba as a substring.

ii) Design a Turing machine that recognizes the language of all strings of even length over alphabet {a,b}

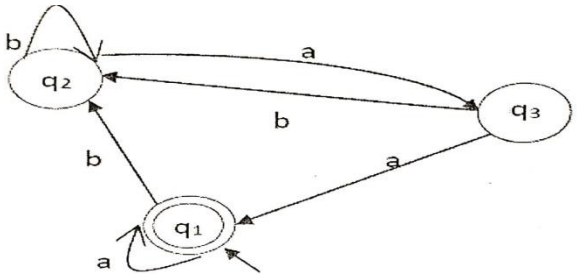
8. Write a short note on pumping lemma for context free language.

9. Given NFA is

δ / $\sum$	a	b
$\rightarrow q_0$	$\{q_0 , q_1\}$	$\{q_2\}$
q_1	$\{q_0\}$	$\{q_1\}$
$^{*}q_2$	ϕ	$\{q_0 , q_1\}$

Convert it into DFA.

10. Construct the regular expression from the given state transition diagram.



ANSWER ANY TWO QUESTIONS (GROUP -C) **[16*2=32]**

1. Design PDA for the grammar G = (V_n , V_t , P , S)
   where V_n ={ S }
   V_t = {a , b , c }
   and P is defined as S ⟶ aSa
   S ⟶ bSb
   S ⟶ c
   Check the acceptance of string w = abbcbba

2. Design the automata for regular expressions i) **a. $(a+b)^*$. b . b**

   ii) **$(0+1)^*$ 1 (0+1)**

3. State and prove pumping lemma for regular languages.

   Prove that language L= { $a^n b^n$ / n>0 } is not regular