RAGHU ENGINEERING COLLEGE

AUTONOMOUS

(Approved by AICTE, New Delhi, Accredited by NBA (CIV,ECE,MECH,CSE), NAAC with 'A+' grade & Permanently Affiliated to JNTU-GV, Vizianagaram)

Dakamarri, Bheemunipatnam Mandal, Visakhapatnam Dist. – 531 162 (A.P.)

Ph: +91-8922-248001, 248002 Fax: + 91-8922-248011

E-mail: principal@raghuenggcollege.com website: www.raghuenggcollege.com

RAGHU ENGINEERING COLLEGE (AUTONOMOUS)

VISAKHAPATNAM

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INSTITUTE VISION

Envisioning to be a world class technical institution by synergizing quality education with ethical values.

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy; establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies, and strives for an efficient, responsive and transparent administration in all areas.

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Department of Computer Science and Engineering

VISION

To generate competent professionals to become part of the industry and research organizations at the national and international levels.

MISSION

To impart high quality professional training in undergraduate level with emphasis on basic principles of computer science and Engineering and to foster leading edge research in the fast-changing field.

To inculcate professional behavior, strong ethical values, innovative research capabilities and leadership abilities in the young minds so as to work with a commitment.

- M1:To impart high quality professional training at undergraduate level with emphasis on basic principles of computer science and Engineering and to foster leading edge research in the fast-changing field.
- M2:To inculcate innovative research capabilities and leadership abilities in the young minds so as to work with a commitment.
- M3:To inculcate professional behavior, strong ethical values in the young minds so as to work with a commitment.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

PEO 1: To produce graduates with a strong foundation in mathematics, science, engineering fundamentals, laboratory and work-based experiences to formulate and solve engineering problems in computer science engineering domains and shall have proficiency in implementation software tools and languages.

PEO 2: To progressively impart training to the students for success in various engineering positions within the core areas in computer science engineering, computational or adapting to the latest trends by learning themselves.

PEO 3: To produce graduates having the ability to pursue advanced higher studies and research. To have professional and communication skills to function as leaders and members of multidisciplinary teams in engineering and other industries with strong work ethics, organizational skills, teamwork, and understanding of the importance of being a thorough professional.

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MAPPING OF MISSION STATEMENTS WITH PEOs

MS/PEO	PEO 1	PEO 2	PEO 3
MS 1	3	2	2
MS 2	2	3	2
MS 3	2	2	3

1-Slight , **2**- Moderate, **3**- Substatial

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PROGRAM OUTCOMES	
Graduates of Computer Science and Engineering Will:	
PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to solve complex engineering problems.
PO 2	**Problem analysis:** Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and the cultural, societal, and environmental concerns.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods, including design of experiments, analysis, interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual and as a member or leader in diverse teams and multidisciplinary settings.
PO 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to

	engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Apply the concepts and techniques of the Computer Science & Engineering branch and the Mathematical foundations in the significant domains to address the complex engineering problems.

PSO 2: Employ emerging computer languages, computer networks, database management systems and platforms in developing innovative career prospects as an entrepreneur.

PS0 3: Apply the knowledge of interdisciplinary skills, and domain-specific tools in working system processes to implement and deploy a quality-based software product to meet evolving needs.

Mapping of PEOs with POs and PSOs

PEO/PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
PEO 1	3	3	3	3	2	2	2	2		2		3	3	2	2
PEO 2	2	3	3	3	2	2	2	2	3	2	3	3	3	3	3
PEO 3	3	2	2	3	2	2	2	3	3	3	3	3	3	3	3

1-Slight , **2**- Moderate, **3**- Substatial

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(2305104) THEORY OF COMPUTATION							
(CSE)							
Programme &Branch	**B.Tech -CSE**	**Sem**	**Category**	**L**	**T**	**P**	**Credit**
Prerequisites:	**Basic mathematics**	**4**	Professional Core	**3**	**0**	**0**	**3**
Preamble	**The main objectives of the course is to make student**						

Course Objectives:

The course objectives of Theory of Computation are to discuss and make student familiar with the

- To understand the basic concepts and language hierarchy.
- To construct automata for any given pattern and find its equivalent regular expressions.
- To learn how to design a context free grammar for any given language.
- To understand and design a push down automata and find its equivalent CFL.
- To understand and design Turing machines and their capability.

Course Contents:

Unit-1	**Finite Automata**: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.	Contact Hours: 9
Unit-2	**Regular Languages:** Regular Sets, Identity Rules, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE (Arden's Theorem), Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars.	Contact Hours: 9
Unit-3	**Context Free languages:** Context Free Grammar, Leftmost, and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Є-Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.	Contact Hours: 9

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Unit-4	Pushdown Automata: Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Non-Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata. Introduction to Linear Bounded Automata.	Contact Hours: 9
Unit-5	**Turning Machine:** Turing Machine Definition, Model, Representation of TMs-Instantaneous Descriptions, Types of TMs, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Classes of P and NP, NP-Hard and NP-Complete Problems.	Contact Hours: 9
		Total Hours: 45

Text Books:	
1	Introduction to Automata Theory, Language and Computation by J. D. Ullman, J. E. Hopcroft and R. Motwani, Narosa Publishing House.
2	Introduction to Computer Theory, Daniel I.A Cohen, John Wiley.
3	An Introduction to formal languages and automata by Peter Linz, Fifth edition, University of California.
Reference Books:	
1	Theory of computer science -Automata language and computation - Mishra and Chandrashekaran, PHI.
2	Formal Languages and Automata Theory by K. V. N. Sunitha and N. Kalyani, Pearson.
3	Elements of theory of computation, Lewis H.P & Papadimitriou C.H, Pearson/ PHI
Web References :	
1	https://www.youtube.com/watch?v=58N2N7zJGrQ&list=PLBlnK6fEyqRgp46KUv4ZY69yXmpwKOIev
2	https://www.youtube.com/watch?v=acCztqcZi_Q
Preamble	**After completion of the course, students will be able to**

COURSE OUTCOMES: Upon completion of the course, students shall have ability to		**BT Mapped** (Highest Level)
CO 1	Understand about state machines, languages and computations.	Understanding
CO 2	Understand the concepts on regular grammar and regular languages.	Understanding
CO 3	Understand the concepts of context free languages and context free grammars.	Understand

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CO 4	Learn how to design push down automata for Context Free Languages.	Applying
CO 5	Learn how to design a Turing machines	Applying

Mapping of Cos with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	1	1	-	-	-	-	-	-	-	1	2	2	1
CO 2	2	3	2	2	-	-	-	-	-	-	-	1	2	1	1
CO 3	2	3	3	2	-	-	-	-	-	-	-	1	2	2	1
CO 4	2	3	3	3	-	-	-	-	-	-	-	1	2	1	-
CO 5	2	3	3	3	-	-	-	-	-	-	-	1	3	1	-
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy															

ASSESSMENT PATERN – THEORY							
TEST	**Remembering (K1)%**	**Understanding (K2)%**	**Applying (K3)%**	**Analyzing (K4)%**	**Evaluating (K5)%**	**Creating (K6)%**	**Total%**
MID-1	**25**	**30**	**30**	**15**			**100**
MID-2	**25**	**30**	**30**	**15**			**100**
SEE	**30**	**35**	**25**	**5**			**100**
***± 3% may be varied**							

(Signature)
Head of the Department
(Seal/Stamp)

(Signature)
Principal
(Seal/Stamp)