WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Visharambag, Sangli – 416415

Second Year B.Tech. Computer Science and Engineering

ESE, EVEN SEMESTER, AY 2023-24

Formal Language and Automata Theory (6CS221)

ESE

PRN: _____

Day & Date: Tuesday, 14/05/2024   Time : 3.00 pm to 5.00 pm

Max Marks: 50
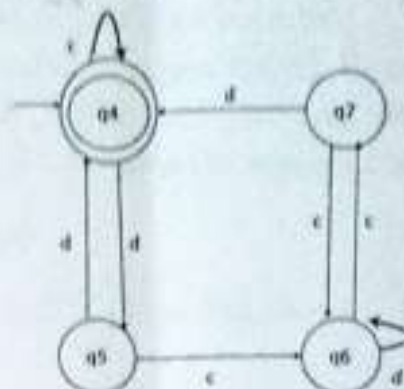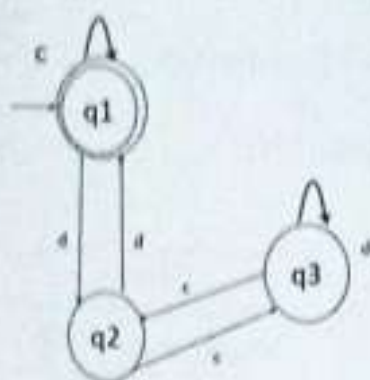
IMP: Verify that you have received question papers with correct course code, branch etc.

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)	Define Push Down Automata (PDA) and Compare PDA with Finite Automata.	4	CO1
	B)	Write down the stepwise algorithm and construct a PDA for the language $L = \{ X, aXa, bXb, aaXaa, abXba, baXab, bbXbb, aaaXaaa,\ldots\ldots \}$	5	CO3
	C)	Demonstrate Bottom-up parsing with suitable example	3	CO2
Q2	A)	Explain BNF, CNF and GNF with suitable example	6	CO1
	B)	Convert the following CFG into Chomsky Normal Form (CNF). $S \rightarrow ABA$ $A \rightarrow aA \mid \varepsilon$ $B \rightarrow bB \mid \varepsilon$	4	CO2
Q3	A)	Explain general working of a Turing Machine and design a Turing Machine to find the 2's complement of a given binary number.	7	CO3
	B)	Explain in short 1) Simulation of Multitape TM to a Single Tape TM 2) Nondeterministic Turing Machine	6	CO1
Q4	A)	What is pumping Lemma for CFG ? Demonstrate with suitable example.	5	CO2

B) What is the condition for equivalence of two DFAs? Prove that following DFAs are equivalent/not equivalent

5

C) List down the rules for replacement of any two states (A and B) during minimizing FA, when these two states are equivalent.

2

D) What is regular expression? Write down the regular expression 'r' for the language L which accepts all strings of a's and b's containing even number of a's followed by odd number of b's

3

······*End of question paper*······