Department of Computer Science and Engineering
National Institute of Technology Tiruchirappalli

1. Course Outline			
Course Title	Automata and Formal Languages		
Course Code	CSPC28		
Department	CSE	**No. of Credits**	4
Pre-requisites Course Code	CSPC11- Discrete Structures	**Faculty(s) Name**	Dr. R. Leela Velusamy Mr. R.Siranjeevi
E-mail	leela@nitt.edu jeevi@nitt.edu	**Telephone No.**	0431 – 2503201
Course Type	Core Course		

2.Course Overview

Automata and Formal Languages deals with practical problems related to computation of different languages

3. Course Objectives

- To introduce concepts in automata theory and theory of computation
- To identify different formal languages and their relationship
- To design grammars and recognizers for different formal languages

4. Course Outcomes (CO)

- Ability to relate practical problems to languages, automata, and computability
- Ability to demonstrate an increased level of mathematical application
- Ability to apply mathematical and formal techniques for solving problems

5. Course Outcome (CO)	Aligned Programme Outcome (PO)							
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**
Ability to relate practical problems to languages, automata, and computability	S	B	S	S	S	S	S	S
Ability to demonstrate an increased level of mathematical application	S	B	M	M	M	M	M	M
Ability to apply mathematical and formal techniques for solving problems	S	B	S	S	M	M	M	M

S = 0.6 M = 0.4 B = 0.0

6. Course Teaching and Learning Activities							
L.No	Title	Type		Mode of delivery			
		L	T	C& T	PPT	VL/VC	DEMO
	UNIT I						
1.	Introduction to alphabets, strings and formal languages	√		√			
2.	Regular Languages and regular grammars	√		√			
3.	Recognizers for regular languages, DFA, NFA	√	√	√			
4.	Transition tables, transition graphs	√		√			
5.	Conversion of NFA with and without epsilon to DFA	√		√			
6.	Equivalence of NFA & DFA	√		√			
7.	Minimization of states using equivalence classes	√	√	√			
8.	Myhill Nerode theorem and its application in state minimization	√		√			
	UNIT II						
9.	Regular expression, algebraic laws for regular expression, Kleen's theorem	√		√			
10.	Regular expression to NFA & DFA conversion	√	√	√			
11.	DFA to regular expression using Ardens theorem	√	√	√			
12.	Pumping Lemma and Applications of Pumping Lemma	√		√			
13.	Closure properties and Decision properties of regular Languages	√		√			
14.	Design of Moore and Mealy machines	√	√	√			
15.	Equivalence of Moore and Mealy machines	√		√			
16.	Applications and limitations of Finite automata	√		√			
	UNIT III						
17.	Introduction to CFL, CFG and their applications	√		√			
18.	Conversion of CFL to CFG and vice versa	√	√	√			
19.	Derivation and derivation trees for strings belonging to CFG	√		√			
20.	Ambiguity in CFG, conversion to unambiguous grammar	√	√				
21.	Simplification of CFG: removal of useless symbols, unit production rules and left recursion	√	√	√			
22.	Normal forms: both CNF and GNF	√		√			
23.	Closure and decision properties of CFL	√		√			

24.	Pumpimg Lemma for CFL, uvwxy theorem and its applications						
	UNIT IV						
25.	Recognizer for CFL	√		√			
26.	NPDA and DPDA	√	√				
27.	Transition graphs and tables for DPDA	√		√			
28.	Acceptance by final state and empty stack	√		√			
29.	Equivalence of acceptances and conversion of one form to the other	√	√	√			
30.	Equivalence of PDA and CFG	√		√			
31.	Conversion of CFG to PDA and vice versa	√	√	√			
32.	Chomsky Hierarchy of Languages	√		√			
	UNIT V						
33.	Turing machine definition and representation	√		√			
34.	Transition graphs and tables for TM	√	√	√			
35.	Language acceptance by TM	√	√	√			
36.	Variants of TM	√		√			
37.	Variants of TM continued	√	√	√			
38.	Universal TM and Church's theorem	√		√			
39.	Halting problem and post correspondence problem	√		√			
40.	Consolidating the entire course	√		√			

7. Course Assessment Methods

Sl. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test – 1	3rd week of Feb'17	1 hour	20%
2	Cycle Test – 2	4th week of March'17	1 hour	20%
3	Assignment I	2nd week of Feb'17	1 week time	5%
	Assignment II	2nd week of Mar'17	1 week time	5%
4	End Semester Exam	Last of April'17 or First week of May'17	2 hours	50%
			Total	100%

8. Essential Readings (Textbooks, Reference books, Websites, Journals, etc.)
Text Books 1. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation" ,Pearson Education, 3rd edition, 2014 **Reference books** 1. Martin J. C., "Introduction to Languages and Theory of Computations", TMH, 4th edition, 2010 2. Peter Linz, "An Introduction to Formal Language and Automata", Narosa Pub. House, 2011 3. Papadimitriou, C. and Lewis, C. L., "Elements of the Theory of Computation", PHI, 1997

9. Course feedback methods:		
Feedbacks	Duration	Assessment method
I	2nd week of Feb'17	Offline through grade points (0 to 5)
II	3rd week of Mar'17	
III	1st week of April '17	

10. Course Policy (including plagiarism, academic honesty, Attendance)
1. Academic honesty
2. Attendance minimum 75% mandatory

11. Additional Course Information
Students can meet faculty for discussion and queries any time during working hours seeking prior appointment from the faculty

For Senate's Consideration

(Dr. R. LEELA LUSAMY)		
(Mr. R.SIRANJEEVI)	(Dr. N.RAMASUBRAMANIAN) 03 01 17	(Dr. R. LEELA LUSAMY) 3/1/2017
Course Faculties	Class Committee Chairperson	HoD