SCHEME OF COURSE WORK

Department of Information Technology

Course Details:

COURSE TITLE	Formal Languages & Automata Theory		
COURSE CODE	13CT1115	L T P C	4 1 0 3
PROGRAM	B.TECH		
SPECIALIZATION	CSE, IT		
SEMESTER	V		
PRE REQUISITES	None		
COURSES TO WHICH IT IS A PRE REQUISITE	Compiler Design		

Course Outcomes (COs):

1	Design Finite Automata
2	Convert Regular Expressions into Finite Automata& vice versa
3	Explain formal languages
4	Design Push down Automata and Turing Machines
5	Discuss decidability and un-decidability

Course Outcome versus **Program Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										
CO2	S	S										
CO3	S	S										
CO4	S	S										
CO5	S	S										

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods	Assignment / Quiz / Mid-Test

Teaching- Learning & Evaluation

Week	Topic/ Contents	Course Outcomes	Sample questions	Teaching learning strategy	Assessment method & schedule
1	Basic Concepts, formal finite state machines,	CO1	Define symbols, strings, languages, DFA, NFA, Design of finite state		Assignment-1, Test- 1 Quiz-1

	acceptance of strings by languages, DFA, NFA		machines, acceptance of strings by FSM		
2	Transition diagrams, language recognizers, Equivalence between DFA & NFA, NFA to DFA Conversion, NFA- Є Transitions, Significance	CO1	Conversion from NFA to DFA,		Assignment-1, Test- 1 Quiz-1
3	Conversion of NFA with Є to NFA without Є transitions, FA minimization, mealy and moore machines	CO1	Define mealy and moore machines, conversion of NFA with Є to NFA without Є transition		Assignment-1, Test- 1 Quiz-1
4	Regular sets, regular expressions, operations and applications, Identity rules, conversion of a given RE into FA, Conversion of FA to RE using Ardens theorem	CO2	Define regular languages, regular sets, Conversion of given RE to FA and vice versa State arden's theorem and prove it		Assignment-1, Test- 1 Quiz-1
5	Pumping lemma for regular sets, Closure properties for regular sets, Grammar definition, language of a grammar, types of grammars, Chomsky classification of languages	CO2, CO3	Prove some of the languages are not regular using pumping lemma State the closure properties of regular sets		Assignment-1, Test- 1 Quiz-1
6	Regular grammars, right linear and left linear grammars, Conversion from right linear to left linear grammars, Equivalence between regular grammar and FA, interconversion, Context sensitive grammars, linear bounded automata	CO3	Define regular grammars, right and left linear grammars Conversion from left to right linear grammars, Define context sensitive grammars, linear bound automata		Assignment-1, Test- 1 Quiz-1
7	Derivation trees, left most and right most derivation of strings, sentential forms, Ambiguity of grammars, left recursion and	CO3	What are ambiguous grammars? Define derivation trees and writing derivation trees for a given grammars,		Assignment-1,2, Quiz-1, Test-1, 2

	factoring				
8	Test- 1				
9	Minimization of CFG, Normal forms- CNF, GNF, Pumping lemma for CFL, Closure and decision properties of CFL, Applications of CFL	CO3	Define null productions and unit productions Define useless productions State CNF & GNF State pumping lemma for CFL		Assignment-2, Test- 2, Quiz-2
10	PDA, Acceptance of CFL, Acceptance by final state and acceptance by empty state, Equivalence of CFG & PDA, Interconversion	CO4	Define PDA. State the ID of a PDA for empty state and final state		Assignment-2, Test- 2, Quiz-2
11	Introduction to deterministic PDA, Turing machine, representation, Design of turing machines, Types of turing machines	CO4	Define turing machine Design of turing machines for various grammars		Assignment-2, Test- 2, Quiz-2
12	Computable functions, Unrestricted grammar, recursive and RE Languages, Church's hypothesis	CO4	Design of turing machine for a given computable function What are recursively enumerable languages State church's hypothesis		Assignment-2, Test- 2, Quiz-2
13	LR(0) Grammar, Decidable and un-decidable problems, universal TM, Halting problem of TM, PCP	CO5	Define LR(0) grammars, State un-decidability of posts correspondence problem What are universal turing machines		Assignment-2, Test- 2, Quiz-2
14	Turing reducibility, P & NP Class problems, NP Complete and NP Hard problems	CO5	What is turing reducibility Define the following NP Class, NP hard, NP Completeness problems		Assignment-2, Test- 2, Quiz-2
15	Test- 2				Assignment-2, Test- 2, Quiz-2