INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

ASSIGNMENT

Course Name	:	**FORMAL LANGUAGES AND AUTOMATA THEORY**
Course Code	:	A40509
Class	:	II B. Tech II Semester
Branch	:	Computer Science and Engineering
Year	:	2016 – 2017
Course Faculty	:	Dr. K Rajendra Prasad , Professor Ms.N Mamatha, Assistant Professor Ms.M Sandhya Rani, Assistant Professor Ms.K Rashmi, Assistant Professor

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S. No.	Question	Blooms Taxonomy Level	Course Outcome
	UNIT – I		
1	**Construct** NFA for (0+1)*0(0+1)0(0+1)* and convert to DFA.	Apply	2
2	**Construct** NFA for (0+1)*010(0+1)* and Convert to DFA.	Apply	2
3	**Construct** NFA with Ɛ for 0*1*2* and Convert to NFA .	Apply	2
4	**Explain** the steps for the minimization of given DFA with an example.	Understand	2
5	**Construct** Mealy Machine for Residue Modulo of 5 for the ternary number system and convert to Moore Machines.	Apply	2
6	**Define** language over an alphabet with examples. Write a DFA to accept set of all strings ending with 010.	Remember	2
7	**Give** example for Minimize the DFA .	Understand	2
8	**Construct** a Moore machine to accept the following language. L = { w |w mod 3 = 0} on ∑ = { 0,1,2}	Apply	3
9	**Write** any four differences between DFA and NFA	Apply	2
10	**Convert** NFA with Ɛ to NFA with an example.	Understand	2
	UNIT – II		
1	**Explain** Identity rules . Give an example using the identity rules for the simplification	Remember	7
2	**Construct** Regular grammar for the given Finite Automata	Apply	7
3	**Convert** given Finite Automat to Regular Expression using standard method(R_{ij}^{K} method)	Understand	7
4	**Convert** Regular Expression ab* + b to Finite Automata.	Understand	7

S. No.	Question	Blooms Taxonomy Level	Course Outcome
5	**Convert** given Finite Automat to Regular Expression using Arden's theorem.	Understand	7
6	**Use** G be the grammar S →aB | bA A→a |aS |bAA B→ b | bS |aBB For the string aaabbabbba , Find a. Leftmost Derivation. b. Rightmost Derivation. c. Derivation Tree.	Apply	8
7	**Convert** Regular Expression (bb + a)*(aa + b)* to NFA with ε.	Understand	7
8	**Construct** Regular Grammars for Finite Automata a*(b (a + b))* .	Apply	7
9	**Construct** Finite Automata for A0 → a A1 A1 → b A1 A1 → a A1 → bA0.	Apply	7
10	**Convert** Regular Expression (a + b)*(aa + bb)(a + b)* to DFA.	Understand	7
	UNIT - III		
1	**Discuss** the Pumping lemma for Context Free Languages concept with example.	Understand	9
2	**Show** that the following grammar is ambiguous with respect to the string aaabbabbba. S→ aB | bA A→ aS| bAA| a B→ bS | aBB | b	Understand	8
3	**Use** the following grammar : S→ ABC | BbB, A→ aA | BaC|aaa B→ bBb| a|D C→CA|AC D→ ε Eliminate ε-productions. Eliminate any unit productions in the resulting grammar. Eliminate any useless symbols in the resulting grammar. Convert the resulting grammar into Chomsky Normal Form (CNF).	Apply	9
4	**Convert** the following grammar to GNF A1 →A2 A3 A2 → A3 A1 /b A3→ A1 A2 /a	Understand	9
5	**Write** the procedure to convert CFG to PDA and also convert the following CFG to PDA. PDA. S→ aABB |aAA A→ aBB | a B→ bBB | A C→ a	Apply	11
6	**Construct** PDA for equal number of x's and y's	Apply	10
7	**Convert** the following PDA to CFG δ(q0,0,z0)={q0,xz0) δ(q0,0,x)=(q0,xx) δ(q0,1,x)=(q1,ϵ) δ(q1,1,x) = (q1,ϵ) δ(q1,ϵ,x)=(q1,ϵ) δ(q1,ϵ,z0)=(q1,ε)	Understand	11
8	**Construct** a PDA to accept the language L ={$a^n b^n$ | n >= 1} by a final state. Draw the graphical representation of the PDA. Also show the	Apply	10

S. No.	Question	Blooms Taxonomy Level	Course Outcome
	moves made by the PDA for the string aaabbb		
9	**Construct** NPDA for L = { W W^R /W ϵ (X + Y)*} M = ({q1,q2},{0,1}.{R,B,G},δ,q1,R, ε}	Apply	10
10	**Show** that the following CFG ambiguous. S→ iCtS | iCtSeS | a C→ b	Understand	8
	UNIT – IV		
1	**Construct** a Turing Machine to accept the language L= { ww^R | w € (0 + 1) *}	Apply	12
2	**Construct** a Turing Machine that accepts the language L = {a^nb^n | n ≥1}. Give the transition diagram for the Turing Machine obtained	Apply	12
3	**Construct** a Turing Machine which shift non block symbols 2 cells to the right.	Apply	12
4	**Construct** a Turing Machine that accepts the language L = {0^n1^n | n ≥1}. Give the transition diagram for the Turing Machine obtained and also show the moves made by the Turing machine for the string 000111.	Apply	12
5	**Define** a Turing Machine. With a neat diagram explain the working of a Turing Machine.	Remember	12
6	**Define** Recursive and Recursively Enumerable languages? Write the properties of recursive and recursively enumerable languages.	Remember	12
7	**Construct** a Turing Machine that gives two's compliment for the given binary representation.	Apply	12
8	**Construct** a Turing Machine that accepts the language L = {$0^{2n}1^n$| n ≥0}. Give the transition diagram for the Turing Machine obtained.	Apply	12
9	**Construct** a Turing Machine that accepts the language L = {$1^n2^n3^n$ | n ≥1}. Give the transition diagram for the Turing Machine obtained and also show the moves made by the Turing machine for the string 111222333.	Apply	12
10	**Construct** a Turing Machine to implement Subtraction (m-n).	Apply	12
	UNIT – V		
1	**Explain** the concept of undecidability problems about Turing Machine	Remember	13
2	**Write** a short notes on Context sensitive language and linear bounded automata	Apply	4
3	**Explain** individually classes P and NP	Remember	13
4	**Write** a shot notes on post's correspondence problem	Apply	13
5	**Explain** the Halting problem with an example. Write a short notes on universal Turing machine.	Apply	13
6	**Construct** LR(0) for A → aAa/B B→b	Apply	5
7	**Write** a short notes on Chomsky hierarchy	Apply	4
8	**Write** a note on Modified PCP and Multi stack Turing machine.	Apply	13
9	**Write** a short notes on NP complete , NP hard problems	Apply	13
10	**Construct** LR(0) for S → E E → E*B E →E + B	Apply	5

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