26/05/2023

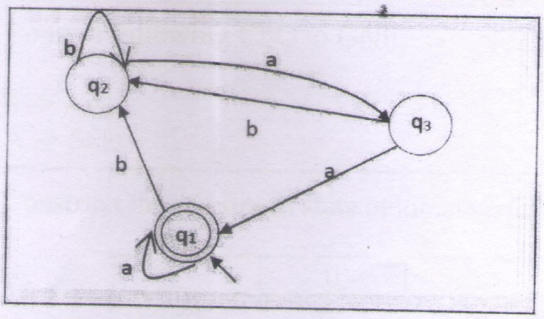
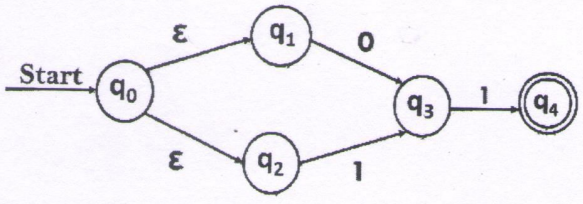
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Subject Code: CEC501 Subject Name: Theory of Computer Science
Date:

May-June-2023
B.Tech Program
Examination: TY Semester: V
Course Code: CEC501 and Course Name: Theory of Computer Science
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)	Differentiate between DFA and NFA.	**2**	CO1	U
ii)	Design a Moore machine to decrement a binary number	**2**	CO1	An
iii)	Give regular expression for a set of all strings over {0,1} with even number of 1's followed by odd number of 0's	**2**	CO2	An
iv)	Explain decision properties of regular languages.	**2**	CO2	U
v)	Eliminate Unit productions from S->ABA|BA|AA|AB|A|B A->aA|a B->bB|b	**2**	CO3	Ap
vi)	Difference between DPDA and NPDA.	**2**	CO4	U
vii)	Explain Universal Turing machine.	**2**	CO5	U
viii)	Differentiate between partially decidable languages and undecidable languages	**2**	CO6	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	Design a DFA which can accept a ternary number divisible by 4	**4**	CO1	An

ii)	 Give Regular expression for the given FSM using Arden's Theorem.	4	CO2	An
iii)	What is ambiguous grammar? Check whether following grammar is ambiguous or not? $S \rightarrow aS \mid \varepsilon$ $S \rightarrow aSbS$	4	CO3	Ap
iv)	Design Push Down Automata for $a^{2n}\ b^n$ for n>0.	4	CO4	An
v)	Design a Turing machine to compare two numbers, which will produce the output L if first number is less than the second number, output G if first number is greater than the second number and E otherwise.	4	CO5	An
vi)	Explain Post Correspondence Problem with an example	4	CO6	U
Q.3	**Solve any two questions out of three.**	**16**		
i)	Convert NFA with ε into its equivalent DFA. 	8	CO1	Ap
ii)	Design NPDA for ww^R where w ε (a,b)*.	8	CO4	An
iii)	Design a Turing machine for multiplication of two unary numbers.	8	CO5	An
Q.4	**Solve any two questions out of three.**	**16**		
i)	Explain the closure properties of regular languages.	8	CO2	U

ii)	Convert following CFG to GNF S -> AA|a A -> SS|b	**8**	CO3	Ap
iii)	Construct the minimum state automata equivalent to given DFA	**8**	CO1	An

	0	1
$->q_0$	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
$*q_3$	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3