

**University Institute of Engineering & Technology**

*(Recognised Under Section 2(f) and 12B of UGC)*

**Kurukshetra University, Kurukshetra**

<b>THEORY EXAMINATION – JAN 2021</b>	
<b>B.TECH -CSE</b>	<b>SEMESTER – V</b>

**TIME – 3 Hrs 15 Min**

**M.M. - 56**

**PAPER - PC-CS-303**

**SUBJECT- FORMAL LANGUAGE & AUTOMATA THEORY**

**INSTRUCTIONS TO BE FOLLOWED**

- Allotted time for examination is 3 hours 15 minutes that includes time for downloading the question paper, writing answers, scanning of answer sheets and E-mailing the PDF files to the designated Email ID.
- For CSE-A Regular Students, the Email ID is:- [btech5thcsea@kuk.ac.in](mailto:btech5thcsea@kuk.ac.in)
- For CSE-B Regular Students, the Email ID is:- [btech5thcseb@kuk.ac.in](mailto:btech5thcseb@kuk.ac.in)
- The candidates will be required to attempt 75% of the question paper (maximum) by choosing to their any best questions accumulating 56 marks.
- The PDF files should be saved as Roll No. and Subject Code. Proper attention should be given while sending the email and in the subject line, the Roll Number and Subject Code should be mentioned.
- Maximum Page Limit should be 20 (Twenty) for attempting the question paper on A4 sheets which could be downloaded and printed from the sample sheets given in the Kurukshetra University Examination guidelines.
- Over-attemptation should be avoided.
- Handwriting should be neat and clean and diagrams should be clear and contrasted.
- The candidate should not write their Mobile No. otherwise Unfair Means Case will be made.
- While attempting the paper, the candidate will use blue/black pen only.
- Before attempting the paper, the candidate will ensure that he/she has downloaded the correct question paper. No complaint for attempting wrong question paper by the candidate will be entertained.
- Candidate must ensure that he/she has put his/her signature on each page of the answer sheet used by him/her. Answer sheet without the signature of the candidate will not be evaluated.

## PART-A

**Q. No. – 1 Answer the following questions.**

**15**

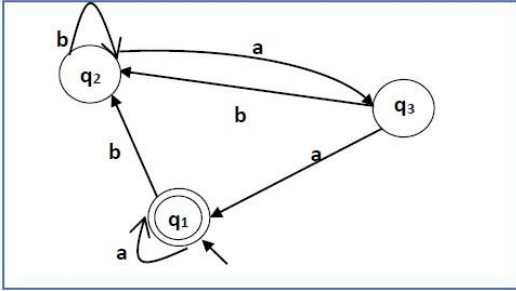
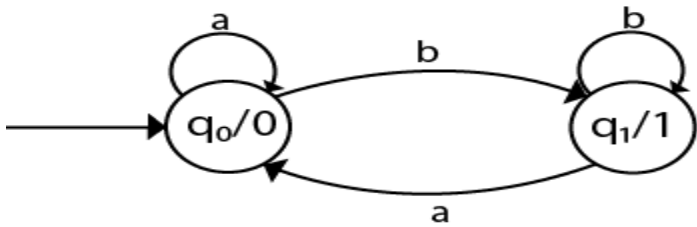
(i)	From the identities of RE, prove that $10+(1010)^*[\wedge+(1010)^*]=10+(1010)^*$ ----2
(ii)	What is the significance of $\epsilon$ -Moves.- ---2
(iii)	What are the application of pumping lemma.--2
(iv)	Compare NFA & DFA With example--3
(v)	What is a Turing machine used for?--2
(vi)	Define the terms alphabet, string, prefix, suffix, language give examples--2
(vii)	How do you know if a grammar is regular or not?---2

## PART-B

2	Design FA for decimal number divisible by 4	5
3	Write a Right linear grammar and left linear grammar for RE $(0+1)^*0$ and show derivation tree for 1010110.	5
4	Construct a PDA that accepts $L = \{ wwR \mid w = (a+b)^* \}$	5
5	What is Turing machines and also explain Time and Tape Complexity Measures of Turing machines. How is it different from PDA.	5

## PART-C

6	<p>(a) Give the Regular expression and corresponding DFA for all the words that begin and end with double letter.                  (b) Minimize the following DFA</p> <div style="text-align: center;"> </div>	10
7	<p>Convert the following NFA with <math>\epsilon</math> to NFA without <math>\epsilon</math>.</p> <div style="text-align: center;"> </div>	10
8	<p>(a) What is Ambiguous Grammar, find the following grammar is ambiguous or not?  <math>S \rightarrow S+S</math></p>	10

	<p> <math>S \rightarrow S^* S</math>  <math>S \rightarrow a</math>  <math>S \rightarrow b</math> </p> <p>(b) Construct a regular expression corresponding to the automata given below –</p> 	
9	<p>(a) Construct CFG for the following</p> <p>(i) Alternate sequences of 0 and 1.  (ii) Do not contain 3 consecutive b's</p> <p>(b) converting the following CFG into GNF</p> <p> <math>S \rightarrow XB \mid AA</math>  <math>A \rightarrow a \mid SA</math>  <math>B \rightarrow b</math>  <math>X \rightarrow a</math> </p>	10
10	<p>(a) Design Moore machine for binary adder.  (b) Construct PDA for the given CFG, and test whether 0104 is acceptable by this PDA.</p> <p> <math>S \rightarrow 0BB</math>  <math>B \rightarrow 0S \mid 1S \mid 0</math> </p>	10
11	<p>Convert the following Moore machine into its equivalent Mealy machine.</p> 	10
12	Design a Turing machine which can find out the multiplication of two unary numebrs.	10
13	Explain Post's Correspondence Problem (PCP) and Rice's Theorem in detail with the help of example.	10

