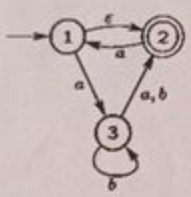
PEC UNIVERSITY OF TECHNOLOGY
End-Term Examination (21221)

Programme: **B. Tech (CSE)**
Course Name: **TOC**
Maximum Marks: 55

Year/Semester: 5th **Sem.**
Course Code: **CSN301**
Time allowed: **02 Hours**

- All questions are compulsory. Write answers precisely.
- The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right **course code**.

Q No.		Marks
1.	a) Construct finite automata equivalent to the following regular expressions (step by step). **((0+1)(0+1))*+((0+1)(0+1)(0+1))***	5
	b) Design and explain step by step Turing Machine for computing " Concatenate two strings w1 and w2 , where each string is generated over {1,b}"	5
	c) Consider the language L = {w ∈ (a, b)* ; w has an odd number of a's}	2+3
	(i) Write a regular grammar for L.	
	(ii) Use that grammar to derive a (possibly nondeterministic) FSA to accept L.	
2.	a) Write the Instantaneous descriptions and design PDA which recognizes the set of strings over {a,b} where string length is odd and its middle symbol is a 'b'.	5
	b) Let M =({ q0,q1},{0,1},{Z0,x},δ,q0,Z0,φ) be a pushdown automata where transition function δ is given below. $\delta(q0,1,Z0)=\{(q0,XZ0)\}$, $\delta(q0,\varepsilon,Z0)=\{(q0,\varepsilon)\}$, $\delta(q0,1,x)=\{(q0,xx)\}$, $\delta(q1,1,x)=\{(q1,\varepsilon)\}$, $\delta(q0,0,x)=\{(q1,x)\}$ and $\delta(q,0,Z0)=\{(q1,Z0)\}$ What is the language accepted by this PDA? Describe informally the working of the PDA.	5
	c) Prove that the language L = { w ∈ {a, b}* | w = w^R } is not regular grammar.	5
3.	a) Convert the following grammars to Chomsky Normal Form: $S \rightarrow ASB$, $A \rightarrow aASA \mid a \mid \varepsilon$, $B \rightarrow SbS \mid A \mid bb$	5
	b) Convert the following CFG into Greibach normal form: $A_1 \rightarrow A_2 A_3$, $A_2 \rightarrow A_3 A_1$, $A_2 \rightarrow b$, $A_3 \rightarrow A_1 A_2$, $A_3 \rightarrow a$	5
	c) Consider the following grammar : $S \rightarrow bSe \mid PQR$, $P \rightarrow bPc \mid \acute{e}$, $Q \rightarrow cQd \mid \acute{e}$, $R \rightarrow dRe \mid \acute{e}$	

	Where S,P,Q,R are non-terminal symbols with S being the start symbol, b, c, d, e are terminal symbols and 'ε 'is the empty string. i) Recognize the grammar. ii) Find the smallest string that shows grammar is ambiguous.	2+3
4.	a) What is Post Correspondence Problem? How reduction works in the structure of undecidability proof? Design an instance and match of PCP to explore that the lists **M = (ab, bab, bbaaa)** and **N = (a, ba, bab)** include a Post Correspondence Solution?	5
	b) Find a DFA equivalent to NFA M=({q1,q2,q3},{a,b},q1,{q2} δ): Step by Step  	5
