

University of Mumbai
Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Program: **Computer Engineering**

Curriculum Scheme: Rev2012

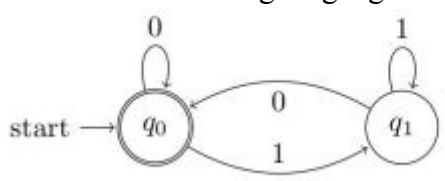
Examination: Second Year Semester IV

Course Code: CSC405 and Course Name: Theoretical Computer Science

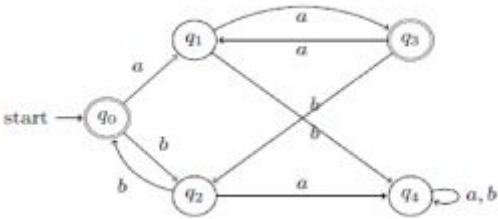
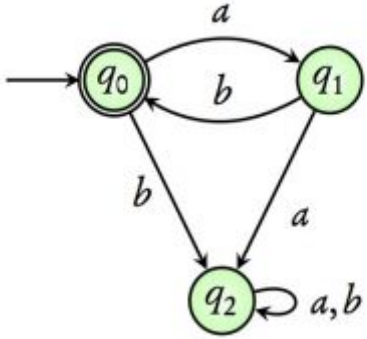
Time: 1 hour

Max. Marks: 50

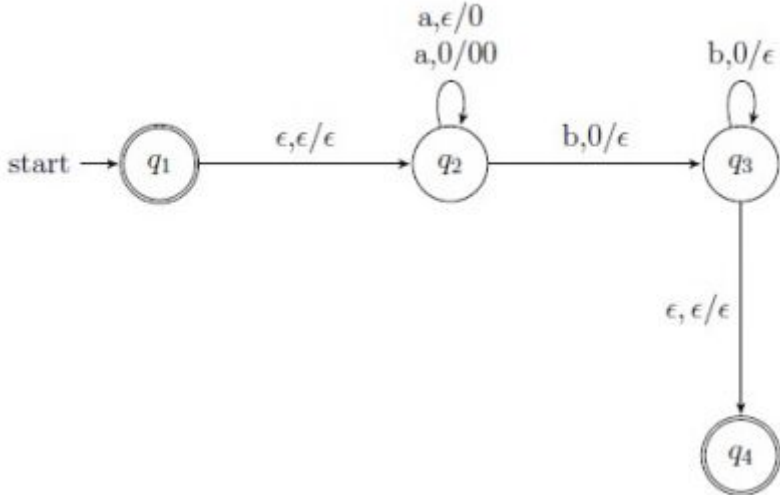
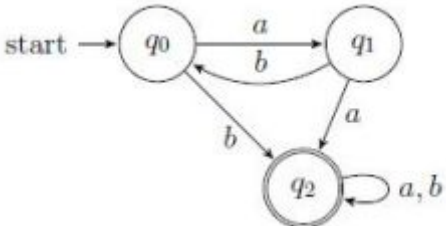
For the students:- All the Questions are compulsory and carry equal marks .

Q1.	Context Sensitive grammar is which type of grammar in chomsky heirarchy
Option A:	Type-0
Option B:	Type-1
Option C:	Type-2
Option D:	Type-3
Q2.	Which of the following language is accepted by given DFA? 
Option A:	{w w ends with 0}
Option B:	{w w contains equal number of 0 and 1}
Option C:	{w w does not ends with 1}
Option D:	{w w contains 1 and ends with 0}
Q3.	In an given NFA with n states, the maximum number of states in an equivalent DFA is
Option A:	2
Option B:	2^n
Option C:	$2^{(n-1)}$
Option D:	$\log n$
Q4.	Given $L = \{ab, baa\}$ which of the following is not in L^*
Option A:	ababaaab
Option B:	abbaaab
Option C:	baaabbaa
Option D:	baabaaab
Q5.	Compute the string accepted by given NFA.

Option A:	All strings ending with 00
Option B:	All string ending with 00 and empty string
Option C:	All strings containing 00
Option D:	All strings containing 00 and empty string
Q6.	The number of states in minimum DFA corresponding to the language $(0+1)^*(10)$
Option A:	2
Option B:	3
Option C:	4
Option D:	5
Q7.	Which statement is TRUE?
Option A:	NFA computes on multiple paths simultaneously
Option B:	NFA computes on multiple paths but not simultaneously
Option C:	NFA computes on single paths simultaneously
Option D:	NFA computes on single paths but not simultaneously
Q8.	Which of the following string is accepted for given NFA
Option A:	1000101
Option B:	111010111
Option C:	1100001
Option D:	1000110
Q9.	Consider the grammar $S \rightarrow AB$

	$A \rightarrow aa ab ba bb$ $B \rightarrow aBa bBb C$ $C \rightarrow aa ab ba bb$ Identify the string generated from given G.
Option A:	bababbab
Option B:	abaab
Option C:	aaabbabba
Option D:	babaa
Q10.	Consider the following DFA  What will be the number of states in minimum DFA for the given DFA.
Option A:	2
Option B:	3
Option C:	4
Option D:	5
Q11.	Which of the following regular expression determines the Grammar given below: $S \rightarrow aSb \text{epsilon}$ $S \rightarrow aA bB$ $A \rightarrow aA bB \text{epsilon}$ $B \rightarrow bB aA \text{epsilon}$
Option A:	$a^n(a+b)^*b^n$ where $n > 0$
Option B:	$a^n(a+b)^*b^n$ where $n \neq 0$
Option C:	$(a+b)^*$
Option D:	$\{a^nb^n, n \geq 0\}$
Q12.	Identify the correct option for given Automaton 
Option A:	$(a+b)^*$
Option B:	$(ab)^*$
Option C:	a^*b^*
Option D:	$a^*a + b^*$

Q13.	The regular expression $(a^* + b)^*$ is equivalent to which of the following?
Option A:	a^*b^*
Option B:	$(a^*b+b)^*$
Option C:	$(a+b^*)^*$
Option D:	$(a^*b)^*$
Q14.	Which of the following statement is TRUE?
Option A:	PDA is not an NFA with Stack
Option B:	Size of a stack of an PDA is finite
Option C:	PDA and CFG are equivalent
Option D:	PDA and CFG are not equivalent
Q15.	Which of the following statement TRUE?
Option A:	A language accepted by an regular expression is also accepted by some NFA and some DFA
Option B:	A language accepted by an regular expression is also accepted by some NFA but not necessarily accepted by some DFA
Option C:	A language accepted by na regular expression may not be accepted by NFA and DFA.
Option D:	A language accepted by an regular expression is also accepted by some DFA but not necessarily accepted by some NFA
Q16.	Regular expression is not closed under
Option A:	Intersection
Option B:	Difference
Option C:	Concatenation
Option D:	Union
Q17.	Consider the given CFG $S \rightarrow ASA \mid aB$ $A \rightarrow B \mid S$ $B \rightarrow b \mid \epsilon$ How many non terminals need to be added to convert the above grammar to CNF?
Option A:	1
Option B:	4
Option C:	2
Option D:	3
Q18.	Consider the Grammar 1. $S \rightarrow AS$ 2. $S \rightarrow AAS$ 3. $A \rightarrow AS$ 4. $A \rightarrow aa$ which of the following denies the format of CNF?
Option A:	2,4
Option B:	1,3

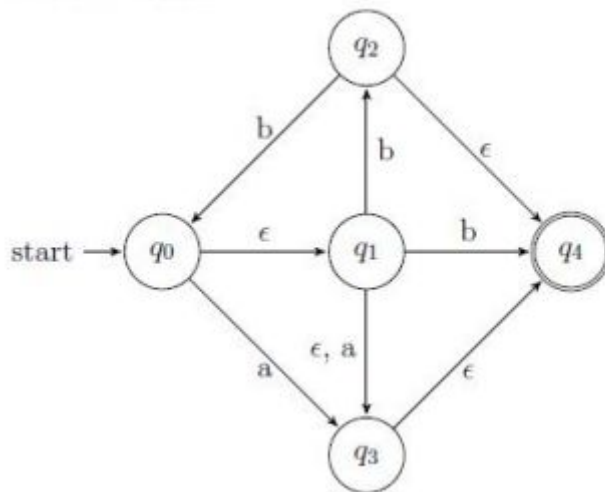
Option C:	1,2,3,4
Option D:	2,3,4
Q19.	The GNF Grammar for the language $L = \{a^n b^{n+1} n \geq 0\}$ is
Option A:	$S \rightarrow aSB b, B \rightarrow bB \epsilon$
Option B:	$S \rightarrow aSB b, B \rightarrow bB b$
Option C:	$S \rightarrow aSB b, B \rightarrow b$
Option D:	$S \rightarrow aSB b, B \rightarrow bb$
Q20.	Which of the following language is accepted by given PDA?
	
Option A:	$\{0^n 0^n n \geq 0\}$
Option B:	$\{0^n 1^n n \geq 0\}$
Option C:	$\{0^n 1^m n \geq 0, m \geq 0\}$
Option D:	$\{0^n 1^m n = 2m\}$
Q21.	CFL is closed under
Option A:	Union
Option B:	Concatenation
Option C:	Bont A & B
Option D:	Intersection
Q22.	Which of the following is the transition state for given DFA?
	

Option A:	<table border="1"> <tr><td></td><td></td><td>a</td><td>b</td></tr> <tr><td>→</td><td>q₀</td><td>q₁</td><td>q₂</td></tr> <tr><td></td><td>q₁</td><td>q₂</td><td>q₀</td></tr> <tr><td>*</td><td>q₂</td><td>q₂</td><td>q₂</td></tr> </table>			a	b	→	q ₀	q ₁	q ₂		q ₁	q ₂	q ₀	*	q ₂	q ₂	q ₂
		a	b														
→	q ₀	q ₁	q ₂														
	q ₁	q ₂	q ₀														
*	q ₂	q ₂	q ₂														
Option B:	<table border="1"> <tr><td></td><td></td><td>a</td><td>b</td></tr> <tr><td>→</td><td>q₀</td><td>q₁</td><td>q₁</td></tr> <tr><td></td><td>q₁</td><td>q₂</td><td>q₂</td></tr> <tr><td>*</td><td>q₂</td><td>q₀</td><td>q₀</td></tr> </table>			a	b	→	q ₀	q ₁	q ₁		q ₁	q ₂	q ₂	*	q ₂	q ₀	q ₀
		a	b														
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→	q ₀	q ₂	q ₁														
	q ₁	q ₀	q ₂														
*	q ₂	q ₂	q ₂														

Q23. Which of the following is true in a non deterministic halting TM ?

- Option A: The tape T is same as the input alphabet
- Option B: x belongs to L(M) if and only if M accepts x on only one computational path
- Option C: on an input x, M halts on all computational path
- Option D: x belongs to L(M) if and only if M accepts x on atleast one computational path and may or may not halt on other computational paths

Q24. ϵ closure of q_0 is



- Option A: q₁,q₂,q₃
- Option B: q₀,q₁,q₂,q₃
- Option C: q₀,q₁,q₃,q₄
- Option D: q₀,q₁,q₂,q₃,q₄

Q25.	The value of n in turing machine is defined using n-tuples:
Option A:	6
Option B:	7
Option C:	8
Option D:	5