WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Vishrambag, Sangli – 416415

Second Year B.Tech. Computer Science and Engineering
Re-Exam, Odd and Even Semester AY 2022-23
Formal Language and Automata Theory (6CS221)

Re-Exam

PRN: _____

Day & Date: Thursday, 14/09/2023 Time : 02.00 pm to 05.00 pm Max Marks: **100**

IMP: Verify that you have received question papers with correct course code, branch etc.

Instructions
a) All questions are compulsory.
b) Writing question number on answer book is compulsory otherwise answers may not be assessed.
c) Assume suitable data wherever necessary.
d) Figures to the right of question text indicate full marks.
e) Mobile phones, smart gadgets and programmable calculators are strictly prohibited.
f) Except PRN anything else writing on question paper is not allowed.
g) Exchange/Sharing of stationery, calculator etc. not allowed.

Text on the right of marks indicates course outcomes (Only for faculty use)

			Marks	
Q1	A)	**What is regular expression? Write down the regular expression 'r' for the language which defines following set of strings** **1. L (r) = { ε, X, XX, XXX, XXXX, XXXXX}** **2. L (r) = { aaa, aab, aba, abb, baa, bab, bba, bbb}**	6	CO2
	B)	**Describe the language L(r) in simple English represented by following regular expressions** **1. (1+10)*** **2. (aa)* (bb)* b**	4	CO2
	C)	**State and explain with suitable example pumping lemma for Regular Language**	5	CO1
Q2	A)	**What is Finite State Machine (FSM)? Explain DFA and NFA with suitable example**	6	CO1
	B)	**Define NFA with ε- transition and demonstrate the procedure to convert NFA to its equivalent DFA using suitable example.**	7	CO3
	C)	**List down the rules for replacement of any two states (A and B) during minimizing FA, when these two states are equivalent.**	3	CO1
		State and explain Kleen's theorem part-I	5	CO1

0DE15273153468F5654DE20167C46AEF

Q3 A) What is Derivation Tree? Derive the string ' aabbaa' considering following grammar and draw the derivation tree for the same. 6

G = ({S, A}, {a,b}, P, S) where P consists of

S --> aAS |a A --> SbA | SS | ba

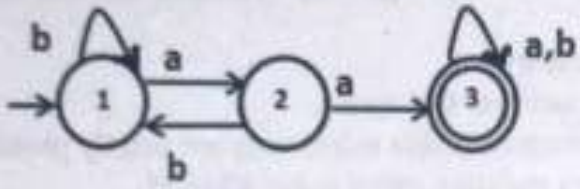
B) What is Context Free Grammar (CFG)? Explain with suitable example. 4

C) Prove that following grammar is an ambiguous grammar. Re-write the grammar by removing its ambiguity 5

S --> iCtS | iCtSeS |a

C --> b

Q4 A) Construct a PDA recognizing the language accepted by the DFA given below 5



B) Define PDA, explain with suitable example how PDA is more powerful than Finite Automata. 6

C) What is parse tree? Demonstrate with suitable example how parse tree is used to derive a string using Top-down and Bottom-up parsing techniques 6

Q5 A) Explain Backus Normal Form (BNF) and Greibach Normal Form (GNF) with suitable example 6

B) Convert following CFG into Chomsky Normal Form 5

S--> bA | aB A --> bAA | aS | a B --> aBB | bS |b

Q6 A) What is Composite TM? Explain Nondeterministic Turing Machine with suitable example and explain the conditions for ACCEPT and REJECT scenario in case of non-deterministic Turing Machine 7

B) Define Turing machine and design a Turing Machine to find 2's complement of given binary number 8

C) What is doubly-infinite tape Turing Machine? Demonstrate the working of multi tape Turing Machine 6

..... End of question paper .....