SUBJECT: COMPUTER SCIENCE							
DSE	**BCS-E805**	**Theory of Computation**	**L**	**T**	**P**	**C**	**Time for ESE**
			5	**1**	**-**	**6**	**3 Hrs.**

Pre- requisite: A strong background in discrete mathematics, data structures, and algorithms.

Course Objectives:

- To give an overview of the theoretical foundations of computer science from the perspective of formal languages
- To illustrate finite state machines to solve problems in computing
- To explain the hierarchy of problems arising in the computer sciences.
- To familiarize Regular grammars, context frees grammar.

Course Outcomes:

CO1	Write a formal notation for strings, languages and machines.
CO2	Design finite automata to accept a set of strings of a language.
CO3	For a given language determine whether the given language is regular or not.
CO4	Design context free grammars to generate strings of context free language.
CO5	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
CO6	Write the hierarchy of formal languages, grammars and machines.
CO7	Distinguish between computability and non-computability and Decidability and undecidability.

Course Contents

UNIT	Contents	Lectures Required
1.	Introduction to Languages; Recursive Definitions; Regular Expressions; Finite Automata; Transition Graphs; Kleene's Theorem.	12
2.	Non- Deterministic Finite Automata, Finite Automata with Output - Moore and Mealy machines, Equivalence of Moore and Mealy machines; Regular Languages; Non-regular Languages; Decidability.	12
3.	Context-Free Grammars. Trees; Regular Grammars; Chomsky's Normal Form; Pushdown Automata; Context- Free Languages; Non- Context- Free Languages; Parsing; Decidability for CFG - Emptiness, Finiteness and Membership questions about CFG.	12
4.	Turing Machines (TM); Post Machines (PM), simulating a PM on TM.	12
5.	Recursively Enumerable Languages; Encoding of Turing Machines; Phrase Structure Grammar; Context Sensitive Grammar; Defining the Computer and Computable Functions; Church's Thesis; Halting Problem for Turing Machines.	12
	Total Lectures	60

Suggested Text Book(s):

1.	Cohen, Daniel I.A., Introduction to Computer Theory, John Wiley & Sons

2.	K. L. P. Mishra and N. Chandrasekaran, Theory of Computer Science: Automata Languages and Computation, PHI

Suggested Reference Book(s):

1.	Lewis & Papadimitriou, Elements of the theory of computation, PHI.
2.	Hoperoft, Aho, Ullman, Introduction to Automata theory, Language & Computation, Pearson Education.

Other Useful Resource(s)

1.	https://nptel.ac.in/courses/111103016/
2.	https://ocw.mit.edu/courses/mathematics/18-404j-theory-of-computation-fall-2006/
3.	http://cse.iitkgp.ac.in/~abhij/course/theory/FLAT/Spring13/

Course Outcomes Contributed to Programme Outcomes

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	AVERAGE
CO1	1	3	3	1	1	2	2	2	**1.9**
CO2	3	3	3	2	2	3	2	3	**2.6**
CO3	2	3	1	1	3	3	2	2	**2.1**
CO4	3	3	2	2	2	3	3	3	**2.6**
CO5	3	2	2	1	3	2	3	2	**2.3**
CO6	1	1	3	1	1	1	1	2	**1.4**
CO7	2	1	1	2	3	2	1	1	**1.6**
AVG.	**2.1**	**2.3**	**2.1**	**1.4**	**2.1**	**2.3**	**2.0**	**2.1**	**2.1**

Course Outcomes Contributed to Programme Specific Outcomes

PSO→ CO↓	PSO1	PSO2	PSO3	AVERAGE
CO1	3	1	1	**1.7**
CO2	3	3	3	**3.0**
CO3	3	3	2	**2.7**
CO4	3	2	3	**2.7**
CO5	3	1	3	**2.3**
CO6	3	1	2	**2.0**
CO7	2	1	1	**1.3**
AVG.	**2.9**	**1.7**	**2.1**	**2.4**

SUBJECT: COMPUTER SCIENCE							
DSC	BCS-C861	Industrial Training/ Research Project/ Dissertation	L	T	P	C	Time for ESE
			-	-	-	6	3 Hrs.

Pre- requisite: Fundamental knowledge of programming languages and computer science.

Course Objectives:

- To provide to students the feel of the actual working environment and to gain practical knowledge and skills, which in turn will motivate, develop and build their confidence.
- Industrial training is also expected to provide the students the basis to identify their key operational area of interest.

Course Outcomes:

CO1	Participate in the projects in industries during his or her industrial training.
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.
CO5	Prepare professional work reports and presentations.

Course Outcomes Contributed to Programme Outcomes

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	AVERAGE
CO1	2	-	2	3	1	2	3	3	**2.3**
CO2	2	2	2	2	1	2	3	3	**2.1**
CO3	2	2	2	2	2	3	3	3	**2.4**
CO4	2	2	2	2	2	3	3	3	**2.4**
CO5	2	2	2	2	2	3	3	3	**2.4**
AVG.	**2.0**	**2.0**	**2.0**	**2.2**	**1.6**	**2.6**	**3.0**	**3.0**	**2.3**

Course Outcomes Contributed to Programme Specific Outcomes

PSO→ CO↓	PSO1	PSO2	PSO3	AVERAGE
CO1	3	3	2	**2.7**
CO2	3	3	3	**3.0**
CO3	2	3	3	**2.7**
CO4	2	2	3	**2.3**
CO5	3	3	3	**3.0**
AVG.	**2.6**	**2.8**	**2.8**	**2.8**