K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2023
(B.Tech .) Program: Computer Engineering   Scheme I/II/IIB/III: II
Examination: TY   Semester: V
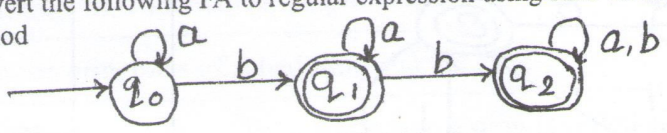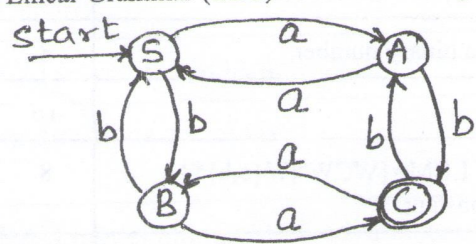Course Code: CEC501 and   Course Name: Theory of Computer Science

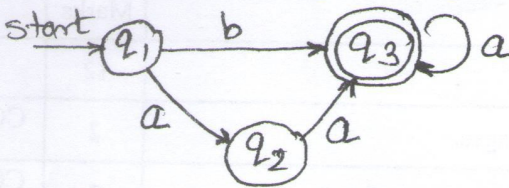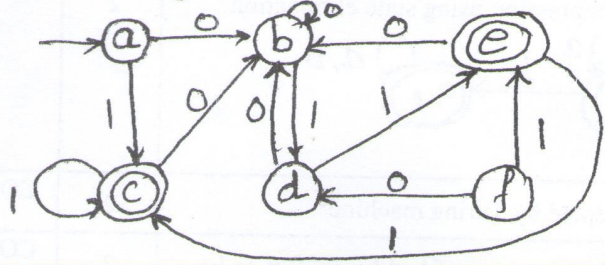Date of Exam: 28/11/2023   Duration: 2.5 Hours   Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight	12		
i)	Explain decision properties of regular languages.	2	CO2	U
ii)	What is the language generated by the grammar G = (V,T,P,S) where P={S->aSb, S->ab}	2	CO3	Ap
iii)	Differentiate between recursive and recursively enumerable languages	2	CO6	U
iv)	Difference between DPDA and NPDA.	2	CO4	U
v)	Convert the following FA to regular expression using state elimination method	2	CO1	Ap
vi)	Write in short which language is accepted by Turing machine	2	CO5	U
vii)	Design Moore machine to count each occurrence of 'aab' over Σ = {a,b}	2	CO1	Ap
viii)	Give a Left Linear Grammar (LLG) for the following DFA.	2	CO5	Ap
Q 2	Solve any four questions out of six.	16		
i)	Design Mealy machine to output even and odd depending on the number of 1's are even and odd over Σ = {a,b}	4	CO1	Ap
ii)	Explain Post Correspondence Problem with an example.	4	CO6	U

Nov – Dec 2023 ✓
(B.Tech .) Program: Computer Engineering   Scheme I/II/IIB/III: II
Examination: TY   Semester: V
Course Code: CEC501 and   Course Name: Theory of Computer Science

Date of Exam: 28/11/2023   Duration: 2.5 Hours   Max. Marks: 60

iii)	Design PDA to check well-formed parentheses.	4	CO4	Ap
iv)	Convert the following CFG to GNF S->AA|a A->SS|b	4	CO3	Ap
v)	Find regular expression for following DFA using Arden's theorem. 	4	CO2	Ap
vi)	Design Turing machine that accepts the strings over $\Sigma = \{0,1\}$ and converts every occurrence of 111 to 101	4	CO5	Ap
Q.3	Solve any two questions out of three.	16		
i)	Convert the following into minimized DFA 	8	CO1	Ap
ii)	Reduce the following S-> aS | A| C A-> aB | d | ϵ B-> cB | ad | ϵ C-> aB | db	8	CO3	Ap
iii)	Design TM to perform 2's complement of a binary number.	8	CO5	Ap
Q.4	Solve any two questions out of three	16		
i)	Design PDA for the following language of LCM=$\{WCW^R\|W\{a,b\}*\}$, where W^R is the reverse of W and C is a constant.	8	CO4	An
ii)	Design Turing machine for recognizing L=$\{a^{2n}b^{2n}\|n>=1\}$.	8	CO5	An
iii)	Explain in detail the closure properties of Regular languages.	8	CO2	U

****