

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Theory of Computation
2.	Course Number	CS2202
3.	Status of the Course	Core
4.	Structure of Credits	3-0-0-3
5.	Offered To	UG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Computer Science and Engineering
8.	To take effect from	July 2018
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective: To learn the notion of formal languages and expressiveness; To classify formal languages with respect to key theoretical models of computations.	
12.	Course Content: Introduction, language membership problem, Deterministic Finite Automata(DFA), regular languages, pumping lemma; Non-deterministic Finite Automata(NFA) and its equivalence to DFAs; NFA with epsilon transitions, regular expressions and their equivalence to regular languages; Closure properties, decision problems, Myhill-Nerode theorem and minimization of DFA; Context-Free Grammar(CFG) and Context-Free Language(CFL): derivation, parse trees, language generated by a CFG, ambiguity, Chomsky normal form, pumping lemma, closure properties, decision problems; Pushdown automata (PDAs), instantaneous descriptions, acceptance by final states and by empty stack and their equivalence; Equivalence of PDAs and CFGs; Turing machines(TM), instantaneous description, notion of acceptance, robustness of the model; Church-Turing hypothesis; Recursively enumerable (r.e.) and recursive languages; TM codes, existence of non-r.e. languages; Notion of undecidable problems; Universal language and Universal TM, reduction and undecidability; Introduction to theory of NP-completeness.	
13.	Text book(s): 1. Hopcroft J, Ullman J D and Motwani R, <i>Introduction to Automata Theory, Languages and Computation</i> , 3rd Edition, Pearson (2008). 2. Sipser M, <i>Introduction to the Theory of Computation</i> , 3rd Edition, Cengage Learning (2012).	
14.	Reference(s): 1. Lewis H R and Papadimitriou C H, <i>Elements of the Theory of Computation</i> , 2nd Edition, Pearson (2015). 2. Martin J, <i>Introduction to Languages and the Theory of Computation</i> , 3rd Edition, McGraw Hill Education (2007).	