



COMSATS - Lancaster Dual Degree Programme
COMSATS Institute of Information Technology, Lahore

Lancaster University

☒ Sessional-I ☐ Sessional-II ☐ Terminal Examination - FALL 2017

Course Title	Automata Theory	Course Code	CSC312	Credit Hours	10/09
Course Instructor's	Dr. Ashfaq Ahmad	Programme Name	BS Computer Science		
Semester	3 rd	Batch	SP14-BCS	Section	A.D & C
Time Allowed:	60 Minutes	Maximum Marks:			20
Student's Name		Reg. No.			

Important Instructions / Guidelines:

- Answer all questions.
- Show your complete work, as partial credit will be given. You will be graded not only on the correctness of your answer, but also on the clarity and method correctness with which you express your answer.
- Do not give multiple answers to a question. Clearly cross out what you do not want me to read.
- Do not use lead pencil.
- Turn off your mobile phone, no silent mode.

Question 1:

[3+4]

Write down the recursive definitions of the language POLYNOMIAL of forming single variable polynomials and prove that $3X^2 - 7X - 9$ is in POLYNOMIAL according this definition.

Question 2:

[2+2]

Write the regular expression for the following descriptions of languages over the alphabet set $\Sigma = \{a, b\}$.

- The language of all the words that contain odd number of total b's.
- The language of all the words that do not end at aa.

Question 3:

[3+3+3]

Given the alphabet set $\Sigma = \{a, b\}$

- Construct an FA that accepts all the strings not containing the substring aaa.
- Construct an FA that accepts all the strings that starts with aa and end at bb.
- Construct an FA that accepts all the strings that do contain the substring bba.

$a^*(ba^*ba^*)^*b^*$
 $b(ba^*ba^*)^*a^*$





☐ Sessional-I ☒ Sessional-II ☐ Terminal Examination - SP 2017

Course Title:	Automata Theory			Course Code:	CSC112	Credit Hours:	3
Course Instructor/s:	Dr. Ashfaq Ahmad			Programme Name:	BS Computer Science		
Semester:	7 th	Batch:	SP14-BCS	Section:	A&B	Date:	
Time Allowed:	80 Minutes			Maximum Marks:	30		
Student's Name				Reg. No.			

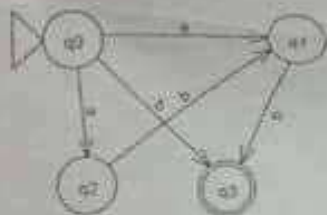
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- Switch off your mobile phones, no silent mode.

Question 1:

Convert the Following NFA to DFA

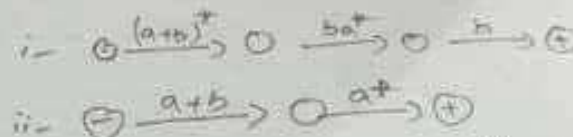
[6]



Question No: 2

Design NFAs for the following Regular Expressions:

- (i) $RE = (a+b)^*ba^*b$ The alphabet set is $\{a,b\}$
 (ii) $RE = (a+b)a^*$ The alphabet set is $\{a,b\}$

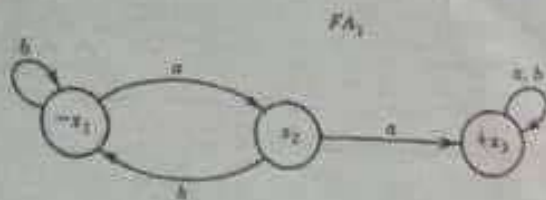
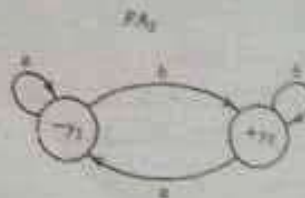


[6]

Question 3:

Given below are the FA1 that accepts all words with a double a in them and FA2 accepts all words ending in b. Design a machine that accepts the union of these two machines (i.e. Find $FA1 \cup FA2$).





Question No. 4

[6]

For the following DFA/FG, find the equivalent RE.

