School of Engineering and Technology

Programme Structure & Syllabus

Computer Science & Engineering

Bachelor of Technology (B. Tech)

2023-24

K.K. University

Bihar Sharif, Nalanda – 803115

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School of Engineering & Technology.

Department of Computer Science & Engineering

Objective of the Program:

The objective of a **Bachelor of Technology (B.Tech)** program in Computer Science typically encompasses several key goals:

1. **Technical Proficiency**: To equip students with a strong foundation in computer science principles, including programming languages, algorithms, data structures, databases, operating systems, and software engineering methodologies.
2. **Problem-Solving Skills**: To develop analytical and problem-solving skills necessary for addressing complex computational problems, fostering creativity and innovation in finding solutions.
3. **Advanced Knowledge**: To provide advanced knowledge in specialized areas of computer science such as artificial intelligence, machine learning, cyber security, data science, and computer networks, enabling students to explore and excel in their areas of interest.
4. **Practical Experience**: To offer hands-on experience through practical sessions, projects, internships, and industry collaborations, enabling students to apply theoretical concepts to real-world scenarios and gain valuable industry exposure.

Program Education Outcomes (PEOs):

PEO-1: Technical Competence: Graduates should demonstrate a strong understanding of core computer science concepts, including programming languages, algorithms, data structures, and software engineering principles, enabling them to effectively design, implement, and maintain software systems.

PEO-2: Problem-Solving Skills: Graduates should possess the ability to analyze complex computational problems, identify appropriate solutions, and apply algorithmic techniques to solve them efficiently, demonstrating proficiency in both theoretical and practical problem-solving approaches.

PEO-3: Critical Thinking and Innovation: Graduates should exhibit creativity and innovation in addressing technological challenges, demonstrating the ability to think critically, evaluate alternatives, and propose novel solutions to enhance the efficiency, scalability, and security of computing systems and applications.

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PEO-4: Effective Communication: Graduates should communicate effectively, both orally and in writing, with technical and non-technical audiences, conveying complex technical concepts clearly and persuasively, and collaborating productively in multidisciplinary teams to achieve common goals.

PEO-5: Ethical and Professional Responsibility: Graduates should uphold high ethical standards and professional integrity in their work, demonstrating awareness of legal and ethical issues related to computing, and exhibiting a commitment to ethical behavior, responsible decision-making, and respect for diversity and intellectual property rights.

PEO-6: Lifelong Learning and Professional Development: Graduates should recognize the importance of lifelong learning and professional development, exhibiting a willingness to continuously update their skills and knowledge, adapt to evolving technologies and industry trends, and pursue opportunities for further education and career advancement.

PEO-7Leadership and Management Skills: Graduates should demonstrate leadership potential and management abilities, exhibiting the capacity to lead teams, coordinate projects, and effectively manage resources to achieve organizational objectives, while also fostering a collaborative and inclusive work environment.

PEO-8: Global and Societal Impact: Graduates should be cognizant of the broader societal implications of technology and computing, recognizing their responsibilities as global citizens and actively seeking to contribute positively to the advancement of society through the ethical and responsible application of technology.

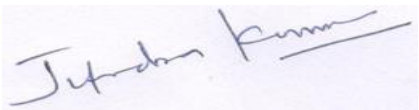
Program Outcomes (POs):

PO-1: Problem Solving: Graduates should be able to apply principles of computer science and mathematical reasoning to analyze problems, formulate algorithms, and develop efficient solutions for a wide range of computational problems.

PO-2: Programming Proficiency: Graduates should demonstrate proficiency in programming languages, tools, and technologies commonly used in the field of computer science, and be capable of designing, implementing, testing, and debugging software systems and applications.

PO-3: Data Structures and Algorithms: Graduates should possess a deep understanding of fundamental data structures and algorithms, including their properties, performance characteristics, and applications, and be able to apply them effectively to solve computational problems.

PO-4: Software Engineering Principles: Graduates should understand the principles of software engineering, including software development methodologies, requirements



engineering, software design, testing, maintenance, and quality assurance, and be able to apply them to the development of large-scale software systems.

PO-5: Computer Architecture and Operating Systems: Graduates should have a thorough understanding of computer architecture principles and operating system concepts, including memory management, process synchronization, file systems, and virtualization, and be able to design and optimize systems software.

PO-6: Database Management Systems: Graduates should be familiar with the principles and techniques of database management systems, including relational database design, query optimization, transaction management, and data modeling, and be able to develop and manage database applications.

PO-7: Networking and Security: Graduates should understand the principles of computer networks and network protocols, including the OSI model, TCP/IP stack, routing, and switching, and be able to design, implement, and secure networked systems and applications.

PO-8: Artificial Intelligence and Machine Learning: Graduates should have a basic understanding of artificial intelligence and machine learning techniques, including supervised and unsupervised learning, neural networks, and natural language processing, and be able to apply them to solve real-world problems.

PO-9: Software Development Lifecycle: Graduates should be familiar with the software development lifecycle, including requirements analysis, software design, implementation, testing, deployment, and maintenance, and be able to collaborate effectively in multidisciplinary teams to develop software projects.

PO-10: Professional Ethics and Responsibility: Graduates should understand the ethical, legal, and societal implications of computing, including issues related to privacy, security, intellectual property, and professional responsibility, and be committed to upholding ethical standards in their professional practice.

PO-11: Communication and Collaboration: Graduates should possess effective communication and collaboration skills, including the ability to communicate technical concepts clearly and persuasively, work collaboratively in diverse teams, and engage in lifelong learning and professional development.

Program Specific Outcomes (PSOs) :

Program Specific Outcomes (PSOs) are tailored to the specific objectives and focus areas of a particular program. They provide a more detailed and specialized set of outcomes that reflect the unique characteristics and strengths of the program. Here are some examples of Program Specific Outcomes for a B.Tech Computer Science program:

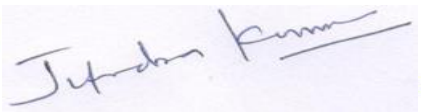
PSO-1: Advanced Programming Skills: Graduates should demonstrate proficiency in advanced programming paradigms and languages, such as object-oriented programming, functional programming, and concurrent programming, and be able to apply them to develop complex software systems and applications.

PSO-2: Specialization in Emerging Technologies: Graduates should have specialized knowledge and skills in emerging areas of computer science, such as artificial intelligence, machine learning, big data analytics, cloud computing, internet of things (IoT), and blockchain, and be able to leverage these technologies to address contemporary challenges in the field.

PSO-3: Software Development for Specific Domains: Graduates should be capable of developing software solutions tailored to specific application domains, such as web development, mobile app development, game development, scientific computing, e-commerce, healthcare, finance, or education, and be familiar with the tools and technologies relevant to those domains.

PSO-4: Cybersecurity Expertise: Graduates should possess specialized knowledge and skills in cybersecurity, including threat analysis, vulnerability assessment, risk management, cryptography, secure coding practices, and incident response, and be able to design and implement secure and resilient computing systems.

PSO-5: Data Science and Analytics: Graduates should be proficient in data science and analytics techniques, including data preprocessing, exploratory data analysis, statistical modeling, machine learning algorithms, and data visualization, and be able to extract actionable insights from large and complex datasets.



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PSO-6: Networking and Distributed Systems: Graduates should have in-depth knowledge of networking principles and protocols, including network architecture, protocols, routing algorithms, and network security, and be able to design and optimize distributed systems and networked applications.

PSO-7: Software Quality Assurance and Testing: Graduates should be proficient in software quality assurance and testing methodologies, including test planning, test case design, test automation, and performance testing, and be able to ensure the quality and reliability of software products.

PSO-8: Entrepreneurship and Innovation: Graduates should have an entrepreneurial mindset and be equipped with the knowledge and skills to identify opportunities, develop innovative solutions, and launch successful technology startups or ventures, contributing to economic growth and innovation in the technology sector.

PSO-9: Project Management and Leadership: Graduates should possess project management and leadership skills, including the ability to plan, execute, and monitor software development projects, allocate resources effectively, and lead cross-functional teams to achieve project goals and deliverables.

PSO-10: Industry-Ready Skills: Graduates should be prepared for industry roles and possess industry-relevant skills, such as collaboration tools, version control systems, agile methodologies, and best practices in software development, enabling them to seamlessly transition into professional roles in the technology industry.

Programme / Course Structure

FIRST SEMESTER

S. No	CODE	TITLE	CREDIT	L	T	P	HOURS PER WEEK	Internal Marks	External Marks
1	ETSH-101	Engineering Physics	3	3	0	0	3	30	70
2	ETSH-102	Engineering Mathematics-I	3	2	1	0	3	30	70
3	ETCS-101	Introduction to Artificial Intelligence	3	3	0	0	3	30	70
4	ETSH-103	Soft Skills	3	3	0	0	3	30	70
5	ETSH-105	Engineering Chemistry	3	3	0	0	3	30	70
6	ETEA-111	Inter-disciplinary Experimental Active Learning (IDEA LAB)	2	0	0	3	3	30	70
7	ETME-111	Engineering Workshop Lab	1	0	0	2	2	30	70
8	ETSH-111	Engineering Physics Lab	1	0	0	2	2	30	70
9	ETSH-115	Engineering Chemistry Lab	1	0	0	2	2	30	70
10	ETCS-111	Introduction to Artificial Intelligence with Python Lab	1	0	0	2	2	30	70
11	ETSH-113	Soft Skill Lab	1	0	0	1	1	30	70
Total			**22**	**14**	**1**	**12**	**27**	**330**	**770**

SECOND SEMESTER

S. No	CODE	COURSE TITLE	CREDIT	L	T	P	HOURS PER WEEK	INTERNAL MARKS	EXTERNAL MARKS
1	ETSH-201	Engineering Mathematics -II	3	2	1	0	3	30	70
2	ETEE-201	Basic Electrical & Electronics Engineering	3	3	0	0	3	30	70
3	ETCS-201	C Programming	3	3	0	0	3	30	70
4	ETME-201	Fundamental of Mechanical & Civil Engineering	3	3	0	0	3	30	70
5	ETSH-202	Technical Communication & Project Management	3	2	1	0	3	30	70
6	ETME-202	Engineering Graphics & Design	3	1	0	3	4	30	70
7	ETCS-202	Basics of Internet of Things (IoT)	NC	2	0	0	2	30	70
8	ETEE-211	Basic Electrical & Electronics Engineering Lab	1	0	0	2	2	30	70
9	ETME-211	Fundamental of Mechanical & Civil Engineering Lab	1	0	0	2	2	30	70
10	ETCS-211	C Programming Lab	1	0	0	2	2	30	70
TOTAL			**21**	**16**	**2**	**09**	**27**	**300**	**700**

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THIRD SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hour/ week	Internal marks	External marks
1	ETEC301	Electronic Device and Circuit	3	3	0	0	3	30	70
2	ETCS301	Data structure and algorithm	3	3	1	0	4	30	70
3	ETEC302	Digital Electronics	3	3	0	0	3	30	70
4	ETSH301	Engineering Mathematics-III	4	3	1	0	4	30	70
5	ETSH302	Entrepreneurship development and Business Incubation	3	3	0	0	3	30	70
6	ETCS311	Data structure and algorithm Lab	2	0	0	3	4	30	70
7	ETEC312	Digital Electronics Lab	2	0	0	3	4	30	70
8	ETEC311	Electronic Device and Circuit Lab	2	0	0	3	4	30	70
TOTAL			**22**	**15**	**2**	**9**	**29**	**240**	**560**

FOURTH SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours/ week	Internal marks	External marks
1	ETCS401	Discrete Mathematics	3	3	1	0	4	30	70
2	ETCS402	Computer Organization & Architecture	3	3	0	0	3	30	70
3	ETCS403	Operating Systems	3	3	0	0	3	30	70
4	ETCS404	Design and Analysis of Algorithms	3	3	0	0	3	30	70
5	ETSH401	Organizational Behavior	3	3	0	0	3	30	70
6	ETCS405	Problem Solving and Python Programming	3	3	0	0	3	30	70
7	ETCS413	Operating Systems Lab	2	0	0	2	4	30	70
8	ETCS415	Problem Solving and Python Lab	2	0	0	2	4	30	70
TOTAL			**22**	**18**	**1**	**4**	**27**	**240**	**560**

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FIFTH SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours/ week	Internal marks	External marks
1	ETCS501	Database Management System	3	3	0	0	3	30	70
2	ETCS502	Theory of Computation	3	3	1	0	4	30	70
3	ETCS503	Object Oriented programming	3	3	0	0	3	30	70
4	ETCS504	Java Programming	3	3	0	0	3	30	70
5	ETSH501	Business Management & Economics	2	3	0	0	3	30	70
6	*****	Elective-I	3	3	0	0	3	30	70
7	ETCS511	Database Management System Lab	2	0	0	3	4	30	70
8	ETCS513	Object Oriented programming Lab	2	0	0	3	4	30	70
9	ETCS514	Java Programming Lab	2	0	0	3	4	30	70
TOTAL			**23**	**18**	**1**	**9**	**31**	**270**	**630**

Elective-I: ETCS521 : Data Warehousing and Data mining
ETCS522 : Software Testing
ETCS523 : Graph Theory and Application

SIXTH SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours/ week	Internal marks	External marks
1	ETCS601	Compiler Design	3	3	0	0	3	30	70
2	ETCS602	Computer Network	3	3	1	0	4	30	70
3	ETCS603	Computer Graphics	3	3	0	0	3	30	70
4	ETCS604	Web Technology	3	3	0	0	3	30	70
5	*****	Elective II	2	3	0	0	3	30	70
6	*****	Elective III	3	3	1	0	4	30	70
7	ETCS611	Compiler Design Lab	2	0	0	3	4	30	70
8	ETCS613	Computer Graphics Lab	2	0	0	3	4	30	70
9	ETCS614	Web Technology Lab	2	0	0	3	4	30	70
		TOTAL	**23**	**18**	**2**	**9**	**32**	**270**	**630**

Elective II

ETCS621: Software Engineering
ETCS622: Embeded System
ETCS623: Intellectual Property Rights

Elective III

ETCS624: Machine Learning
ETCS625: Computational Intelligence
ETCS626: Genetic Algorithm

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SEVENTH SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours/ week	Internal marks	External marks
1	ETCS701	Internet Of Things	3	3	1	0	3	30	70
2	ETCS702	Artificial Intelligence with Deep Learning	3	3	0	0	3	30	70
3	*****	Elective IV	2	3	0	0	3	30	70
4	*****	Elective V	3	3	0	0	3	30	70
5	*****	Elective VI	3	3	0	0	3	30	70
6	ETCS705	Bioinformatics	3	0	0	3	4	30	70
7	ETCS712	Artificial Intelligence with Deep Learning Lab	2	0	0	3	4	30	70
8	ETCS713	Minor Project	2	0	0	3	3	30	70
9	ETCS714	Industrial training	3	0	0	3	3	30	70
TOTAL			**24**	**15**	**1**	**12**	**29**	**270**	**630**

Elective IV

ETCS721: Distributed Computing
ETCS722: Big Data Analytics
ETCS723: Human Computer Interaction

Elective V

ETCS724: Introduction to Data Science
ETCS725: Wireless Adhoc and Sensor Network
ETCS726: C# and .Net Programming

Elective VI

ETCS727: Cyber Security
ETCS728: Cloud Computing

EIGHTH SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours per week	Internal marks	External marks
1	ETCS801	Cryptography	3	3	1	0	3	30	70
3	*****	Elective VII	3	3	1	0	4	30	70
4	*****	Elective VIII	4	4	0	0	4	30	70
6	ETCS813	Major Project	8	0	0	11	7	50	150
7	ETCS814	Seminar	2	0	0	3	2	30	70
TOTAL			**20**	**13**	**3**	**21**	**27**	**170**	**430**

Elective VII

ETCS821: Fundamental of Data Communication
ETCS822: Information Security
ETCS823: Software Defined Network

Elective VIII

ETCS824: Neural Networks & Its Applications
ETCS825: Natural Language Processing
ETCS826: Parallel Algorithms

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SEMESTER - I

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH-101
Course Name	Engineering Physics.
Course Credits	3 (T) + 1(P)= 4
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   To impart knowledge in basic concepts of physics relevant to engineering applications. To introduce advances in technology for engineering applications. Apply Biot- Savart Law and Ampere's Law. To impart knowledge on the concepts of electrostatics, electric potential, energy.

2. **Prerequisite:** Basic Concept of semiconductor, Optics and Laser.

3. **Objective of Syllabus:**
   - To impart knowledge in basic concepts of physics relevant to engineering applications.
   - To introduce advances in technology for engineering applications.
   - Apply Biot- Savart Law and Ampere's Law to compute magnetic field due to a current distribution.
   - Calculate the field of a magnetized object.
   - To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.

4. **Course Outcome:**

S. No.	Course Outcomes (Cos)
CO1	To design and conduct simple experiments as well as analyze and interpret data.
CO2	Engineering applications Capability to understand advanced topics in engineering.
CO3	Identify formula and solve engineering problems.
CO4	Apply quantum physics to electrical phenomena.
CO5	Apply engineering and physics concepts to the nano-scale and non-continuum doma

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5. Syllabus.

UNIT I: ELECTROSTATICS AND ELECTROMAGNETIC

Electrostatics, Electric charge as point charge, charge distribution, Coulomb s law, Electric field, electric field due to point charge & charge distribution, Electrostatic Potential , Potential due to point charge, long charged wire, charged Spherical conductor & Electric dipole ,Ampere's law, application of Ampere's law, Biot- Savart law, Application of biot- savart law.

UNIT II: OPTICS & LASER

Reflection and refraction, Snell's law, physical significance of refractive index (simple problems), Total internal reflection, Lasers , Characteristics of Laser, Ruby laser, Working Principle of He-Ne Laser. Polarization of light, Brewster's Law, Malu's Law.

UNIT III : QUANTUM PHYSICS

Planck's theory of black body radiation, Compton effect, Photo electric effect, Wave particle duality, De-Broglie waves, De-Broglie wave velocity, Wave and group velocity, Heisenberg's uncertainty principle, Application of uncertainty principle.

UNIT IV: SEMICONDUCTORS

Introduction of semiconductor, intrinsic & Extrinsic semiconductor, P –N junction , P-N junction with forward bias, P-N junction with reverse bias, reverse breakdown ,light emitting diode ,Zener diode, properties of zener diode .

UNIT V: NANO-PHYSICS

Introduction and Basic definition of Nano Technology, Properties of Nano particles, Elementary ideas of Synthesis of Nano particles, Application of Nano particles.

REFERENCE BOOKS:

1. Modern Physics by G. Aruldhas & P. Rajagopal; Pub: Prentice Hall of India.
2. Quantum Physics by H.C. Verma Pub.: Surya Publication .
3. Lasers and Non-Linear Optics by B.B. Laud; Pub: New Age International (P) Ltd.
4. Principles of electricity by Leigh Page and Normal llsley Adams, Pub.: Eurasia Publishing House, New Delhi.
5. Engineering physics by Dr. Rakesh Dogra Pub: S.k kataria & sons.
6. Engineering physics by Dr. Abhijit Nayak Pub: S.k kataria & sons.

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ENGINEERING PHYSICS LAB SUB-CODE: ETSH-111 CREDIT: 01

LIST OF EXPERIMENTS:

Week 1: Find the acceleration due to gravity (g) with the help of bar Pendulum.
Week 2: To determine the external diameter of solid Cylinder by the slide calipers.
Week 3: To determine the thickness of glass plate by using Spherometer.
Week 4: To determine the diameter of metal wire by using Micrometer (Screw Gauge).
Week 5: Study the junction diode.
Week 6: To find the refractive index of a material given in the form of a prism by using a Spectrometer.
Week 7: To obtain the particle size by the laser.

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Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH-102
Course Name	Engineering Mathematics - I
Course Credits	3 (T)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

Techniques in matrices, differentiation and Integration, advanced level of Mathematics and applications.

2. Prerequisite:

Basic knowledge of Algebra & Calculus.

3. Objective of Syllabus:

- Techniques in matrices, differentiation and Integration.
- It aims to equip the student's to deal with advanced level of Mathematics and applications that would be essential for their disciplines.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	Use both the limit definition and rules of differentiation to differentiate functions.
CO2	Apply differentiation to solve maxima and minima problems.
CO3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
CO4	Evaluate integrals using techniques of integration, such as substitution, partial fra and integration by parts.
CO5	Determine convergence/divergence of improper integrals and evaluate convergent p integrals.
CO6	Apply various techniques in solving differential equations

5. Syllabus.

UNIT I: LINEAR ALGEBRA

Matrix algebra, Determinant, Inverse and rank of a matrix by elementary transformation,

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solution of system of linear equation, vector, Basis, L.D&L.I, Eigen value and Eigen vector of a real matrix, properties of Eigen values, cay-lay Hamilton theorem. diagonalization of matrices.

UNIT II: DIFFERENTIAL CALCULUS

Limit, continuity and Differentiability, Successive differentiation, Leibnitz theorem, mean value theorem (Rolle's, Lagrange's Cauchy) Maxima & Minima for single variable, Taylor & Maclaurin Series.

UNIT III: FUNCTION OF SEVERAL VARIABLES

Partial derivative, Homogeneous functions and euler's theorem Total derivative, Differentiation of implicit function of two variables, Maxima and Minima of function of variables, Lagrange's method of undetermined co-efficient.

UNIT IV: INTEGRAL CALCULUS

Integration of various functions, Definition of proper and improper integral, Convergence of improper integral, Beta and gamma functions, Differentiation under integral sign.

UNIT V: CURVE TRACING

Curve tracing of Cartesian and Polar form, Surface area and volume of Surface of revolution.

REFERENCE BOOKS

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher's, 36 th edition, 2010.
2. Erwin Kresyszig, Advance Engineering Mathematics, John Wiley and Sons, 9 th edition, 2006.

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Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS-101
Course Name	Introduction to Artificial Intelligence
Course Credits	3 (T) + 1(P)= 4
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

The primary objective of this course is to introduce the basic principles techniques, and applications of. Artificial Intelligence, students will get a basic knowledge about Searching techniques like hill climbing,A* Algorithm, AO*.

2. Prerequisite:

To understand the basic knowledge of Reasoning, Mathematics, Psychology and Learning Techniques.

3. Objective of Syllabus:

- The primary objective of this course is to introduce the basic principles
- techniques, and applications of. Artificial Intelligence
- In this course, students will get a basic introduction to the building blocks and components of artificial intelligence
- learning about concepts like algorithms.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	To understand Introduction to AI, Overview of AI, Problems of AI, AI technique, Searching techniques like hill climbing, A* Algorithm, AO*.
CO2	Understand the basic concept of Python, Data types, Variables, Basic input –output operations, Basic Operators, literals, Strings, Number and Conditional Statement, Loop Statements.
CO3	Ability to Define and Accessing List, tuple, Dictionary, Functions, Numpy, Matplotlib.
CO4	To understand Problem in representing knowledge, Knowledge representation

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	propositional and predicate logic, resolution.
CO5	Ability to understand Probabilistic reasoning, Baye's Theorem, Semantic networks, logic, forward and backward reasoning.
CO6	Ability to understands Learning, various techniques in Learning, Introduction to Neural networks, application of Neural network, common sense and reasoning.

5. Syllabus.

UNIT I:
Introduction to AI : History of AI, Overview of AI, Problems of AI, AI technique, Production Systems, Characteristics of production systems, Tic-Tac-Toe problems, Searching techniques like hill climbing,A* Algorithm, AO* Algorithm etc , and various types of control strategies.

UNIT II:
Introduction to Python: Python basics – Data types, Variables, Basic input –output operations, Basic operators, Python literals, Strings, Number, list, tuple, Dictionary, Functions, Conditional Statement, Loop Statements, Numpy, Matplotlib, Simple programming exercises using Python.

UNIT III:
Knowledge representation, Problem in representing knowledge, Knowledge representation using propositional and predicate logic, resolution, refutation, deducation, Theory proving, monotonic and non-monotonic reasoning.

UNIT IV:
Probabilistic reasoning, Baye's Theorem, Semantic networks, Scripts, Schema, frames, conceptual dependency, fuzzy logic, forward and backward reasoning, introduction to understanding,natural language processing.

UNIT V:
Introduction to learning, various techniques in Learning, Introduction to neural networks, application Neural network, common sense, reasoning, some example of expert systems.

TEXTBOOKS / REFERENCES

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

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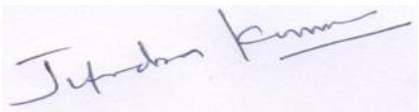
Introduction to A.I with Python LAB SUB-CODE: ETCS-111 CREDIT: 01

LIST OF EXPERIMENTS:

Week 1: Python program to demonstrate the example for arithmetic operators
Week 2: Python program for simple interest
Week 3: Python program to find power of a number using exponential operator
Week 4: Python program Find largest of three number using nested if else.
Week 5: Python program Calculate discount based on the sale amount.
Week 6: Python program Demonstrate an example of for loop
Week 7: Python program Examples of loops (based on their control)
Week 8: Python program Find factorial of a given number
Week 9: Python Program to print Odd and Even numbers from the list of integers.
Week 10: Python Program to calculate n-th term of a Fibonacci Series
Week 11: Python Program to check whether a given Number is prime or not prime.
Week 12: Python Program to check whether a given Number is Armstrong or not.



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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETSH-103**
Course Name	**SOFT SKILLS**
Course Credits	**3 (T) + 1(P) = 4**
Total Course Credit	**181**

Abbreviations: T-Theory

1. **Course Overview**:This course will encourage students for self awareness,self Development, and will give good communication skill,Leadership knowledge, and will also have knowledge about Ethics.

2. **Prerequisite:**students should have knowledge about Basic English and communication and also about Basic Leading knowledge **.**

3. **Objective of the Syllabus:** The objective of this course to help the students to develop as team member, leader and all round professional in the long run. This course would focus on over all personality development of the student and to improve his technical writing and documentation.

4. **Course Outcomes:**

S.No.	CourseOutcomes(Cos)
CO1	Communicate, interact and present his ideas to the other professionals
CO2	Understand and aware of importance, role and contents of soft skills through instructions, knowledge acquisition, demonstration and practice
CO3	Have right attitude in al and behavioral aspects, and build the same through activities.
CO4	Possess right professional and social ethical values.
CO5	Posses knowledge about Time Management.

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5.Syllabus:

UNIT I: SELF AWARENESS AND SELF-DEVELOPMENT

Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self-appraisal, Personal Goal setting, Career Planning, Personal success factors, Handling failure, Emotional Intelligence, Lateral thinking, Depression and Habit, relating SWOT analysis &goal setting, prioritization.

UNIT II: COMMUNICATION SKILL

Importance of communication, Aspects of communication, communication through words, communication through body language, communication through technology, Oral communication, Listening Skills, Group Discussion and Interview Skills, Presentations kills: preparing the presentation, performing the presentation, Written communication: Reading comprehension, précis writing, Business and technical reports, Styles, Business correspondence, Memorandum writing, Notice, Agenda and Minutes, Research papers and articles, Advertising and job Description, Mechanics of Manuscript preparation.

UNIT III: INTERPERSONAL RELATIONSHIP

Teamwork, Team effectiveness, Group discussion, Decision making- Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics, Multicultural Diversity and Socializing

UNIT IV: LEADERSHIP SKILLS

Leaders: their skills, roles, and responsibilities. Vision, Empowering and delegation, motivating others, organizational skills, team building, Organizing and conducting meetings, decision making ,giving support, Vision, Mission, Coaching, Mentoring and counseling, Appraisals and feedback, conflict, Power and Politics, Public Speaking.

UNIT V: OTHER SKILLS

Managing Time, Managing Stress, Meditation. Improving personal memory, Study skills that include Rapid Reading, Note Taking, Self-learning, Complex problem solving and creativity, listening skill and speaking skills, Corporate and Business Etiquettes.

UNIT VI: ETHICS IN ENGINEERING PRACTICE AND RESEARCH Introduction to ethical reasoning and engineer ethics, Right and responsibilities regarding Intellectual property, workplace rights and responsibilities, Central Professional Responsibilities of Engineers, Responsibility for environment.

TEXTBOOKS:

1. DevelopingCommunicationSkill:KrishnaMohan,MeeraBanerji,-MacMillanIndiaLtd.
2. BNGhosh, :ManagingSoftSkillsforPersanalityDevelopment"McGrawHill
3. EthicsinEngineeringPracticeandResearch:CarolineWhitbeck,CambridgeUniversitypress

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4. ACourseInCommunicationSkills:KiranmaiDutt,CambridgeUniversitypress
5. EnglishforBusinessCommunication:SimonSweeney,CambridgeUniversityPress
6. BasicsOfCommunicationInEnglish:FrancisSounderaj,MacMillanIndiaLtd.
7. GroupDiscussionsandInterviewSkills:PriyadarshiPatnaik,CambridgeUniversityPress
8. ProfessionalPresentations:MalcolmGoodale,CambridgeUniversityPress
9. An IntroductiontoProfessionalEnglishAndSoft Skills:Das,CambridgeUniversityPress
10 ApracticalcourseinEffectiveEnglishspeakingskills,G.K.Gangal,PHIPublication.

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SOFT SKILL LAB **SUB. CODE: ETSH-113** **CREDIT 01**

LIST OF EXPERIMENTS

- Work/Assignments
- SWOT analysis Personal & Career Goal setting – Short term &long term Presentation Skill
- Dining EtiquettesLetter/Application/Notice/Agenda/MinuteswritingReportwriting
- Listening skills using Language laboratory
- Group discussion
- Resume writing

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School of Engineering & Technology.

Department of Computer Science & Engineering

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH-105
Course Name	ENGINEERING CHEMISTRY
Course Credits	3 (T) + 1(P)= 4
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

A number of academic and research options are available to students in various fields such as pharmaceuticals, food products, environmental monitoring and assessments, environmental chemistry, fuel chemistry, cosmetic chemistry, biochemistry, biomaterials, nano-chemistry, materials chemistry, polymer chemistry, industrial chemistry, water chemistry, etc. in addition to physical, organic and inorganic chemistry that a student can explore for choosing a professional career.

2. Prerequisite:

Students must have Chemistry as a one subject at +2 levels.

3. Objective of Syllabus:

i. Broad and balance knowledge in chemistry in addition to understanding of key chemical concepts, principles and theories.

ii. To develop students' ability and skill to acquire expertise over solving both theoretical and applied chemistry problems.

iii. To provide knowledge and skill to the students' thus enabling them to undertake further studies in chemistry in related areas or multidisciplinary areas that can be helpful for self employment/entrepreneurship.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	Characterize bonding between atoms, molecules, interaction and energetics (ii) hybridization and shapes of atomic, molecular orbitals, bond parameters, bond-distances and energies.
CO2	Importance of hydrogen bonding, metallic bonding
CO3	Understanding chemistry of Water and its properties

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CO4	Understanding principle of UV-Vis/FTIR spectroscopy and its applications.
CO5	Understanding principles of NMR analysis and study of Flame photometry of materials/characterization of materials.
CO6	Understanding chemistry of polymers, their structures and uses.

5. Syllabus.

UNIT- I: CHEMICAL BONDING

Introduction, Molecular Orbital Theory (MOT), Sigma (σ) and pi (π) Molecular Orbitals, Energy level Diagram for Mono and Di atomic Molecules, Linear Combination of Atomic Orbitals (LCAO) Method, Crystal Field Theory, Calculation of CFSE

UNIT- II: WATER AND ITS TREATMENT

Introduction, Soft and Hard Water, Type of Hardness, Techniques for Water Softening- Lime Soda Process, Zeolite Process, Ion Exchange Process.

UNIT- III: SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Basic concept of spectroscopy. Principle and Applications of different spectroscopic techniques (UV-Visible and IR spectroscopy). Nuclear magnetic resonance and magnetic resonance imaging. Elementary Discussion of Flame photometry.

UNIT- IV: POLYMER

Introduction, types of polymerization. Classification, mechanism of polymerization (Free radical and Ionic polymerization). Thermoplastic, and thermosetting polymers Elementary idea of Biodegradable polymers, preparation, properties and uses of the following polymers- PVC, PMMA, Teflon, Nylon-6, Polyester phenol formaldehyde, Urea- Formaldehyde, Buna-s, Vulcanization of Rubber.

UNIT- V: CORROSION AND LUBRICANT

Lubricant- Definition, Classification with examples. Functions of Lubricant, Physical Characterisitics of Lubricants Such and Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, and Cloud & Pour Point. Chemical Characteristics of Luricant such as Acid Value or Neutralization Number, Emulsification, Saponification Value etc.

TEXT BOOKS:

- University Chemistry,byB.H.Mahan
- Chemistry Principles and Applications, by M.J.Sienko and R.A.Plane
- Fundamentals of Molecular Spectroscopy, by C.N.Banwell
- Engineering Chemistry(NPTEL Web-book),by B.L. Tembe,KamaluddinandM.S.Krishnan
- Physical Chemistry, by P.W.Atkins

ENGINEERING CHEMISTRY LAB SUB. CODE: ETSH-115 CREDIT 01

OBJECTIVES OF THE COURSE:

This Engineering Chemistry Laboratory is common to first year branches of UG Engineering. At The end of the course the student is expected to provide the students with a solid foundation in Chemistry laboratory required to solve engineering problems. Practical implementation of fundamental concepts.

LIST OF EXPERIMENT:-

1. Qualitative analysis of given salts having three acidic and basic radicals.
   Basic radicals:- Pb2+,Cu2+,Al3+,Fe2+,Fe3+,Cr3+,Zn2+,Ca2+,Ba2+ etc.
   Acidic radicals:- Cl-,Br-,I-,,SO4,NO3,OH- etc.

2. Determination the total hardness of given water sample.

3. To Determine the Saponification value of given oil sample.

4. To Determine the acid value of given oil sample.

4. Adsorption of acetic acid by charcoal.

6. Synthesis of polymer /drug.

7. To Determine the Ph of given solution by universal indicator or pH meter.

8. To determine dissolved oxygen in water sample.

9. To determine thinner content in oil paint.

10. To determine carbon monoxide, carbon di-oxide, ontent emission from petrol vehicle.

COURSE OUTCOMES:-

- Students are able to estimate the impurities present in water.
- Ability to select lubricants for various purposes.
- Ability to prepare advanced polymer materials.
- Ability to find the Fe+2, Ca & Cl- present in unknown substances/ ores using titrimetric and instrumental methods.

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School of Engineering & Technology

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETEA - 111
Course Name	Inter-disciplinary Experimental Active Learning (IDEA LAB)
Course Credits	0 (T) + 2 (P) = 2
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Syllabus:**

Course Objective:

The objective of an Idea Lab course is to foster creativity, innovation, and problem-solving skills among participants. Through a combination of theoretical learning, practical exercises, and hands-on projects, Idea Lab courses aim to:

Cultivate creative thinking: Encourage participants to think outside the box, explore unconventional solutions, and challenge traditional approaches to problem-solving.

Develop ideation skills: Equip participants with techniques and methods for generating, refining, and evaluating ideas effectively.

Promote collaboration: Foster a collaborative environment where participants can exchange ideas, provide feedback to each other, and collaborate on projects.

Encourage experimentation: Encourage participants to experiment with different ideas, prototypes, and solutions, embracing failure as a natural part of the creative process.

Course Outcomes:

The outcomes of an Idea Lab course go beyond the acquisition of knowledge to encompass the development of a creative and entrepreneurial mindset, equipping participants with the skills and confidence to thrive in a rapidly changing world.

LIST OF EXPERIMENTS:-

Week 1 To study various active & passive devices like R, L & C, battery etc.

Week 1 To study the CRO and function generator for signal analysis.

Week 2 To study the basics of mechatronics and various parts of a robot.

Week 3 To study the refrigeration and Air-conditioning system with future perspectives.

Week 4 Identification of various types fabrics like cotton, woolen, linen, silk etc.

Week 4 Identification of different types of stones and aggregates (visual identification) with study of their properties and applications.

Week 5 Identification of timbers: teak, Sal, chir, shisum, siras, deodar, kail and mango. (Visual identification) and with study of their properties and applications.

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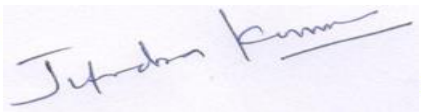
Week 6 Identification of hard drive, RAM, mother board and other important parts in a desktop computer

Week 7 To study the types of soil, water and renewable energy with present scenario and future challenges for sustainable development.

Week 8 To learn the parts of fan, LED bulb, induction cook top, electric iron etc.

Week 9 To study the working principle and various parts of a Hybrid Electric Vehicle (HEV)

Week 10 To study the various components of Green Building (also called as Zero Energy Building)



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School of Engineering & Technology

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETME - 111
Course Name	Engineering Workshop Lab
Course Credits	0 (T) + 1 (P) = 1
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Syllabus:**

Course Objective:

Providing basic knowledge of workshop tools, equipment, machineries and various workshop activities related to carpentry, smithy, foundry etc. with hands-on practices.

Course Outcomes:

On successful completion of this course, the student will be able to

- Use welding equipments to join the structures.
- Carry out the basic machining operations
- Illustrate on operations of smithy, Carpentry, foundry and fittings

LIST OF EXPERIMENTS:-

Week 1 Smithy Shop

(a) To prepare a ring a mild steel rod in black smithy shop.

(b) To prepare an eye-nail of M.S rod of 125 mm long & 8 mm thickness.

Week 2 Foundry Shop

(a) To prepare a V block casting using pit furnace.

Week 3 Carpentry Shop

(a) To prepare a dovetail joint in carpentry shop.

(b) To prepare a cross lap joint in carpentry shop.

Week 4 Fitting Shop

(a) Toprepare a matching joint in fitting shop.

(b) To prepare a square by chipping & filling.

Week 5 Machine Shop

(a) To prepare a cylindrical job of dia. 25 mm to 22.5 mm on lathe using turning operation.

(b) DrillingPractice

Week 6 Welding

(a) To prepare a T-joint by arc welding.

(b) To prepare an L-shape corner joint by Arc welding.

Week 7 Sheet Metal Shop

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(a) Toprepare a conical funnel with soldering in sheet metal shop.

TEXT BOOK:

1. Jain, R.K. Production Technology.

2. Rao, P. N. Manufacturing Technology (Vol. I &II)

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School of Engineering & Technology.

Department of Computer Science & Engineering

SEMESTER - II

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH-201
Course Name	ENGINEERING MATHEMATICS –II
Course Credits	3 (T)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

This course will introduce the core concepts of differential equations, Laplace and Fourier transform, Fourier series and advanced level of mathematics and applications.

2. **Prerequisite:**

Basic knowledge of differential equation.

3. **Objective of Syllabus:**

- The objective of this course is to familiarize the prospective engineers with techniques in ordinary and partially differential equations, Laplace and Fourier transform, Fourier series, complex variables
- It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their discipline

4. **Course Outcome:**

S. No.	Course Outcomes (Cos)
CO1	After successfully completing the course, the student will have a good understanding of the following topics and their applications:
CO2	Analytic function, singularity, residues and complex integration
CO3	Laplace and Fourier transform and its properties, application of Laplace and Fourier transform
CO4	Laplace and Fourier transform and its properties, application of Laplace and Fourier transform.
CO5	Finding the solution of ode and pde

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5. Syllabus.

UNIT 1: ORDINARY DIFFERENTIAL EQUATION

Ordinary differential equation: definitions,order and degree of differential equation, equation, exact differential equations, equations solvable for x, y and p, Clairaut's form, second order linear differential equation with constant coefficient, Cauchy -Euler's equation, Method of variation of parameter.

UNIT 2: PARTIAL DIFFERENTIAL EQUATION

Partial differential equations: Definition and formulation, partial differential equation of the first order, Non-linear Partial differential equations, Legendre's and Charpit's method,Homogeneous linear partial differential equation with constant co-efficient, Methods for finding C.F. and P.I. of Linear Homogeneous Partial Differential Equations.

UNIT 3: LAPLACE TRANSFORM

Laplace Transform: Definition and properties of Laplace transform, shifting theorem, Transform of derivative and integrals, Multiplication by t^n, Division by t.Inverse Laplace transform, convolution theorem (without proof) and its application.

UNIT 4: FOURIER SERIES AND FOURIER TRANSFORM

Fourier series: Periodic Function, Function of arbitrary period, Even and odd functions, half range SeriesFourier Transform: definition and properties of Fourier transform, convolution, Parseval's identity for Fourier transforms, Relation between Fourier transform and Laplace transform.

UNIT 5: COMPLEX ANALYSIS

Complex Analysis: definitions, Cauchy- Riemann Equations, Harmonic functions, Elementary Analytic function and their properties, Cauchy Integral formula (without proof),Taylor's Series, Singularities, Residues, Cauchy Residue Theorem (without proof).

REFERENCE BOOK:

B.S. Grewal, Higher Engineering Mathematics, Khanna publisher's,44thedition
Erwin Kresyszig, Advance Engineering mathematics, John Wiley and Sons,9th edition

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETEE201
Course Name	Basic Electrical & Electronics Engineering
Course Credits	3 (T) + 1 (P)= 4
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

The course provides a thorough understanding of fundamental electrical concepts, beginning with potential difference, current, resistance, and Ohm's law, progressing to advanced topics such as electromagnetism, magnetic circuits, and energy stored in magnetic fields. Students learn analysis techniques for DC circuits and AC fundamentals, including Kirchhoff's laws and sinusoidal voltage/current characteristics. Single-phase transformers and electrostatics are explored, covering construction, working principles, and capacitance. Semiconductor theory, diodes, rectifiers, and transistor configurations and applications are also studied. The course concludes with an introduction to Boolean algebra, logic gates, and simplification techniques, equipping students with a comprehensive skill set for electrical engineering and related disciplines.

2. **Prerequisite:** The prerequisite for the course encompasses a solid understanding of fundamental electrical concepts, including potential difference, current, resistance, and Ohm's law. Additionally, familiarity with electromagnetism, magnetic circuits, and basic analysis techniques for DC circuits and AC fundamentals is required. Students should also possess knowledge of single-phase transformers, electrostatics, semiconductor theory, and Boolean algebra.

3. **Objective of the Syllabus:**

- To explain the laws used in the analysis of DC and AC circuits.
- To understand and analyze AC & DC circuits.
- To provide students with a fundamental knowledge of Single-phase transformer construction and working.
- To provide students with a fundamental knowledge of AC Fundamentals.
- To provide students with a fundamental knowledge of Electrostatics.
- Familiarize with semiconductor devices, rectifier circuits, and their applications.
- Describe the basic applications of transistors.
- Define logic gates & understand the working principles of logical circuits.
- Describe the significance of Boolean algebra in digital circuits.

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4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Students will comprehend fundamental electrical principles and electromagnetism, enabling them to analyze circuits and understand magnetic effects.
CO2	Learners will master DC and AC circuit analysis techniques, including Kirchhoff's laws and sinusoidal characteristics, enhancing their ability to analyze and design electrical circuits.
CO3	By the end of this module, students will be proficient in understanding the operation of single-phase transformers and electrostatic phenomena, enabling them to evaluate transformer efficiency and capacitor behavior.
CO4	Participants will gain expertise in semiconductor theory, diode, and transistor operation, facilitating their capability to design and analyze electronic circuits.
CO5	Students will develop skills in Boolean algebra and logic gates, allowing them to simplify logical expressions and design digital systems effectively.

5. Syllabus:

Unit I ELEMENTARY CONCEPTS

(A) Prerequisite: Concept of Potential difference. Current and resistance. Ohm's law, resistance Temperature coefficient, insulation resistance, SI units of work Power and Energy (B) Electromagnetism: Magnetic effect of an electric current, cross and dot conventions, right-hand thumb rule and corkscrew rule, Concept of M.M.F., flux, flux density, reluctance, permeability and Field strength, their units and relationships, the analogy of electrical and magnetic circuit, Energy stored In a magnetic field.

Unit II D. C. CIRCUITS AND AC FUNDAMENTALS

(A) Kirchhoff's law, ideal and practical voltage and current sources. Mesh and Nodal analysis (Supernode And super mesh excluded). Source transformation. Star delta transformation. Superposition Theorem, Thevevnins's theorem Norton's theorem, maximum power transfer theorem (Source Transformation not allowed for superposition theorem, Mesh and Nodal analysis. (B) Sinusoidal voltage and currents, their mathematical and graphical representation, the concept of Cycle period, frequency, instantaneous, peak, average, R.M.S. values, peak factor, and form factor, Phase difference.

Unit III SINGLE PHASE TRANSFORMER AND ELECTROSTATICS

A) Single phase transformers: Construction, principle of working, e.m.f. equations, voltage, and current ratios, losses, the definition of regulation and efficiency, determination of these by direct loading method. B) Electrostatics: electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity, and capacitance, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors.

Unit IV ANALOG DEVICES

A) Semiconductor theory:- Intrinsic and Extrinsic Semiconductors - N type and P type materials –

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mechanism of the hole and free electrons- majority and minority carriers, drift and diffusion current - Semi conductor diode - V -I characteristics of PN Junction diode, B) Rectifiers: Working and Waveforms of Half wave - Full wave - Bridge rectifiers (without filters) – Differences. C) Transistor: Working Principle of NPN and PNP transistor - Transistor as a switch - Transistor working as an amplifier- common base - common collector- common emitter configuration - input and output characteristics.

Unit V BOOLEAN ALGEBRA AND LOGIC GATES

A) Number representation: Decimal, Binary, Octal, and Hexa- decimal number systems - Conversion of numbers from one number system to another without decimal points - BCD Codes and limitations – Conversion of BCD to decimal and vice versa. B) Logic gates: Definition, truth table, symbol, and logical equations of logic gates: AND – OR - NOT- NAND – NOR-EXOR - EXNOR (Only 2-inputs) – Universal gates. C) Logic Simplification: Rules and laws of Boolean algebra – Demorgan's Theorem and proof - Simplification of logic functions using Boolean.

TEXT / REFERENCES BOOKS:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. E. Hughes, "Electrical and Electronics Technology, Pearson, 2010
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

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Basic Electrical & Electronics Engineering Lab SUB-CODE: ETEE-211 CREDIT: 01

Syllabus:

A. BASIC ELECTRICAL ENGINEERING-

WEEK 1-5

1. Verification of Ohm's Law.
2. Verification of KVL (Kirchhoff's Voltage Law) and KCL (Kirchhoff's Current Law).
3. Verification of Superposition theorem.
4. To Verify the Maximum Power Transfer theorem.
5. Measurement of power and power factor of single phase AC circuit using three voltmeter methods.
6. Verification of The venin's theorem.
7. 7. To verify Norton's theorem.
8. To measure power and power factor in a single-phase A.C. circuit using a wattmeter.

B. BASIC ELECTRONICS ENGINEERING-

WEEK 6-11

1. CRO – Applications.
2. V- I characteristics of Silicon & Germanium PN junction diodes.
3. V-I characteristics of Zener diode.
4. Characteristics of BJT in Common Emitter Configuration.
5. Characteristics of JFET in common source configuration.
6. Half and Full wave rectifier without a filter.
7. Half wave and Full wave rectifier with Filter.
8. Characteristics of Common Emitter BJT amplifier.

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REFERENCE BOOKS:

- E. Hughes, “Electrical and Electronics Technology, Pearson, 2010
- V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

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School of Engineering & Technology.

Department of Computer Science & Engineering

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS201
Course Name	C Programming
Course Credits	3 (T) + 1(P)= 4
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

Understand the basic concept of C Programming, and its different modules that include Conditional and looping expressions, Arrays, Functions, Pointers, Structures and files.

2. Prerequisite:

To understand the basic knowledge of computer, Keyboard and operating system.

3. Objective of Syllabus:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, and Structures.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	Understand the basic concept of C Programming, Constants, variables & data types Operators and expressions managing input and output operators, and Branching Decision Making and Looping.
CO2	Understanding One–dimensionalArrays and their declaration and Initialisations, Two-dimensional Arrays and their initialisations, Multidimensional Arrays, Dynamic Arrays, String Variables, Reading and Writing Strings, Arithmetic Operations on characters, Putting Strings together, Comparison of Two Strings.
CO3	Understand the concept of Functions, Declaration, Definition and Calling of functions, Nesting function and Recursion, Passing array and string to functions, Storage classes: automatic, external and static variables.
CO4	Ability to Defining Structure, Declaring Structure Variable and Accessing Structure Members, Initialisation of Structure, Comparing Structure Variables, Operation on Individual Members, Arrays of Structures, Structures within structures, Structures

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	and Functions, Unions, Size of Structures
CO5	Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor
CO6	Understanding Pointers and Arrays, Pointers and Character Strings, Arrays of Pointers, Pointers and Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers and Structures, Union, File Management in C.

5. Syllabus.

UNIT I: INTRODUCTION TO PROGRAMMING

Introduction to components of a computer system (disks, memory, processor, where a Program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo Code with examples. From algorithms to programs; source code, variables (with data types) Variables and memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence.

UNIT II: CONDITIONAL BRANCHING AND LOOPS & ARRAYS

Writing and evaluation of conditionals and consequent branching, Iteration and loops Arrays (1-D, 2- D), Character arrays and Strings

UNIT III: **BASIC ALGORITHMS & FUNCTIONS**

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required) Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

UNIT IV: RECURSION

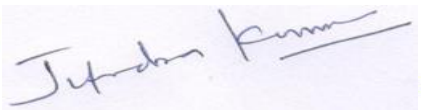
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort**.**

UNIT V: STRUCTURE & POINTERS

Structures, Defining structures and Array of Structures Idea of pointers, Defining pointers, Use
of Pointers in self-referential structures, notion of linked list (no implementation)

TEXTBOOKS / REFERENCES

1. ByronGottfried,Schaum's Outline of ProgrammingwithC,McGraw-Hill
2. E.Balaguruswamy,Programming ANSIC,TataMcGraw-Hill
3. C in Depth by S.K.Srivastava/ Deepali Srivastava
4. C Programming Language (Prentice Hall)



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5. https://www.tutorialspoint.com/cprogramming/index.htm
6. https://www.geeksforgeeks.org/c-programming-language/
7. https://www.javatpoint.com/c-programming-language-tutorial

C PROGRAMMING LAB SUB-CODE: ETCS-211 CREDIT: 01

A Theory: Variable, Data type, Keyword ,Operator, Hello world Program, Control Structure, Array, Pointer

Week 1: Write a C program to find the sum of individual digits of a positive integer.

Week 2: Write a C program to generate Fibonacci series.

Week 3: Write a C program to generate all the prime numbers between 1 and n is a Value supplied by the user.

Week 4: Write a C program to find the roots of a quadratic equation.

Week 5: Two integer operands and one operator form user, performs the operation and then prints the result.

Week 6: Write a C program to find the factorial of a given integer by using recursive and non-recursive functions.

Week 7: A C program to find both the largest and smallest number in list of integers

Week 8: Write A C- Program to Determine If The Given String Is A Palindrome Or Not

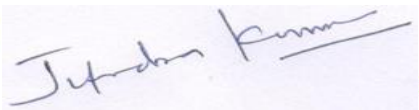
Week 9: Example of Array In C programming to find out the average of 4 integers

Week 10: Write a program in c to Addition of two matrix in C

Week 11: Write a C program to implement the following searching method.

i) Linear search ii) Binary search

Week 12: Write C programs that implement the following sorting methods to sort a given list of integers in ascending order by using Bubble sort.



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School of Engineering & Technology

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETME - 201
Course Name	Fundamental of Mechanical and Civil Engineering
Course Credits	3 (T) + 1 (P) = 4
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

A course on "Fundamental of Mechanical and Civil Engineering" is foundational for understanding the physical principles that govern the behavior of solids and fluids. This part of the course covers topics such as force systems, moments, equilibrium conditions, free-body diagrams, and analysis of trusses, frames, and beams. Students learn how to calculate reactions, internal forces, and stresses in static systems. Fluid mechanics deals with the behavior of fluids (liquids and gases) at rest and in motion. Topics include fluid properties, fluid statics, fluid dynamics, continuity equation, Bernoulli's equation, momentum equation, flow in pipes, and boundary layer theory. Students learn about the principles governing fluid flow and their applications in engineering systems. Overall, a course on Fundamental of Mechanical & Civil Engineering provides students with a strong foundation in the principles of mechanics, enabling them to analyze and design mechanical and structural systems with confidence and precision.

2. **Prerequisite:**

Throughout the course, students are exposed to a variety of engineering problems and applications that require the application of mechanics principles. This could include analyzing structures, designing mechanical components, and solving real-world engineering challenges.

3. **Objective of the Syllabus:**

The main learning objective of this course is to prepare the students for:

- Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
- Applying the concepts of frictional forces at the contact surfaces of various engineering systems.
- To understand the concepts of Centroid and centre of gravity.
- To study the concepts of power plant, IC engine components refrigeration's and air conditioning.
- To study the concepts of properties of fluids.
- To study the civil engineering materials and building components.

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4. **Course Outcomes:**

Upon completion of this course, the students will be able to:

S.No.	Course Outcomes (Cos)
CO1	Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D. Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
CO2	Apply the concepts of locating Centroid / center of gravity of various sections
CO3	To study the concepts of power plant, IC engine components refrigeration's and air conditioning.
CO4	To study the concepts of properties of fluids.
CO5	To study the Civil Engineering Material, Survey and Building Components.

5. **Syllabus:**

UNIT 1 FORCE SYSTEMS AND FRICTION

Introduction –Laws of Mechanics – Lami's theorem,Triangle, Parallelogram and polygon law of forces –Force system and its classifications –Equivalent systems of forces, free body diagram.

Beam and types of beam – Support and types of support, Shear force and bending moment diagram– for cantilever and simply supported beam with concentrated, distributed load and couple.

Friction-its types, Laws of friction, Co-efficient of friction, Angle of friction, Angle of repose and its relation.

UNIT 2 CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA

Center of gravity and Moment of inertia; Centroid and center of gravity, Moment Inertia of area and mass, Radius of Gyration

UNIT 3 THERMAL ENGINEERING

Introduction, Classification of power plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear power plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles - Principle of vapour compression system – Layout of typical domestic refrigerator – Window and split type room Air conditioner

UNIT 4 BASIC CONCEPTS OF FLUID MECHANICS

Fluid – definition, - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension,Fluid statics:

concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers and pressure gauges.Bernoulli's equation and its applications.

UNIT 5 CIVIL ENGINEERING MATERIAL, SURVEY AND BUILDING COMPONENTS

Civil Engineering Material:Brick, Stone, Cement, Concrete and its properties.
Surveying:Principles, Measurements of distances, Determination of angles, area, and leveling
Building components: Foundation and its types, bearing capacity,Requirement of goodfoundation
Superstructure: Brick masonry, Stone Masonry, beams, columns, Lintels, roofing, flooring, plastering.

BOOKS AND REFERENCES

Text Books

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education. 11thEdition, 2017
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.
3. Nag. P.K. "Power Plant Engineering" Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008
4. B. C. Punamia- Surveying part-1
5. N.S. Basak – Surveying
6. Building Material – S. K. Duggal
7. R. K. Bansal Fluid Mechanics and Machinery

Reference Books

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeller, R.C., and Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.

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Fundamental of Mechanical and Civil Engineering **SUB-CODE:** ETME-211 **CREDIT: 01**

Course Objective:

The main learning objective of this course is to prepare the students for:

- Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
- Applying the concepts of frictional forces at the contact surfaces of various engineering systems.
- To understand the concepts of Centroid and centre of gravity.
- To study the concepts of power plant, IC engine components refrigeration's and air conditioning.
- To study the concepts of properties of fluids.
- To study the civil engineering materials and building components.

Course Outcomes:

At the end of the course the students are able to:

- Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D. Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
- To study the concepts of IC engine components.

Syllabus:

Week 1 To verify the parallelogram law of forces.
Week 2 To verify the lami's theorem.
Week 3 To determine the coefficient of Friction of an inclined Plane.
Week 4 To study about the model of two stroke petrol engine.
Week 5 To study about the four stroke petrol engine and diesel engine.
Week 6 To Verify the Bernoulli's Theorem.
Week 7 To determine the compressive strength of Brick
Week 8 To determine the horizontal angle with prismatic and surveyor compass.
Week 9 To determine the area by chain survey.

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Week 10 To measure horizontal and vertical angles in the field by using Theodolite.

BOOKS AND REFERENCES

Text Books

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education. 11thEdition, 2017
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.
3. Nag. P.K. "Power Plant Engineering" Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008
4. B. C. Punamia- Surveying part-1
5. N.S. Basak – Surveying
6. Building Material – S. K. Duggal
7. R. K. Bansal Fluid Mechanics and Machinery

Reference Books

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeller, R.C., and Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETSH-202**
Course Name	**TECHNICAL COMMUNICATION & PROJECT MANAGEMENT**
Course Credits	**3 (T)**
Total Course Credit	**181**

Abbreviations: T-Theory

1. **Course Overview**:
   In this course student will learn about letter writing and technical presentation skills.

2. **Prerequisite:**
   Basic knowledge of grammar, letter & application.

3. **Objective of the Syllabus**
   - To introduce the students to the fundamentals of mechanics of writing.
   - To facilitate them with the style of documentation and specific formal written communication.
   - To initiate in them the art of critical thinking and analysis.
   - To help them develop techniques of scanning for specific information, comprehension and organization of ideas.
   - To enhance their technical presentation skills.

4. **Course Outcomes:**

S.No.	CourseOutcomes(Cos)
CO1	Students will heighten their awareness of correct usage of English grammar in writing and speaking
CO2	Acquisition of technical communication's generic aspects like Reading Technical Material, Technical Writing, Listening
CO3	Learning the skill of proofreading and copy editing, paraphrasing and spinning using technical tools
CO4	Learning the technical phrases and writing styles like descriptive, argumentative etc for developing good technical documents for presentations or disseminating technical documents

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CO5	Accessing the reading material and developing the writing technical material with the use of technical concepts and tools

5.Syllabus:

UNIT I:
Mechanics of Writing: Grammar rules -Articles, Tenses, Part of Speech. General Reading and Listening comprehension – rearrangement & organization of sentences.

UNIT II:
Different kinds of written documents: Definitions- descriptions- instructions-recommendations- user manuals – reports – proposals. Formal Correspondence: Writing formal Letters. Reading & Listening Comprehension.

UNIT III:
Technical paper writing: documentation style – document editing – proof reading – Organizing and formatting Reading and listening comprehension of technical documents Technical presentations

UNIT IV:
Reading and listening comprehension of technical documents Technical presentations

UNIT V:

Project Writing

TEXT BOOKS:

- Essential Communication Strategies for Scientists, Engineers and Technology Professionals. II Edition. New York: IEEE press, 2002
- Technical Communication: A Reader-Centred Approach. V Edition. Harcourt Brace College Publication, 2003
- Technical Report Writing Today. VIII Edition (Indian Adaptation). New Delhi: Biztantra, 2004.
- Practical English Usage, Oxford University Press, 2000

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Programme Structure	**B. Tech (Computer Science & Engineering)**
Subject Code	**ETME202**
Course Name	**Engineering Graphics & Design**
Course Credits	**3(L)**
Total Course Credit	**181**

Abbreviations: L-Lecture, T- Tutorial, P-Practical

1) **Course Overview:** This course of Graphics explains the concepts of engineering drawing of objects in order to develop the skill of designing the new and existing engineering products.

2) **Prerequisite:** There are no specific prerequisites for this course, although a basic understanding of Geometry and Menstruation is recommended.

3) **Objectives of the Syllabus:** To develop graphic skills for communication of concepts, ideas and design of engineering products among the students. To expose them to existing national standards related to technical drawings.

4) Course Outcomes: On successful completion of this course, the student will be able to

SL No.	Course Outcomes(Cos)
CO1	Familiarize with the fundamentals and standards of Engineering graphics
CO2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.
CO3	Project orthographic projections of lines and plane surfaces.
CO4	Draw projections and solids and development of surfaces.
CO5	Visualize and to project isometric and perspective sections of simple solids.

5) Syllabus:

CONCEPTS AND CONVENTIONS

Importance of graphics in engineering applications–Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning, Scales

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MODULE I: PLANE CURVES

Plane Curves: - Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of in volutes of square and circle – Drawing of tangents and normal to the above curves.

MODULE II: PROJECTION

Projection: - Types of projection, Orthographic projection, First and Third angle projection, Projection of points and lines, Line inclined to one plane, Inclined with both the plane.

MODULE III: PROJECTION OF PLANES AND SOLIDS

Projection of Planes and Solids: - Projection of Planes likes circle and polygons in different positions; Projection of polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.

MODULE IV: SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Section of Solids: - Section of right solids by normal and inclined planes; Intersection of cylinders.

Development of Surfaces: - Parallel line and radial - line method for right solids, Introduction of surfaces-cylinder.

MODULE V: ISOMETRIC PROJECTIONS & COMPUTER AIDED DRAFTING

Isometric Projections:-Isometric scale, Isometric axes, Isometric Projection from orthographic drawing.

Computer Aided Drafting (CAD): Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.

BOOKS AND REFERENCES:

1) Bhatt, N.D.,Panchal V M and Pramod R. Ingle, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2) Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015
3) Agrawal, B. and Agrawal C.M., "Engineering Drawing", Tata McGraw, N. Delhi, 2008.
4) Gopalakrishna, K. R., "Engineering Drawing",Subhas Stores, Bangalore, 2007.
5) Natarajan, K. V., "A text book of Engineering Graphics", 28thEd.,Dhanalakshmi Publishers, Chennai, 2015
6) Shah, M. B., and Rana, B. C., "Engineering Drawing", Pearson, 2nd Ed., 2009.
7) Venugopal, K. and Prabhu Raja, V., "Engineering Graphics", New Age, 2008.

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School of Engineering & Technology.

Department of COMPUTER SCIENCE AND ENGINEERING

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Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS202
Course Name	Internet of Things (IOT)
Course Credits	0(L) + 0(P)= 0
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

ETCS-202 BASICS OF INTERNET OF THINGS (IOT)

OBJECTIVES OF THE COURSE:

- The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time.
- It's becoming the Internet of Things (IoT).
- The course enables student to understand the basics of Internet of things and protocols.
- It introduces some of the application areas where Internet of Things can be applied.
- Students will learn about the middleware for Internet of Things.

1. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural Models
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
CO3	Appraise the role of IoT protocols for efficient network communication.
CO4	Elaborate the need for data analytics and security in IoT.
CO5	Illustrate different sensor technologies for sensing real world entities.

MODULE - 1 INTRODUCTION

Introduction, Definition and Characteristics of IoT, Some basic terminologies related to IoT, The technology behind IoT, Design principles of IoT:Physical design of IoT, Logical design of IoT, Functional blocks of IoT, , Advantage & Disadvantage of IoT. Applications of IoT.

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MODULE-2 IOT& M2M

IoT& M2M ,M2M Communication, Key features of M2M, M2M Applications, Difference between IoT and M2M, Sensing, Actuation, Basic of Networking. M2M ecosystem.

MODULE-3 IOT ARCHITECTURE

IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoT acivity stack architecture- Resource model and Abstraction.

MODULE-4 IOT AND ITS COMPONENT

IoT and its component –Introduction, RFID, Applications of RFID, Wireless Sensor network (WSN & VSN),Participatory Sensing Technology, Embedded platform for IoT. Interfacing a gas sensor to Arduino.

MODULE- 5 IOT APPLICATION DEVELOPMENT AND DESIGN CHALLENGES

IoT Design methodology, Requirement and process model of IoT, Process specification, Information model for IoT application. IoT applications- smart city street lights-control and monitoring, Home automation,
E-health, Smart farming.

COURSE OUTCOMES:

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics.

TEXT BOOKS /REFERENCES:

• Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press,2012.
• Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.
• David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, 2010.
• Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012. References:
• Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”,1st Edition, VPT, 2014
• Francis da Costa, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013
• CunoP fister, Getting Started with the Internet of Things, O‟Reilly Media, 2011, ISBN: 978-1- 4493-9357-1

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Department of Computer Science & Engineering.

SEMESTER - III

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETEC301
Course Name	Electronic Devices & Circuit
Course Credits	3 (T) + 2(P) = 5
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. **Course Overview:**
   This course serves as an introduction to the fundamental principles and applications of electronic devices and circuits. It provides students with a solid foundation in the theory, analysis, and design of electronic circuits, preparing them for advanced study or careers in electrical engineering, electronics, and related fields**.**
2. **Prerequisite:** To understand the fundamental principles of electronic devices and circuits & Analyze and design basic electronic circuits using passive components.
3. **Objective of the Syllabus:**
   This course Electronic Devices & Circuit is an essential part of any Electronics engineering education. These objectives aim to provide students with a comprehensive understanding of electronic devices and circuits, preparing them for further study or careers in fields such as electrical engineering, electronics, telecommunications, and computer hardware.

   Learn the fundamentals of principles of electronic devices and circuits & Analyze and design basic electronic circuits using passive components such as resistors, capacitors, and inductors and also explore semiconductor physics.

4. **Course Outcomes:**

S. No.	Course Outcomes (Cos)
CO1	Understand fundamentals of Introduction to Semiconductor Physics.
CO2	Apply in PN Junction Diode, P-N junction characteristics, I-V characteristics, Rectifier, Clipper &Clamper.
CO3	Understand the basic concepts of BJT & MOSFET.
CO4	Understand the basic concepts of CMOS Fabrication & Special Types of Diodes.
CO5	Understand fundamentals of Operational Amplifier & its Characteristics of an ideal op-amp.

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5. **Syllabus:**

Module I: **Introduction to Semiconductor Physics**

Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors

Module II: **PN Junction Diode**

Generation and recombination of carriers; Poisson and continuity equation P-N junction characteristics, I-V characteristics, Rectifier, Clipper &Clamper and small signal switching models; Avalanche breakdown, Zener diode, Scotty diode

Module III: BJT & MOSFET

Bipolar Junction Transistor, I-V characteristics, Early effect, Ebers-Moll Model, MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor.

Module IV: **CMOS Fabrication & Special Types Of Diodes**

Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process. Photodiodes, photo detectors, solar cell, light emitting diodes, semiconductor lasers, and light emitting materials. Tunnel Diode

Module V: Operational Amplifier

Characteristics of an ideal op-amp, Introduction- Summing, Scaling and averaging amplifier, Subs tractor or difference amplifier, Voltage to current converter, Current to voltage converter, Controlled sources, O pamp integrator and differentiator.

BOOKS AND REFERENCES:

1. G. Streetman, and S. K. Banerjee, " Solid State Electronic Devices," 7th edition, Pearson,2014.
2. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, " Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons,2006.
4. C.T. Sah, " Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, " Operation and Modeling of the MOS Transistor," Oxford Univ.Press,2011.

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ELECTRONIC DEVICES AND CIRCUITS LAB SUB-CODE: ETEC311 CREDIT: 02

Course Objective:

- To be exposed to the characteristics of basic electronic devices.
- Investigate the characteristics and applications of various types of diodes including rectifiers, Zener diodes, and light-emitting diodes (LEDs).
- Gain hands-on experience through laboratory experiments, circuit simulations, and design projects to reinforce theoretical concepts and develop practical skills.

Course Outcomes:

At the end of the course the students are able to:

- Ability to implement the characteristics and applications of various types of diodes including rectifiers.
- Ability to design and develop practical skills.
- Ability to simulate and implement Gain hands-on experience through laboratory experiments, circuit simulations, and design projects.

Syllabus:

Week 1: To perform and get familiar with working knowledge of following instruments:-
(a) Function generator (b) CRO (cathode ray oscilloscope)
Week 2: . To perform and plot the forward and reverse V-I characteristics of a PN junction diode.
Week 3: . To perform and plot the characteristics of Zener diode.
Week 4: To perform and plot the wave shape of half wave rectifier.
Week 5: To perform and plot the wave shape of full wave rectifier.
Week 6: To perform and study the input and output characteristics of common base transistor
Week 7: To perform and study the input and output characteristics of common emitter transistor.
Week 8: To perform and study transfer and drain characteristics of FET.
Week 9: Drain and Transfer Characteristics of JFET.
Week 10: To perform and plot the characteristics of Photo diode.
Week 11: To perform and plot the characteristics of light emitting diode.

REFERENCE BOOKS:

1. Fundamentals of Electric Circuits | 7th Edition. Charles K. Alexander.
2. Op-Amps and Linear Integrated Circuits | Fourth Edition | By Pearson. Ramakant A. Gayakwad.

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School of Engineering & Technology.

Department of Computer Science & Engineering

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS301
Course Name	Data Structure and Algorithm
Course Credits	3 (L) + 2(P)= 5
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   To understand the concepts of ADTs, linear data structures (lists, stacks, and queues),

   To implement non-linear data structures (Tree and Graph), get familiarized to sorting and searching algorithms.

2. **Prerequisite:**

   To understand the basic knowledge of C programing.

3. **Objective of Syllabus:**
   - To understand the concepts of ADTs
   - To Learn linear data structures – lists, stacks, and queues
   - To implement non-linear data structures
   - To apply Tree and Graph structures
   - To implement graph traversal algorithms
   - To get familiarized to sorting and searching algorithms

4. **Course Outcome:**

S. No.	Course Outcomes (Cos)
CO1	Understand basic data structures such as arrays, strings, and linked lists.
CO2	Study linear data structures such as stacks and queues and understand their difference.
CO3	Critically analyze the various sorting algorithms.
CO4	Understand the concept of memory management.
CO5	Study tree, heap and graphs along with their basic operations
CO6	Study different techniques for solving problems like sorting and searching

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5. Syllabus.

UNIT I: LINEAR DATA STRUCTURES – LIST

Abstract Data Types (ADTs) – List ADT – array-based implementation - linked list implementation - singly linked lists - circularly linked lists- doubly-linked lists - applications of lists - Polynomial Manipulation- All operations (Insertion, Deletion, Merge, Traversal).

UNIT II: LINEAR DATA STRUCTURES – STACKS, QUEUES

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III: NON LINEAR DATA STRUCTURES – TREES

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

UNIT IV: NON LINEAR DATA STRUCTURES - GRAPHS

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V: SEARCHING, SORTING AND HASHING TECHNIQUES

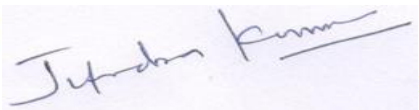
Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TEXT BOOKS:

- Mark Allen Weiss, —Data Structures and Algorithm Analysis in C‖, 2nd Edition, Pearson Education,1997.
- Reema Thareja, —Data Structures Using C‖, Second Edition , Oxford University Press, 2011

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, —Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, —Data Structures and Algorithms‖, Pearson Education, 1983.
3. Stephen G. Kochan, —Programming in C‖, 3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C‖, Second Edition, University Press, 2008
5. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.



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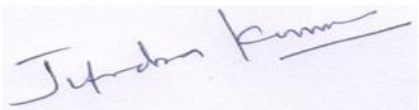
DATASTRUCTURE LAB SUB-CODE: ETCS311 CREDIT: 02

LIST OF EXPERIMENT

Week 1: Array implementation of Stack and Queue ADTs
Week 2: Array implementation of Stack and Queue ADTs
Week 3: Linked list implementation of List, Stack and Queue ADTs
Week 4: Applications of List, Stack and Queue ADTs
Week 5: Implementation of Binary Trees and operations of Binary Trees
Week 6: Implementation of Binary Search Trees
Week 7: Implementation of AVL Trees
Week 8: Implementation of Heaps using Priority Queues.
Week 9: Graph representation and Traversal algorithms
Week 10: Applications of Graphs
Week 11: Implementation of searching and sorting algorithms
Week 12: Hashing – any two collision techniques

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETEC302
Course Name	Digital Electronics
Course Credits	3(L) + 2(P)= 5
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

This course serves as an introduction to the fundamental principles and practical applications of digital electronics. Students will delve into the world of digital systems, exploring the building blocks of modern electronic devices, circuits, and systems that process digital signals. Through a blend of theoretical knowledge and hands-on experimentation, students will develop a comprehensive understanding of digital logic, binary arithmetic, combinational and sequential circuits, and programmable logic devices.

2. Prerequisite: There are no specific prerequisites for this course, although a basic understanding of algebra and physics is recommended. Familiarity with electrical circuits and components will also be beneficial but is not required.

3. Objective of the Syllabus:

This course Digital Electronics is an essential part of any Electronics engineering education. Students will grasp the foundational concepts of digital logic, including Boolean algebra, logic gates, and binary arithmetic, to comprehend the fundamental principles underlying digital electronic systems. Through theoretical learning and practical exercises, students will gain the ability to design, analyze, and optimize combinational logic circuits using various logic gates and components.

4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Understanding the basic of gates, De-Morgan theory, K-map.
CO2	Design of sequential circuit and asynchronous counters, up down counters, Shift registers.
CO3	Understand the Digital memories (SRAM, DRAM, ROM, EPROM).
CO4	Understand the Logic Family and Semiconductor Memory.
CO5	Understanding the 555 IC Timers.

5. Syllabus:

Module I:Introduction of Logic Gates

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Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

Module II: Combinational Circuits

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU

Module III: Sequential Logic Design

Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

Module IV: Logic Family and Semiconductor Memory

TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices

Module V: The 555 IC Timer

555 Timer pin configuration, Basics and block diagram of 555 timer, working, 555timer as a monostable & stable multivibrator, 555 timer as a VCO.

BOOKS AND REFERENCES:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann," Digital Electronics- An introduction to theory and practice", PHI, 2nd edition,2006.
4. D.V. Hall, "Digital Circuits and Systems" , Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

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Digital Electronics LAB SUB-CODE: ETEC312 CREDIT: 02

Course Objective:

- Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits.
- Develop practical skills in circuit prototyping, simulation, and troubleshooting.
- Understand the importance of synchronous and asynchronous digital systems.

Course Outcomes:

At the end of the course the students are able to:

- By the end of this course, students will have acquired a solid foundation in digital electronics, enabling them to pursue further studies or careers in fields such as electrical engineering, computer engineering, and digital design.
- Ability to design and develop practical skills.
- Ability to simulate and implement Gain hands-on experience through laboratory experiments, circuit simulations, and design projects.

Syllabus:

Week 1: To study and verify the truth table of gates.
Week 2: To study and verify the truth table of half adder and full adder using gates.
Week 3: To study and verify the truth table of half subs tractor and full subs tractor using gates.
Week 4: To study and verify NAND as a universal gate.
Week 5: To study and verify the truth table of S-R and J-K flip flop.
Week 6: To study and verify the truth table of D and T-flip flop.
Week 7: To study and verify the truth table of MUX and DEMUX.
Week 8: To study about analog to digital converter.
Week 9: To study about digital to analog converter.
Week 10: To study about Counters.

REFERENCE BOOKS:

1. Digital electronics Lab Manual by Mr.S.Munaf.
2. Op-Amps and Linear Integrated Circuits | Fourth Edition | By Pearson. Ramakant A. Gayakwad.

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH-301
Course Name	ENGINEERING MATHEMATICS –III
Course Credits	4 (L)
Total Course Credit	181

Abbreviations: L-Lecture

Course Overview:

This course is designed to provide students with a comprehensive understanding of basic probability theory and statistical methods. It covers fundamental concepts in probability theory, including probability spaces, random variables, discrete and continuous distributions, as well as statistical techniques for data analysis and inference. The course aims to equip students with the necessary knowledge and skills to analyze data, make informed decisions, and draw meaningful conclusions in various fields of study and application.

1. **Prerequisite:** Students are expected to have a solid foundation in mathematical concepts such as calculus, algebra, and basic probability theory. Familiarity with concepts such as probability spaces, random variables, and basic statistical measures is recommended. Proficiency in mathematical reasoning and problem-solving skills is essential for successful completion of the course.
2. **Objective of the Syllabus:**
   It aims to equip students with the necessary knowledge and skills to analyze data, make informed decisions, and draw meaningful conclusions in various fields of study and practical applications.
3. **Course Outcomes:**

S. No.	Course Outcomes (Cos)
CO1	Understand the fundamental concepts of probability theory, including probability spaces, conditional probability, and independence. Analyze discrete random variables and their distributions, including the multinomial distribution and the Poisson approximation to the binomial distribution. Compute the expectation, variance, and correlation coefficient of discrete random variables.
CO2	Describe the properties of continuous random variables, including distribution functions and densities. Analyze common continuous distributions, such as the normal distribution, and understand properties of bivariate distributions.
CO3	Evaluate measures of central tendency, including moments, skewness, and kurtosis. Understand and analyze probability distributions such as the binomial, Poisson, and normal distributions. Calculate statistical parameters for these distributions and apply

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	correlation and regression analysis, including rank correlation.
CO4	Apply curve fitting techniques using the method of least squares to fit data to various types of curves, including straight lines and parabolas. Conduct tests of significance for large samples, including tests for single proportions, differences of proportions, single means, differences of means, and differences of standard deviations.
CO5	Conduct tests for single means, differences of means, and correlation coefficients for small samples.Perform tests for the ratio of variances and apply the chi-square test for goodness of fit and independence of attributes in small sample scenarios.

4. Syllabus:

MODULE I: BASIC PROBABILITY

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev & #39;s Inequality.

MODULE II: **CONTINUOUS PROBABILITY DISTRIBUTIONS AND BIVARIATE DISTRIBUTIONS**

Continuous random variables and their properties, distribution functions and densities, normal, bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes rule.

MODULE III: BASIC STATISTICS: MEASURES OF CENTRAL TENDENCY: MOMENTS, SKEWNESS AND KURTOSIS

Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

MODULE IV: **APPLIED STATISTICS**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

MODULE V: SMALL SAMPLES

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

BOOKS AND REFERENCES:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher‟s, 36 th edition, 2010.
2. Erwin Kresyszig, Advance Engineering Mathematics, John Wiley and Sons, 9 th edition, 2006.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

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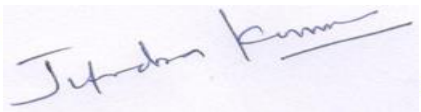
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).



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School of Engineering & Technology.

Department of Computer Science & Engineering

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH302
Course Name	Entrepreneurship development and Business Incubation
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

The objectives of Entrepreneurship Development and Business Incubation courses are multifaceted, aiming to equip individuals with the knowledge, skills, and resources necessary to foster successful entrepreneurial ventures.

2. Prerequisite:

Educational Background, Entrepreneurial Mindset, Basic Computer Skills, Communication Skills, Critical Thinking and Problem-Solving Skills.

3. Objective of Syllabus:

The objectives of Entrepreneurship Development and Business Incubation courses are multifaceted, aiming to equip individuals with the knowledge, skills, and resources necessary to foster successful entrepreneurial ventures.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	**Understanding Entrepreneurship:** Gain a comprehensive understanding of the concept of entrepreneurship, including its importance in driving innovation, economic growth, and job creation.
CO2	**Identifying Opportunities:** Develop the ability to identify and evaluate potential business opportunities, including market needs, trends, and gaps.
CO3	**Business Planning:** Acquire skills in developing effective business plans, including market research, financial projections, and operational strategies.
CO4	**Risk Management:** Understand the risks associated with entrepreneurship and learn strategies for managing and mitigating these risks effectively.
CO5	**Financial Management:** Learn the fundamentals of financial management, including budgeting, cash flow management, and funding options for startups.
CO6	**Business Incubation:** Gain insights into the role and functions of business incubators

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	in supporting startup ventures, including access to resources, mentoring, and networking opportunities.

5. Syllabus.

UNIT I: ENTREPRENEURSHIP

Importance and growth Characteristics and qualities of entrepreneur, Role of enterepreneship Ethics and social responsibilities properties, Entrepreneurship development,

UNIT II: OVERVIEW OF BUSINESS ENVIRONMENT IN INDIA

Assessing overall business environment in the Indian economy, Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs, Globalization and the emerging business/entrepreneurial environment managing an enterprise.

UNIT III: ENTREPRENEURIAL AND MANAGERIAL CHARACTERISTICS AND ENTREPRENEURSHIP

Concept of entrepreneurship, Entrepreneurial and managerial characteristics, managing an enterprise, motivation and entrepreneurship development, Importance of planning, monitoring evolution and follows up, Managing competition, Entrepreneurship development programs, SWOT analysis. Corporate enterprenshiup, Planning and evolution of projects, Creativity.

UNIT IV: GOVT. POLICIES AND PUBLIC- PRIVATE PARTNERSHIP

Govt. policies on SME/SSIs/ business incubation and relevant schemes, Social responsibility of business, Public- Private Partnership, Characteristics of Indian industries:- Characteristics of Indian industries working in Civil engineering/Mechanical engineering/ Electrical engineering/ IT and Computer/ Electronics and communication sectors, Import and export scenarios.

UNIT V: BUSINESS INCUBATION AND VENTURE MANAGEMENT

Business incubation and commercialization of ideas and innovations, Project selection, Planning and control, Venture capital, Joint venture management.

TEXT BOOKS:

1. Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd.,Ram Nagar, New Delhi, 2013.
2. Donald F Kuratko, " Entreprenuership – Theory, Process and Practice", 9th Edition, Cengage Learning 2014.

REFERENCES:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
2. Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2nd Edition Dream tech, 2005.
3. Rajeev Roy, „Entrepreneurship" 2nd Edition, Oxford University Press, 2011.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad, 1986.

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SEMESTER IV

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS-401
Course Name	DISCRETE MATHEMATICS
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: L-Lecture

Course Overview:

This course covers fundamental concepts in discrete mathematics, including sets, relations, functions, mathematical induction, propositional logic, algebraic structures, and graph theory. It provides a foundational understanding of these topics and their applications in various areas of mathematics and computer science.

1. **Prerequisite:** Students should have a basic understanding of mathematical concepts such as algebra, arithmetic, and geometry. Familiarity with basic logic and proof techniques will also be beneficial.

2. **Objective of the Syllabus:**
   The objective of this syllabus is to introduce students to the essential concepts and techniques of discrete mathematics and develop their problem-solving skills. By the end of the course, students should be able to apply these concepts to solve problems in mathematics, computer science, and related fields.

3. **Course Outcomes:**

S. No.	Course Outcomes (Cos)
CO1	Understand and apply operations and laws of sets, including Cartesian products. Define and analyze binary relations, partial ordering relations, and equivalence relations. Describe and apply the concepts of functions, including bijective functions and composite functions. Analyze the size of sets, including finite and infinite sets, countable and uncountable sets. Apply Cantor's diagonal argument and the Power Set theorem. Understand and apply the Schroeder-Bernstein theorem.

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CO2	Understand and apply the Well-Ordering Principle and recursive definitions. Apply the Division algorithm, including prime numbers and the Euclidean Algorithm. Apply the Fundamental Theorem of Arithmetic. Utilize basic counting techniques, including inclusion and exclusion, pigeon-hole principle, permutation, and combination.
CO3	Understand the syntax, semantics, and validity of propositional logic. Apply basic connectives and truth tables. Understand logical equivalence and laws of logic. Apply rules of inference and the use of quantifiers. Utilize various proof techniques, including proof by contradiction, contraposition, necessity, and sufficiency.
CO4	Define and analyze algebraic structures with one binary operation, including semi-groups, monoids, and groups. Understand congruence relation and quotient structures. Analyze Boolean algebra, Boolean rings, duality, and representation of Boolean functions.
CO5	Define and analyze graphs and their properties, including degree, connectivity, paths, cycles, and subgraphs. Understand Eulerian and Hamiltonian walks. Analyze graph colouring, including vertex colouring, edge colouring, and list colouring. Understand rooted trees, trees, and sorting, weighted trees, and prefix codes.

4. Syllabus:

Module I: SETS, RELATION AND FUNCTION

Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Module II: **PRINCIPLES OF MATHEMATICAL INDUCTION**

The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

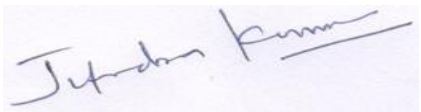
Module III: PROPOSITIONAL LOGIC

Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Module IV: **ALGEBRAIC STRUCTURES AND MORPHISM**

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

Module V: GRAPHS AND TREES



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Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

BOOKS AND REFERENCES:

1. TRUSS, J.K. Discrete Mathematics for Computer Scientists. (ISBN 0-201-175-649) 2nd Edition, Addison Wesley 1998.
2. R.K.Bisht, and H.S.Dhami, Discrete Mathematics, Oxford University Press, First Edition, 2015
3. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill, 5thed, 2003.
4. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications, to Computer Science, TataMc-Graw Hill, 2001.
5. Joe L. Mott, A. Kandel, and T. P. Baker, Discrete Mathematics for Computer Scientists & Mathematics, Prentice Hall of India, 2nd Edition, 2006.
6. N. Deo, Graph Theory with applications to Engineering & Computer Science, Prentice Hall of India, 2006.
7. S. Lipschutz, Discrete Mathematics, Tata McGraw Hill, 2005

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS402**
Course Name	**Computer Organization & Architecture**
Course Credits	**3 (L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1. **Course Overview:**
   This course will introduce the core concept of computer Architecture .structure of Bus in computer main goal of this subject is to understand Hard ware and Architecture of computer**.**
2. **Prequisite :**
   To understand the basic computer architecture and its functions.

3. **Objective of the syllabus:**

This subject Computer Architecture & organization is the core subject of computer science it deals with Hardware and basic conceptual architecture of Computer.
In this subject student will learn about arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit and pipeline,different types of memory and Addressing modes. Gain knowledge about parallelism and multi-core processors understand the memory hierarchies, cache memories and virtual memories & different ways of communication with I/O devices.

4.Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	To learn the basic structure and operations of a computer.
CO2	To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit
CO3	To learn the basics of pipelined execution. • To understand parallelism and multi-core processors.

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CO4	To understand the memory hierarchies, cache memories and virtual memories.
CO5	To learn the different ways of communication with I/O devices.

5.syllabus:

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT II ARITHMETIC FOR COMPUTERS Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISIM Parallel processing challenges – Flynn„s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT V MEMORY & I/O SYSTEMS Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB„s – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

2.Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization B.TECH 45 K.K. UNIVERSITY B.TECH COURSE CURRICULUM-2022-23 and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCE BOOKS:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.

2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012. 3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach‖, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS403
Course Name	Operating System
Course Credits	3 (L) + 2 (P)= 5
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

This course will introduce the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security. The goal of the programming assignments is to give students some exposure to operating system code.

2. **Prerequisite:** To understand the basic computer organization, operating system structures, processes and threads.

3. **Objective of the Syllabus:**

This course OPERATING SYSTEMS is an essential part of any Computer-Science education. The purpose of this course is to understand the mechanisms of the Operating Systems like Process Management, Process Synchronization, Memory Management, File System Implementation, Storage Structures used in OS and Protection Principles. How effectively the OS is utilizing the CPU resources with the help of these mechanisms.

Learn the fundamentals of Operating Systems, learn the mechanisms of OS to handle processes and threads and their communication. To learn the mechanisms involved in memory management in contemporary OS. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.

4. **Course Outcomes:**

S. No.	Course Outcomes (Cos)
CO1	Will be able to control access to a computer andthe files that may be shared.
CO2	Demonstrate the knowledge of the componentsof computer and their respective roles in computing.
CO3	Ability to recognize and resolve user problemswith standard operating environments

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CO4	Gain practical knowledge of how programming languages, operating systems, and architecturesinteract and how to use each effectively
CO5	

Syllabus:

Unit I Introduction

Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit II Processes

Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit III Inter-Process Communication

Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson‟s Solution, The Producer \ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader‟s & Writer Problem, Dinning Philosopher Problem etc.

Unit IV Deadlocks

Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker‟s algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit V I/O Hardware

I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

BOOKS AND REFERENCES

Text Books

1. Operating System Principles, Abraham Silberchatz, Peter B.Galvin,Greg Gagne,8th Edition, Wiley Student Edition,
2. Operating System-Internals and Design Principles, W.Stallings, 6th Edition, Pearson,.

Reference Books

1. Modern Operating System, Andrew s Tanenbaum, 3rd Edition, PHI
2. Operating System A concept-based Approach, 2nd Edition, D.M.Dhamdhere, TMH
3. Principle Of Operating Systems, B.LStuart, Cengage Learning, India Edition
4. Operating system, A.s.Godbole, 2nd Edition, TMH
5. An Introduction to Operating System, P.C.P.bhatt, PHI

OPERATING SYSTEMS LAB SUB-CODE:ETCS413 CREDIT: 02

Course Objective:

- To understand the functionalities of various layers of OSI model
- To explain the difference between hardware, software; operating systems, programs and files.
- Identify the purpose of different software applications.

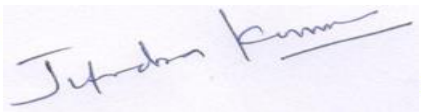
Course Outcomes:

At the end of the course the students are able to:

- Ability to implement inter process communication between two processes.
- Ability to design and solve synchronization problems.
- Ability to simulate and implement operating system concepts such as scheduling, Deadlock management, file management, and memory management.

Syllabus:

Week 1: Simulate the following CPU scheduling algorithms.
a) FCFS b) SJF c) Round Robin d) Priority.
Week 2: Write a C program to simulate producer-consumer problem using Semaphores
Week 3: Write a C program to simulate the concept of Dining-philosophers problem.
Week 4: Simulate MVT and MFT.
Week 5: Write a C program to simulate the following contiguous memory allocation Techniques
a) Worst fit b) Best fit c) First fit.
Week 6: Simulate all page replacement algorithms
a)FIFO b) LRU c) OPTIMAL
Week 7: Simulate all File Organization Techniques
a) Single level directory b) Two level directory
Week 8: Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked.
Week 9: Simulate Bankers Algorithm for Dead Lock Avoidance.
Week 10: Simulate Bankers Algorithm for Dead Lock Prevention.




Week 11: Write a C program to simulate disk scheduling algorithms.

a) FCFS b) SCAN c) C-SCAN

REFERENCE BOOKS:

1. An Introduction to Operating Systems, P.C.P Bhatt, 2nd edition, PHI,
2. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI,.

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS404**
Course Name	**Design & Analysis of Algorithm**
Course Credits	**3 (L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1. **Course Overview:**

This course will introduce students about Algorithm used in computer,its complexity and space .minimize the cost using different algorithm. Demonstrate a familiarity with major algorithms and data structures. Synthesize efficient algorithms in common engineering design situations.

2.**Prequisite :**

To understand the basic concept of Algorithm and its uses in computer engineering.

3.Objective of the syllabus:

.To Analyze the asymptotic performance of algorithms. • Write rigorous correctness proofs for algorithms. • Demonstrate a familiarity with major algorithms and data structures. • Apply important algorithmic design paradigms and methods of analysis. • Synthesize efficient algorithms in common engineering design situations.

4.Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms
CO2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
CO3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.

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CO4	• Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
CO5	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complex.

5.Syllabus:

UNIT I INTRODUCTION

Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade- offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters‟ theorem.

UNIT II FUNDAMENTAL ALGORITHMIC STRATEGIES

Brute-Force, Greedy,Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their applicationdomains.

UNIT III GRAPH AND TREE ALGORITHMS

Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT IV TRACTABLE AND INTRACTABLE PROBLEMS

Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook‟s theorem, Standard NP-complete problems and Reduction techniques.

UNIT V ADVANCED TOPICS

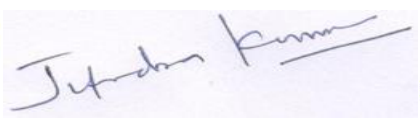
Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

TEXT BOOKS: 1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

2. Fundamentals of Algorithms – E. Horowitz et al.

REFERENCES:

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.



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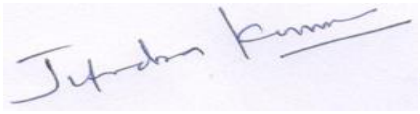
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3rd Edition, UdiManber, Addison-Wesley, Reading, MA



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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETSH-401**
Course Name	**ORGANIZATIONAL BEHAVIOR**
Course Credits	**3 (L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1. **Course Overview:**

To help the students to develop cognizance of the importance of human behaviour.
To enable students to describe how people behave under different conditions and understand why people behave as they do.

2. **Prequisite :**

Should have knowledge of human behavior and how to improve.

3. **Objective of the syllabus:**

To help the students to develop cognizance of the importance of human behaviour.
To enable students to describe how people behave under different conditions and understand why people behave as they do.
To provide the students to analyse specific strategic human resources demands for future action.
To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results.

4.Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.

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CO2	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
CO3	Analyze the complexities associated with management of the group behavior in the organization.
CO4	Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
CO5	Job satisfaction – Determinants – Measurements – Influence on behavior

5. Syllabus:

UNIT I: FOCUS AND PURPOSE

Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.

UNIT II: INDIVIDUAL BEHAVIOUR

Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification. Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

UNIT III: GROUP BEHAVIOUR

Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

UNIT IV: LEADERSHIP AND POWER

Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

UNIT V: DYNAMICS OF ORGANIZATIONAL BEHAVIOUR

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness.

TEXT BOOKS:

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1. Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCES:

1. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.
3. Mc Shane & Von Glinov, Organisational Behaviour, 4th Edition, Tata Mc Graw Hill, 2007.
4. Hellrigal, Slocum and Woodman, Organisational Behavior, Cengage Learning, 11th Edition 2007.

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Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS405
Course Name	Problem Solving and Python Programming
Course Credits	3 (L) + 2(P)= 5
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. **Course Overview:**
   The main objective of this course is to introduce a dynamic, interpreted (bytecode-compiled) language. There are no type declarations of variables, parameters, functions, or methods in source code. This makes the code short and flexible, and you lose the compile-time type checking of the source code. Python tracks the types of all values at runtime and flags code that does not make sense as it runs.

2. **Prerequisite:** Prerequisites typically include knowledge of python, algorithms, formal languages, and automata theory. Additionally, familiarity with programming languages such as C, C++, or Java is beneficial.

3. **Objective of the Syllabus:**
   i. The main objective of this course is Help programmers quickly become comfortable with the basics of
   ii. Python before moving onto advanced topics like iterators and list comprehensions, so they will be able
   to efficiently design and program in Python.
   iii. Explore topics like object-oriented programming, where concepts like classes and inheritance will be
   iv. looked at
   v. Explore topics like object-oriented programming, where concepts like classes and inheritance will be looked at

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4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	**Understanding Python Basics**: Students should gain a solid understanding of basic Python syntax, data types, control structures (loops and conditionals), functions, and basic file I/O operations.
CO2	**Problem Solving with Python**: Ability to solve simple to moderately complex problems using Python programming constructs, including algorithm design and implementation.
CO3	**Object-Oriented Programming (OOP)**: Familiarity with object-oriented programming concepts such as classes, objects, inheritance, polymorphism, and encapsulation, and the ability to apply them in Python.
CO4	**File Handling and Input/Output Operations:** Proficiency in reading from and writing to files, understanding different file formats (text files, CSV, JSON, etc.), and handling exceptions.
CO5	**Modules and Packages**: Knowledge of how to create, import, and use modules and packages to organize and reuse Python code effectively.

5. Syllabus:

UNIT I : Introduction

Introduction: The Python Programming Language, History, features, Installing Python, Running Python program, Debugging : Syntax Errors, Runtime Errors, Semantic Errors, Formal and Natural Languages, Variables and Expressions Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Control statements:

Functions

Functions: Function Calls, Type Conversion Functions, Math Functions, Adding New Functions, Definitions and Uses, Parameters and Arguments, Variables and Parameters. Fruitful Functions and Void Functions, Importing with from, Return Values, Boolean Functions.

Strings

Checking Types Strings: A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations

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UNIT II : Lists: Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods Tuples and Dictionaries:

Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions

Dictionary: Creating a Dictionary, Accessing Values in a dictionary, Updating
Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions,

UNIT III: Classes and Objects

Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values, Built-in Class Attributes, Inheritance, Method Overriding, Data Encapsulation, Data Hiding Multithreaded Programming: Thread Module, creating a thread, synchronizing threads, multithreaded priority queue

UNIT IV: Modules

Importing module, Creating and exploring modules, Math module, Random module, Time module, Numpy, MatPlotlib

UNIT V: Creating the GUI Form and Adding Widgets & File Handling

Widgets: Button, Canvas, Checkbutton, Entry, Frame, Label, Listbox, Menubutton, Menu, Message, Radiobutton, Scale, Scrollbar, text, PanedWindow, LabelFrame, tkMessagebox.. Layout Management: Designing GUI applications with proper Layout Management features. Look and Feel Customization: Enhancing Look and Feel of GUI using different appearances of widgets. Storing Data in Our MySQL Database via Our GUI : Connecting to a MySQL database from Python, Configuring the MySQL connection, Designing the Python GUI database, Using the INSERT command, Using the UPDATE command, Using the DELETE command, Storing and retrieving data from MySQL database.

File Handling and Input/Output Operations: Proficiency in reading from and writing to files, understanding different file formats (text files, CSV, JSON, etc.), and handling exceptions.

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist„„, 2nd edition, Updated for Python 3, Shroff/O„Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCE BOOKS:

1. John V Guttag, —Introduction to Computation and Programming Using Python„„, Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.

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Problem Solving and Python Lab SUB-CODE: ETCS415 CREDIT: 02

Week 1: Write a python program to get python version.

Week 2: Create a list and perform the following methods
insert() 2) remove() 3) append() 4) len() 5) pop() 6)clear()

Week 3: Create a class person use the init() function to assign values for name and age.

Week 4: Create a class that inherits the functionality from another class.

Week 5: Write a program to calculate area using function overloading.

Week 6: Using a numpy module create an array and checkthe following:

1. Type of array 2. Axes of array 3. Shape of array 4. Type of elements in array

Week 7: Write a program to create a menu with thefollowing options

1. TO PERFORM ADDITITON 2. TO PERFORMSUBTRACTION

3. TO PERFORM MULTIPICATION 4. TOPERFORM DIVISION

Accepts users input and perform the operationaccordingly. Use functions with arguments.

Week 8: Write a python program to read an entire text file.

Week 9: Write a python program to append text to a file and display the text

Week 10: Write a python program to create login form using Tkinter (GUI)

Course Objective:

1. To provide hands-on experience on python programming
2. 2. To develop a application using web python
3. 3. To introduce application with python dictionary
4. 4. To understand the various tuples in the of programing .
5. 5. To analyse the data of machine using python.

Course Outcomes:

1. Develop algorithmic solutions to simple computational problems.
2. Develop and execute simple Python programs. .
3. Write simple Python programs using conditionals and loops for solving problems. .
4. Decompose a Python program into functions
5. Represent compound data using Python lists, tuples, dictionaries etc.

REFERENCE BOOKS:

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1 Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist„„, 2nd edition, Updated for Python 3, Shroff/O„Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

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Department of Computer Science & Engineering.

SEMESTER - V

Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS501
Course Name	Database Management System
Course Credits	3 (L) +2 (P)=5
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

This course will introduce the core concepts of database systems, such as database and tables, concurrency , roles and privileges , tablespace management, file systems, input and output management and security. The goal of the programming assignments is to give students some exposure to operating system code.

2. **Prerequisite:** To understand the basic computer organization, operating system concepts.

3. **Objective of the Syllabus:**

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

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4. Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	For a given query write relational algebra expressions for that query and optimize the developed expressions
CO2	For a given specification of the requirement design the databases using E R method and normalization.
CO3	For a given specification construct the SQL queries for Open source and Commercial DBMS - MYSQL, ORACLE, and DB2.
CO4	For a given query optimize its execution using Query optimization algorithms
CO5	For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
CO6	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

5. Syllabus:

UNIT I DATABASE SYSTEM ARCHITECTURE

Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

UNIT II RELATIONAL QUERY LANGUAGES

Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

UNIT III QUERY PROCESSING AND OPTIMIZATION

Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices, B-trees, hashing.

UNIT IV TRANSACTION PROCESSING

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

UNIT V DATABASE SECURITY & ADVANCED TOPICS

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

TEXT BOOKS:

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1. “Database System Concepts” , 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

REFERENCES:

1. “Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.
2. “Fundamentals of Database Systems” , 5th Edition by R. Elmasri and S. Navathe, Pearson Education
3. “Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

DATABASE MANAGEMENT SYSTEMS LAB SUB-CODE:ETCS511 CREDIT: 02

AIM: The aim of this laboratory is to inculcate the abilities of applying the principles of the database management systems. This course aims to prepare the students for projects where a proper implementation of databases will be required.

Course Objective:

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical database applications

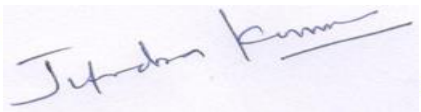
Course Outcomes:

At the end of the course the students are able to:

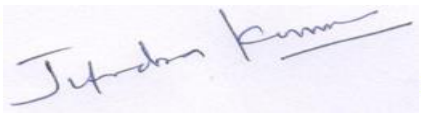
- Use typical data definitions and manipulation commands.
- Design applications to test Nested and Join Queries
- Implement simple applications that use Views
- Implement applications that require a Front-end Tool
- Critically analyze the use of Tables, Views, Functions and Procedures

List of Experiments:

Week 1: Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
Week 2: Database Querying – Simple queries, Nested queries, Sub queries and Joins
Week 3: Views, Sequences, Synonyms
Week 4: Database Programming: Implicit and Explicit Cursors



Week 5: Implementation of Procedures and Functions
Week 6: Implementation of Triggers
Week 7: Implementation of Exception Handling
Week 8: Database Design using ER modeling, normalization and Implementation for any application
Week 9:. Database Connectivity with Front End Tools
Week 10: Case Study using real life database applications



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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS502
Course Name	Theory of Computation
Course Credits	3 (L) + 0(P)= 3
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

Formal languages and automata theory deals with the concepts of automata, formal languages, grammar, computability and decidability. The reasons to study Formal Languages and Automata Theory are Automata Theory provides a simple, elegant view of the complex machine that we call a computer. Automata Theory possesses a high degree of permanence and stability, in contrast with the ever-changing paradigms of the technology, development, and management of computer systems.

2. **Prerequisite:**The purpose Automata theory have direct bearing on practice, such as Automata on circuit design, compiler design, and search algorithms; Formal Languages and Grammars on compiler design; and Complexity on cryptography and optimization problems in manufacturing, business, and management. Last, but not least, research oriented students will make good use of the Automata theory studied in this course.

3. Objective of the Syllabus:

The purpose of theory of Automata is to 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.

4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Apply the knowledge of mathematics and statistics to solve complex engineering problems related to automata theory.
CO2	Identify, formulate and analyze uses and constraints of various computational models used in engineering practice.
CO3	Make use of research based knowledge to abstract the models of computing and their powers to recognize the grammars.
CO4	Design and evaluate abstract machines that demonstrate the 3 1 3 3 3 properties of physical machines and be able to specify the possible inputs, processes and outputs of these machines.

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5. Syllabus:

UNIT - I

FINITE AUTOMATA (FA): Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Non-deterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Non-deterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.

UNIT - II

REGULAR EXPRESSIONS (RE): Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions.

REGULAR GRAMMARS: Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.

UNIT - III

CONTEXT FREE GRAMMER (CFG): Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL (Proof's omitted).

UNIT – IV

PUSHDOWN AUTOMATA: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA.

TURING MACHINES (TM): Formal definition and behaviour, Languages of a TM, TM as accepters,

and TM as a computer of integer functions, Types of TMs.

UNIT V

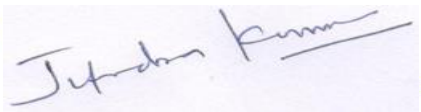
RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL): Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.

TEXT BOOKS:

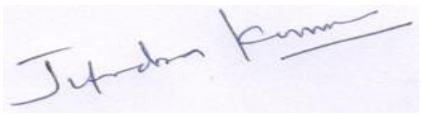
1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory Languages and Computation, 3rdedition, Pearson Education, India.

REFERENCE BOOKS:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata



Languages and Computation, 2nd edition, Prentice Hall of India, India.



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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS503**
Course Name	**Object Oriented programming**
Course Credits	**3(L) +2(P)**
Total Course Credit	**181**

Abbreviations: T-Theory

1. **Course Overview:**

Object-Oriented Programming or OOPs refers to languages that use objects in programming. Object-oriented programming aims to implement real-world entities like inheritance, hiding, polymorphism, etc in programming. The main aim of OOP is to bind together the data and the functions that operate on them so that no other part of the code can access this data except that function.

2.Prerequisite:

Basic understanding of programming concepts: Students should be familiar with fundamental programming concepts such as variables, control structures (e.g., loops, if-else statements), and data types.Familiarity with at least one programming language.

3.Objective of the Syllabus: To get a clear understanding of object-oriented concepts. • To understand object oriented programming through C++.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Gain the basic knowledge on Object Oriented concepts.
CO2	Ability to develop applications using Object Oriented Programming Concepts.

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CO3	Ability to implement features of object oriented programming to solve real world problems.
CO4	Ability to GainVirtual Functions and Runtime Polymorphism
CO5	Gain knowledge about Passing parameters to base Class Constructors, Granting access, Virtual base classes.

5.Syllabus:

UNIT I Introduction to OOPs: What Is Object-Oriented Programming? , Encapsulation, Polymorphism, Inheritance. C++ Overview: The Origins of C++,The General Form of a C++ Program, different data types, operators, expressions, arrays and strings, reference variables. Function Components, argument passing, inline functions, function overloading, function templates.

UNIT II Classes & Objects: Introduction, Class Specification, Class Objects, access members, defining member functions, data hiding, constructors, destructors, parameterized constructors, static data members, static member functions, scope resolution operator, Passing Objects to Functions, Returning Objects, Object Assignment. Pointers and dynamic memory allocation: Pointers, Pointer as function arguments, Dynamic Allocation Operators new and delete, Initializing Allocated Memory, Allocating Arrays, Allocating Objects.

UNIT III Operator overloading: Operator overloading as member functions and using friend functions. Overloading of binary operators like +, -, *.Creating Prefix and Postfix forms of ++, -- Operators, Operator Overloading Restrictions, Operator Overloading Using a Friend Function to Overload ++ or – –, Overloading ( ). Inheritance: Base Class, Inheritance & protected members, protected base class inheritance, inheriting multiple base classes, Constructors, Destructors & Inheritance. Passing parameters to base Class Constructors, Granting access, Virtual base classes.

UNIT IV Virtual Functions and Runtime Polymorphism: Virtual function -Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, pure virtual functions, abstract classes, using Virtual functions, Early & late binding. Standard C++ I/O Classes: Old vs. Modern C++ I/O, C++ Streams, The C++ Stream Classes, C++'s Predefined Streams, Formatted I/O, Formatting Using the ios Members, Setting the Format Flags, Clearing Format Flags, Overloading << and >>, manipulators.

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UNIT V Exception Handling: Exception Handling, Fundamentals, Catching Class Types, Using Multiple catch Statements, Handling Derived-Class Exceptions, Exception Handling Options, Catching All Exceptions, Restricting Exceptions, Rethrowing an Exception, Understanding terminate( ) and unexpected( ), uncaught_exception( ) Function, The exception and bad_exception Classes, Applying Exception Handling. STL: Class template, An overview of STL, containers, vectors .

TEXT BOOKS:

1. Ira Pohl, “Object-Oriented Programming Using C++”, Pearson Education Asia, 2003.

2. Object-Oriented Programming with C++ by E Balagurusamy

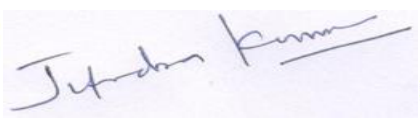
REFERENCE BOOKS:

1. Herbert Schildt, "Complete Reference", Fourth edition, TMH, 2002

2. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 2004.

3. Stanley B. Lippman and Josee Lajoie , “C++ Primer”, Pearson Education, 2003.

4. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003



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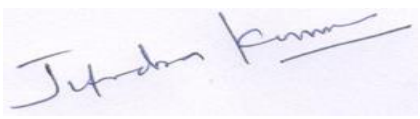
Object Oriented Programming LAB SUB-CODE: ETCS513 CREDIT: 02

LIST OF EXPERIMENTS:

Week 1. Program using functions with default arguments
Week 2: Program using functions implementation of call by value, address, reference
Week 3:simple classes for understanding objects, member functions &constructors
Classes with primitive data members.
Week 4: Program for classes with arrays as data members.

Week5: Program for classes with primitive data members.
Week 6: Program for classes with pointers as data members.
Week 7: Program for classes with constant data members.
Week 8: Program for operator overloading.
Week 9: Program for Function overloading
Week 10: Program for inheritance & virtual functions.
Week 11: Program for virtual base classes & templates.
Week 12: Program for file handling sequential access & random access.

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School of Engineering & Technology.

Department of Computer Science & Engineering

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS-504
Course Name	JAVA PROGRAMMING
Course Credits	3 (L) + 2(P)= 5
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

To understand the basic concepts of platform independent object oriented Programming language, writing the program using Applet and application, writing programs using exception handling, multithreading and database connectivity.

2. Prerequisite:

To understand the basic knowledge of programing and Basic Knowledge of OOP's.

3. Objective of Syllabus:

- . To understand the basic concepts and fundamentals of platform independent object oriented language.
- To demonstrate skills in writing the program using Applet and application
- To demonstrate skills in writing programs using exception handling techniques and multithreading.
- To understand streams and efficient user interface design techniques.
- Able to skills in writing a program for database connectivity.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	Able Use the syntax and semantics of java programming language and basic concepts of OOP.
CO2	Able to write general Program in Java.
CO3	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO4	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
CO5	Able to develop Applet Programing
CO6	Design event driven GUI and web related applications which mimic the real word

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	Scenarios.

5. Syllabus.

UNIT I

Introduction to Java & The Java Environment, Basic Language Elements & Extending Classes and Inheritance. Introduction to Java, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data types, Operators Assignments. Use and Benefits of Inheritance in OOP, Types of Inheritance in Java Inheriting Data members and Methods, Role of Constructors inheritance, Overriding Super Class Methods, Use of "super" , Polymorphism in inheritance, Type Compatibility and Conversion Implementing interfaces.

UNIT II

Input and Output, Arrays and Strings & Wrapper Classes, Accepting Input from the keyboard, reading input in Java, Util, Scanner class, displaying output with System.out.print(), Displaying formatted output with string, Format, Types of Arrays, Array name, Length, Command Line Arguments, Creating Strings, String Class Methods, String Comparison, Immutability of Strings, Creating String Buffer Objects, String Buffer Class, Methods, String Builder Class, String Builder Class Methods. Number class, Character class, Byte class, Short class, Integer class, Long class, Float class, Double class, Boolean class, Math class

UNIT III

Methods of Java, Inheritance and Polymorphism & Packages Method Prototype, Method Body, Understanding Methods, Static Methods Static Block, The keyword 'this 'instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods. Inheritance, The Keyword 'super' The Protected Specified, Types of Inheritance. Polymorphism with variables, Polymorphism using methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Abstract Classes. Exceptional handling, Threads & Introduction to AWT and Applets.

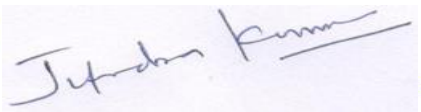
UNIT IV

Errors in Java Program, Exceptions throws and throw clause, Types of exceptions, Re-throwing an exception Single and Multitasking, Creating and terminating the thread, Creating and terminating the thread, Single and Multi-tasking using threads, Deadlock of threads, Thread communication. AWT components, Creating and closing the frame, Drawing in the frame, Displaying dots and text in the frame, Event Handling, Listeners and Listener methods, Creating and uses of Applets, An applet with swing components, Applet parameters. Introduction on Java database connectivity.

UNIT V

Database servers and clients, JDBC Connecting to a Database, Stored Procedures and Callable Statement, Storing file and Image into database Retrieving a file and images from database, Types of JDBC drivers

REFERENCE BOOKS:

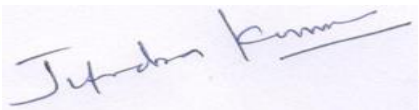


1. E. Balagurusamy, "Programming with Java, a Primer", TMH, ISBN-13: 978-0-07-061713-
2. Patrick Naughton and Herbert Schildt, "Java: the Complete Reference", TMH Publication.
3. Yashavant kanetkar, "Let us Java", BPB Publications.
5. Cay Horstmann, "Big Java", Wiley Publication
6. Peter Norton, "Java Programming", Techmedia Publications.
7. Joseph Weber, "Using Java 1.2", PHI

JAVA PROGRAMMING LAB SUB-CODE: ETCS-514 CREDIT: 02

LIST OF EXPERIMENTS:

Week 1: Write a java program to find the Fibonacci series using recursive and non recursive functions.
Week 2: Write a java program to multiply two given matrices.
Week 3: Write a java program for Method overloading and Constructor overloading.
Week 4: Write a java program to display the employee details using Scanner class.
Week 5: Write a java program that checks whether a given string is palindrome or not.
Week 6: Write a java program to represent Abstract class with example.
Week 7: Write a java program to implement Interface using extends keyword.
Week 8: Write a Java program that implements a multi-thread application that has three threads.
Week 9: Write an applet program that displays a simple message.
Week 10: Write a program for passing parameters using Applet.
Week 11: Write a java program for handling Mouse events and Key events.
Week 12: Write a java program that connects to a database using JDBC.



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School of Engineering & Technology.

Department of Computer Science & Engineering

Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETSH501
Course Name	Business Management & Economics
Course Credits	2 (L)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

The objectives of business management and economics are multifaceted, as they encompass various aspects of organizational success, resource allocation, and market dynamics.

2. Prerequisite:

Foundational Knowledge, Economic Principles, Business Fundamentals, Communication Skills

3. Objective of Syllabus:

The objectives of business management and economics are multifaceted, as they encompass various aspects of organizational success, resource allocation, and market dynamics.

4. Course Outcome:

S. No.	Course Outcomes (Cos)
CO1	Understand the roles of managers in firms
CO2	Understand the internal and external decisions to be made by managers
CO3	Analyze the demand and supply conditions and assess the position of a company
CO4	Design competition strategies, including costing, pricing, product differentiation, and Market
CO5	Environment according to the natures of products and the structures of the markets.
CO6	Analyze real-world business problems with a systematic theoretical framework. Make optimal business decisions by integrating the concepts of economics, mathematics and statistics

5. Syllabus.

UNIT I: INTRODUCTION OF MANAGEMENT

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Definitions, management principles, scientific principles, administrative principles; Maslow‟s Hierarchy of needs theory; Functions of management: Planning, organizing, Staffing, directing, Controlling.

UNIT II: ORGANIZATIONAL STRUCTURES, PRINCIPLES OF ORGANIZATION

Types of organization: Formal and Informal, line, line and staff matrix, hybrid.

UNIT III: INTRODUCTION OF ECONOMICS

Definitions, nature, scope, difference between microeconomics and macroeconomics; Theory of demand and supply, elasticity of demand, price and income elasticity; Markets: types of markets and their characteristics; National income: GDP, GNP, NNP, disposable personal income, per capita variable proportions and law of returns to scale.

UNIT IV: COST

short run and long run cost, fixed cost; variable cost , total cost , average cost , marginal cost, opportunity cost ; Break even analysis ; Finance management: Definition, scope, objective; Different systems of accounting: financial accounting, cost accounting, management accounting.

UNIT V: HUMAN RESOURCE MANAGEMENT

Definitions, objective of manpower planning, process, sources of recruitment, process of selection; corporate social responsibility: Importance, business ethics.

REFERENCES:

1. L.M. PRASAD. 2001 Principles and practices of Management, 9th Ed. S. Chand & Sons, New Delhi.
2. Koontz Harlod. Principles of Management. Tata McGraw- Hill Education Private Limited, New Delhi.
3. P. C Thomas Managerial Economics Theory. S. Chand & Sons, New Delhi.
4. K. K. Dewett and M.H. Navalur. Modern Economics Theory. S. Chand & Sons, New Delhi.5
5. P. Subba Rao. Human Resource Management. Himalaya Publications.
6. S.P. Jain Financial Accounting. Kalyani Publications, Ludhiana.

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School of Engineering & Technology.
Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS521**
Course Name	**Data Warehousing and Data Mining**
Course Credits	**3(L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview:. This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

2.Prerequisite:. The knowledge of following subject is essential to understand the subject: 1. Understand the concepts of Data Ware housing and Data Mining Concepts. 2. Explain the methodologies used for analysis of data 3. Describe various techniques which enhance the data modeling. 4. Discuss and Compare various approaches with other techniques in data mining and data ware housing

3.Objective of the Syllabus: To understand data warehouse concepts, architecture, business analysis and tools , data pre-processing and data visualization techniques ,To study algorithms for finding hidden and interesting patterns in data .

4.Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	Design a Data warehouse system and perform business analysis with OLAP tools.
CO2	Learn about Transformation and discretization.
CO3	Apply suitable pre-processing and visualization techniques for data analysis
CO4	Apply frequent pattern and association rule mining techniques for data analysis
CO5	Apply appropriate classification and clustering techniques for data analysis

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5.Syllabus

UNIT I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP)

Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT II DATA MINING – INTRODUCTION

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III DATA MINING – FREQUENT PATTERN ANALYSIS

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT IV CLASSIFICATION AND CLUSTERING

Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –— Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT V WEKA TOOL

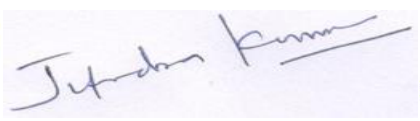
Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

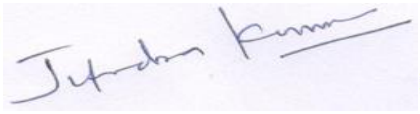
TEXT BOOK:

1. Jiawei Han and Micheline Kamber, —Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

REFERENCES:

1. Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016.
2. K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.





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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS522**
Course Name	**Software Testing**
Course Credits	**3(L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview: This course will cover various techniques for test case design, as used for testing of software artifacts including requirements, design and code. We will discuss algorithms and techniques for test case design based on graphs, logic, syntax of programming languages and on inputs.

2.**Prerequisite:** In a software testing course a person is required to learn exploration, asking questions to investigate problem area, identifying problems in the system, and writing the bug report. This shows that the job profile is not completely correlated to computer science, it mostly relies on exploration.

3.Objective of the Syllabus: To learn the criteria for test cases. • To learn the design of test cases. • To understand test management and test automation techniques • To apply test metrics and measurements.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	• Design test cases suitable for a software development for different domains
CO2	• Prepare test planning based on the document
CO3	Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible
CO4	Discuss about the functional and system testing methods.
CO5	List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects.

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5.Syllabus:

UNIT I: INTRODUCTION Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Testers Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository.

UNIT II: TEST CASE DESIGN STRATEGIES Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing - Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

UNIT III: LEVELS OF TESTING The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.

UNIT IV: TEST MANAGEMENT People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group- The Structure of Testing Group- .The Technical Training Program.

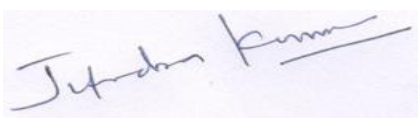
UNIT V: TEST AUTOMATION Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, ―Software Testing – Principles and Practices‖, Pearson Education, 2006.
2. Ron Patton, ―Software Testing‖, Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCES:

1. Ilene Burnstein, ―Practical Software Testing‖, Springer International Edition, 2003.



2. Edward Kit,‖ Software Testing in the Real World – Improving the Process‖, Pearson Education, 1995.
3. Boris Beizer,‖ Software Testing Techniques‖ – 2nd Edition, Van Nostrand Reinhold, New York, 1990.

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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS-523**
Course Name	**GRAPH THEORY AND APPLICATIONS**
Course Credits	**3(T)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview:concepts in network analysis, algorithm design, and problem-solving. learners can explore structured learning paths, tackle real-world problems, and unlock opportunities in computer science and mathematics

2.Prerequisite:.knowledge about node,edge vertex and basic maths.

3.Objective of the Syllabus: To understand fundamentals of graph theory.
,To study proof techniques related to various concepts in graphs.To explore modern applications of graph theory.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Understand the basic concepts of graphs, and different types of graphs
CO2	Understand the properties, theorems and be able to prove theorems
CO3	Apply suitable graph model and algorithm for solving applications
CO4	Understand about Generating functions - Partitions of integers

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CO5	Understand Chromatic number – Chromatic partitioning – Chromatic polynomial

5.Syllabus

UNIT I INTRODUCTION

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT II TREES, CONNECTIVITY & PLANARITY

Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

UNIT III MATRICES, COLOURING AND DIRECTED GRAPH

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT IV PERMUTATIONS & COMBINATIONS

Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

UNIT V GENERATING FUNCTIONS

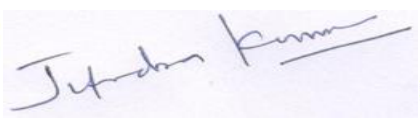
Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

TEXT BOOKS:

1. Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", Prentice-Hall of India Pvt.Ltd, 2003.
2. L.R.Foulds , "Graph Theory Applications", Springer ,2016.

REFERENCES:

1. Bondy, J. A. and Murty, U.S.R., “Graph Theory with Applications", North Holland Publication,2008.
2. 2. West, D. B., —Introduction to Graph Theory‖, Pearson Education,2011.
3. 3. John Clark , Derek Allan Holton, —A First Look at Graph Theory‖, World Scientific Publishing Company, 1991.
4. 4. Diestel, R, "Graph Theory", Springer,3rd Edition,2006.
5. 5. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Mc Graw Hill , 2007.



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SEMESTER - VI

Programme Structure	B. Tech (Computer Science & Engineering)
Semester	6th
Subject Code	ETCS601
Course Name	Compiler Design
Course Credits	3 (L) + 2(P)= 5
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. **Course Overview:**
2. The main objective of this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course is a study of the theory and practice required for the design and implementation of interpreters and compilers for programming languages.
3. **Prerequisite:** Prerequisites typically include knowledge of data structures, algorithms, formal languages, and automata theory. Additionally, familiarity with programming languages such as C, C++, or Java is beneficial. Understanding concepts like parsing, lexical analysis, and code generation will also be important
4. **Objective of the Syllabus:**

   The main objective of this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course is a study of the theory and practice required for the design and implementation of interpreters and compilers for programming languages.

5. **Course Outcomes:**

S. No.	Course Outcomes (Cos)
CO1	Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.
CO2	Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table .

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CO3	Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes.
CO4	Acquire knowledge about run time data structure like symbol table organization and different techniques used in that .
CO5	Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization

6. Syllabus:

UNIT I INTRODUCTION TO COMPILERS

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

UNIT II SYNTAX ANALYSIS

Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar – Top Down Parsing - General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-ShiftReduce Parser-LR Parser-LR (0)Item Construction of SLR Parsing Table -Introduction to LALR Parser
- Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT III INTERMEDIATE CODE GENERATION

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT IV RUN-TIME ENVIRONMENT AND CODE GENERATION

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of a simple Code Generator.

UNIT V CODE OPTIMIZATION

Principal Sources of Optimization – Peep-hole optimization - DAG- Optimization of Basic Blocks- Global Data Flow Analysis - Efficient Data Flow Algorithm.

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

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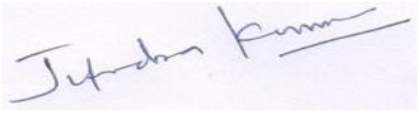
1. Understand the different phases of compiler.
2. Design a lexical analyzer for a sample language.
3. Apply different parsing algorithms to develop the parsers for a given grammar.



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4. Understand syntax-directed translation and run-time environment.
5. Learn to implement code optimization techniques and a simple code generator.
6. Design and implement a scanner and a parser using LEX and YACC tools.

TEXT BOOK:

7. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniquesand Tools‖, Second Edition, Pearson Education, 2009.

REFERENCES:

1. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, Advanced Compiler Design and Implementation‖, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, Engineering a Compiler‖, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. V. Raghavan, Principles of Compiler Design‖, Tata McGraw Hill Education Publishers, 2010.
5. Allen I. Holub, Compiler Design in C‖, Prentice-Hall Software Series, 1993.

Compiler Design Lab SUB-CODE: ETCS611 CREDIT: 02

Course Objective:

1. To provide hands-on experience on web technologies
2. 2. To develop client-server application using web technologies
3. 3. To introduce server-side programming with Java servlets and JSP
4. 4. To understand the various phases in the design of a compiler.
5. 5. To understand the design of top-down and bottom-up parsers
6. **Course Outcomes:**

1. Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML
2. Apply client-server principles to develop scalable and enterprise web applications.
3. Ability to design, develop, and implement a compiler for any language.
4. Able to use lex and yacc tools for developing a scanner and a parser.
5. Able to design and implement LL and LR parsers.

Syllabus:

Week 1: 1. Design a Lexical analyzer for the given language.
Week 2: Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating stools.
Week 3: Design Predictive parser for the given language.
Week 4: Design LALR bottom up parser for the given language.
Week 5: Convert the BNF rules into Yacc form and write code to generate abstract syntax tree..
Week 6: Write program to generate machine code from the abstract syntax tree generated by the parser.
Week 7: Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
Week 8: Implementation of Symbol Table
Week 9: Generation of Code for a given Intermediate Code.

REFERENCE BOOKS:

1. Engineering a Compiler-Cooper & Linda, Elsevier.
2.Compiler Construction, Louden, Thomson.
3. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011.

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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS602**
Course Name	**Computer Networks**
Course Credits	**3 (L) =3**
Total Course Credit	

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   This course will introduce the various technologies and tools used in any computer network. The learner will learn how to create, analyze and troubleshoot issues with computer networks

2. **Prerequisite:** The learner should have basic knowledge of Operating Systems

3. **Objective of the Syllabus:**
   - To understand the protocol layering and physical level communication.
   - To analyze the performance of a network.
   - To understand the various components required to build different networks.
   - To learn the functions of network layer and the various routing protocols.
   - To familiarize the functions and protocols of the Transport layer.

4. **Course Outcomes:**

S.No.	Course Outcomes(Cos)
CO1	Understand the basic layers and its functions in computer networks.

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CO2	Evaluate the performance of a network.
CO3	Understand the basics of how data flows from one node to another.
CO4	Analyze and design routing algorithms.
CO5	Design protocols for various functions in the network.
CO6	Understand the working of various application layer protocols.

5. Syllabus:

UNIT I INTRODUCTION AND PHYSICAL LAYER

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT II DATA-LINK LAYER & MEDIA ACCESS

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III NETWORK LAYER

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT IV TRANSPORT LAYER

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT V APPLICATION LAYER

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP.

TEXT BOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

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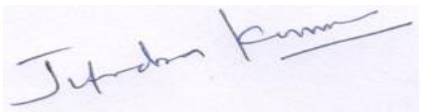
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
5. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.



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Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS603
Course Name	Computer graphics
Course Credits	3 (L) +2 (P)=5
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   This course will introduce the concepts of graphics designing , creation and Modification of images using computer programming

2. **Prerequisite:** Basic knowledge of programming , coordinate geometry and trigonometry.

3. **Objective of the Syllabus:**

- This course prepares students for activities involving the design, development, and testing of modeling, rendering, and animation solutions to a broad variety of problems found in entertainment, sciences, and engineering.
- Students will learn: (1) how to develop interactive programs that use effectively the graphics functionalities available in contemporary personal computers, (2) the fundamental principles and technologies upon which these functionalities, and possibly their future evolutions, are based, and (3) the skills for designing and implementing practical graphic solutions to challenging problems in different application domains.

4. **Course Outcomes:**

S.No.	Course Outcomes(Cos)
CO1	Will have a knowledge of hardware components involved in Computer graphics
CO2	Will have skill to create basic graphical elements through programming
CO3	Will have understanding of 2-D and 3-D graphics
CO4	Will have knowledge of interactive graphics and transformation of images
CO5	

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5. Syllabus:

UNIT I

A Survey of Computer Graphics : computer-Aided Design, Presentation Graphics, computer Art, entertainment, Education and Training, visualization, Image Processing, Graphical User Interfaces Overview of Graphics systems : Application of Computer Graphics, Video Display Devices, refresh Cathode-Ray Tubes Raster-Scan Display, Random-Scan displays Colour CRT Monitors, Direct-View Storage Tubes, Flat-Panel displays, Three-Dimensional Viewing Devices, Stereoscopic and Virtual-Reality Systems, Raster-Scan Systems, Random-Scan systems, Graphics Monitors and Workstations, Input Devices, Hard-copy devices,Graphics Software.

UNIT II

Output Primitives : Points and Lines, Line-Drawing Algorithms, DDA Algorithm, Bresenham's Line Algorithms,Parallel Line Algorithms, Loading and Frame Buffer, Line Function, Circle-Generating Algorithms, Pixel Addressing, Filled-Area Primitives, Fill-Area Function, Cell array, Character Generation. Attributes of Output Primitives : Line Attributes, Curve Attributes Colour and Grayscale Levels, Area-Fill Attributes, Character Attributes, Bundled Attributes, Inquiry functions, Antialiasing.

UNIT III

Two dimensional Geometric Transformations : Basic Transformations, Matrix Representations Homogeneous Coordinates Composite Transformations, Transformation Functions, raster Methods for Transformations. Two Dimensional Viewing : The Viewing Pipeline, Viewing Coordinate Reference Frame,Window-to-Viewport Coordinate transformation, Two- dimensional Viewing functions, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Curve Clipping, Text Clipping, Exterior Clipping.Three-Dimensional Concepts : Three-Dimensional display Methods, parallel Projection, Perspective Projection, Depth cueing visible Line and Surface

UNIT IV

dentification, Surface Rendering, Exploded and Cutaway Views, Three-Dimensional and Stereoscopic Views, Three- Dimensional Graphics Packages. Three-Dimensional Object Representations : Polygon Surface, Curved Lines and Surfaces, Quadric, Surfaces, Super Quadrics, Blobby Objects, Spline

UNIT V

Representations, Cubic Spline Interpolation Methods, Bezier Curves and Surfaces, Bezier Curves, Properties of Bezier Curves, Design Techniques Using Bezier Curves,Cubic Bezier Curves, Bezier Surfaces, B-Spline Curves and Surfaces B-Spline Curves, Uniform, Periodic B-Splines, Cubic, Periodic B-Splines, Open Uniform B-Splines, B-Spline ,Surfaces, Beta-Splines, Beta Spline,Continuity Conditions, Cubic, Periodic Beta-Spline Matrix Representation,Rational Splines. Computer Animation : Design of Animation Sequences, General Computer-Animation Functions Raster Animations, Computer-Animation Languages, Key- Frame Systems, Morphing, Simulating Accelerations Motion Specifications, Direct Motion Specification, Goal- Directed Systems, Kinematics and Dynamics.

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REFERENCE BOOKS:

1. Computer Graphics C Version, D. Hearn And P. Baker, Pearson Education
2. Computer Graphics, Foley and van Dam, Person Education
3. Computer Graphics with OpenGL, Hearn and Baker, Pearson
4. Procedural Methods for computer graphics, Rogers, TMH
5. Computer Graphics with virtual reality systems, R. K. Maurya, Wiley-India
6. Computer Graphics, Sinha & Udai, TMH

COMPUTER GRAPHICS LAB SUB-CODE:ETCS613 CREDIT: 02

Course Objective:

- To understand the creation of basic geometrical shapes using programming
- To create 2D and 3D graphics and transform them as desired
- To create interactive graphics

Course Outcomes:

At the end of the course the students are able to:

- Ability to generate basic graphics elements on computer.
- Ability to create interactive graphics
- Ability to transform given images in 3D and 2D

List of Experiments:

Week 1: Implementation of line generation using slope's method, DDA and Bresenhem's algorithms.

Week 2:. Implementation of circle generation using Mid-point method and Bresenhem's algorithm.

Week 3:. Implementation of ellipse generation using Mid-point method.

Week 4:. Implementation of polygon filling using Flood-fill, Boundary- fill and Scanline algorithms.

Week 5:. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).

Week 6:. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.

Week 7:. Implementation of Polygon Clipping using Sutherland- Hodgeman algorithm.

Week 8:. Implementation of 3D geometric transformations: Translation, Scaling and rotation.

Week 9:. Implementation of Curve generation using Interpolation methods.

Week 10:. Implementation of Curve generation using B-spline and Bezier curves.

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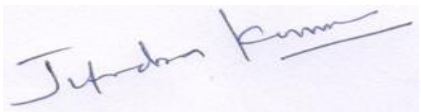
Week 11:. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan-line algorithm)



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Program Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS604
Course Name	Web Technology
Course Credits	3 (L) + 2(P)= 5
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   This Subject is useful for Making own Web page and how to host own web site on internet. Along with that Students will also learn about the protocols involve in internet technology.

2. **Prerequisite:**

   To understand the basic knowledge of computer, Keyboard, Note Pad, Internet, Browser and operating system.

3. **Objective of Syllabus:**

   - To Understand internet , web server ,IP Address and communication over internet
   - Learn complete knowledge of HTML
   - To Understand the basic concepts and syntax of Cascading Style sheet (CSS) and their uses.
   - To Understand operations using JavaScript
   - Understand XML
   - Learn Database Connectivity with MySQL - Servlets, JSP and PHP
   - Design Web Pages using HTML, CSS, JavaScript and PHP.

4. **Course Outcome:**

S. No.	Course Outcomes (Cos)
CO1	Understand internet , web server ,IP Address and communication over internet
CO2	Have a knowledge of HTML
CO3	Understand the basic concepts of HTML Tags and their uses
CO4	Design Web Pages using HTML

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CO5	Understand operations using JavaScript
CO6	Understand XML.

5. Syllabus.

UNIT I : INTRODUCTION

Introduction, HTML- List, Tables, Images, Forms, Frames, Cascading Style sheets, XML- Document Type definition, XML Schemas, Document Object model

UNIT II : JAVA SCRIPT AND WEB SERVERS

Java-Script, Java Script -Control statements, Functions, Arrays, Objects Events, Dynamic HTML with Java Script, Ajax, Web servers, Web servers – IIS (XAMPP, LAMPP), Tomcat Servers, Java Web Technologies- Servlets

UNIT III : JAVA SERVER PAGE

JavaServer Pages, Java Server Faces, Web Technologies in Netbeans,, Building a Web Application in Netbeans, JSF Components, Session Tracking, Cookies

UNIT IV : PHP

PHP- Basics, PHP- Basics, String Processing and Regular Expressions, Form Processing and Business Logic, Using Cookies, Dynamic Content, Operator Precedence Chart

UNIT V : DATABASE CONNECTIVITY

Database Connectivity, Database Connectivity with MySQL - Servlets, JSP, PHP, Case Studies- Student information system, Health Management System

TEXT BOOKS / REFERENCE:

1. Steven Holzner,"HTML Black Book", Dremtech press.
2. Web Technologies, Black Book, Dreamtech Press
3. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
4. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson.
5. https://www.w3schools.com/
6. https://www.geeksforgeeks.org/c-programming-language/
7. https://www.javatpoint.com/c-programming-language-tutorial

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WEB TECHNOLOGY LAB SUB-CODE: ETCS-614 CREDIT: 02

LIST OF EXPERIMENTS:

Week 1: Home page Development static pages (using Only HTML) of an online Book store.

Week 2: Create a Login page.

Week 3: Validate the Registration, user login and payment by credit card pages using JavaScript.

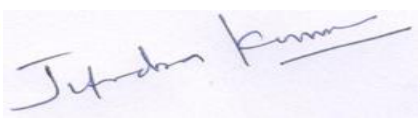
Week 4: To write a program, which takes user id as input and displays the user details by taking the user information from the XML document.

Week 5: To create a JavaBean so that it converts value of INR (Indian Rupees) into equivalent American/Canadian/Australian Dollar value.

Week 6: To create a simple Bean with a label - which is the count of number of clicks and a Bean Info class such that only the "count" property is visible in the Property Window.

Week 7: To create two Beans Traffic Light which implemented as a Label with only three background colours- Red, Green, Yellow and Automobile which is implemented as a Textbox which states its state/movement with above stated conditions.

Week 8: To convert the static web pages online library into dynamic web pages using servlets and cookies.



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School of Engineering & Technology.
Department of Computer Science & Engineering.

Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS621
Course Name	Software Engineering
Course Credits	2 (T)
Total Course Credit	181

Abbreviations: T-Theory

1.Course Overview:

This course will introduce the knowledge about software and software design Life cycle. student will come to know different software model and its specific uses,willalso get knowledge about project management .

2.Prerequisite: Basic knowledge about software its types and uses.

3.Objective of the Syllabus:

This course Software engineering is an essential part of any Computer-Science education. The purpose of this course is to understand the mechanisms of the software engineering like software Management, software Model etc.
To use different models like COCOMO to minimize cost,use of LOC in software engineering.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Knowledge about different software models.
CO2	Demonstrate the knowledge about different testing tools used in software.
CO3	Gain knowledge of Cocomo Model,Loc in softwares etc.

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CO4	To outline the need for Software Project Management
CO5	To highlight different techniques for software cost estimation and activity planning.

5.Syllabus

UNIT I

Introduction of Software Engineering & Software Life Cycle Models/W Engineering DisciplineEvolution and Impact, Emergence of S/W Engineering Waterfall Model, Prototyping Model, Evolutionary Model Spiral models and their comparisons.

UNIT II

Software Project Management & Requirements Analysis and Specification Project Manager Responsibilities, Project Planning Project Size estimation Metrics, Project estimation Techniques COCOMO, Staffing Level Estimation, Scheduling, Organization & Team Structures, Staffing, Risk Management,S/W Configuration Management, Requirement Gathering and Analysis, Software Requirement Specification, Formal System Development Techniques

UNIT III

Software Design & Function-Oriented S/W Design, Overview of Software Design, Cohesion and Coupling, S/W Design Approaches, Object-Oriented vs. Function-Oriented Design, SA/SD Methodology Structured Analysis, Data Flow Diagrams(DFDs), Structured Design, Detailed Design, Design Preview

UNIT IV

Object Modelling Using UML & Object-Oriented Software Development , UML, UML Diagrams Use Case Model, Class Diagrams, Design Patterns, Object-Oriented analysis and Design Process OOD Goodness Criteria

UNIT V

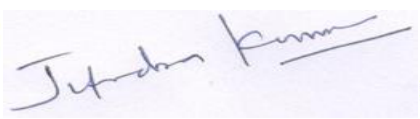
User Interface Design & Coding and Testing, Basic Concepts, Types, Components Based GUI Development, User Interface Design Methodology, Coding, Code Review, Unit Testing, Black Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing Software Reliability and Quality Management & Software Maintenance, S/W Reliability, Statistical Testing, S/W Quality, Management System, ISO 9000, SEI CMM, S/W Reverse Engineering, S/W Maintenance Process Models,

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, —Software Testing – Principles and Practices‖, Pearson Education, 2006.
2. Ron Patton, —Software Testing‖, Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCES:

1. Ilene Burnstein, —Practical Software Testing‖, Springer International Edition, 2003.
2. Edward Kit,‖ Software Testing in the Real World – Improving the Process‖, Pearson Education, 1995.
3. Boris Beizer,‖ Software Testing Techniques‖ – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
4. Aditya P. Mathur, —Foundations of Software Testing _ Fundamental Algorithms and Techniques‖, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.



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Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS622
Course Name	Embedded System
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

A system which is a combination of special purpose hardware and embedded OS for executing a specific set of applications. An Electronic/Electro mechanical system which is designed to perform a specific function and is a combination of both hardware and firmware (Software)

2. Prerequisite:

● We expect you to have a solid background in Python programming and understand basic statistics and machine learning. The following classes are required/recommended**.**

● If you do not have the required/recommended courses, you need the instructor's consent. ● This class includes topics from statistical mathematics g, Parallel Processing, and Machine Learning, making the course very compact for a six-week online course.

3. Objective of the Syllabus:

On successful completion of this course, design, describe, validate and optimise embedded electronic systems in different industrial application areas. To be able to define hardware and software communication and control requirements. To acquire knowledge of and be able to use tools for the development and debugging of programs implemented on micro controllers and DSPs

4. Course Outcomes:

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S. No.	Course Outcomes (Cos)
CO1	Execute the C program to perform transfer of data from source to destination internal data memory location.
CO2	Execute the C program following arithmetic operations on 16 bit data addition and subtraction.
CO3	Use integrated development environment tool for developing embedded system(using Micro Proc)
CO4	Execute the C program to display member 9 on 7 segment display with some delay

5. Syllabus:

UNIT-I INTRODUCTION TO EMBEDDED SYSTEMS

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements,

specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT-II TYPICAL EMBEDDED SYSTEM

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment

LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT-III COMMUNICATION INTERFACE

Onboard communication interfaces-I2C, SPI, CAN, parallel interface; External communication Interfaces-RS232 and RS485, USB, infra-red, Blue tooth, Wi-Fi, ZigBee, GPRS, GSM.

UNIT-IV EMBEDDED FIRMWARE DESIGN AND DEVELOPMENT

Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development,

high level language based development.

UNIT-V RTOS BASED EMBEDDED SYSTEM DESIGN

Operating system basics, types of operating systems, tasks, process and threads, multiprocessing

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and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task Communication-shared memory, message passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization Issues, Task Synchronization Techniques

TEXT BOOKS:

1. Introduction to Embedded Systems - shibu k v, Mc Graw Hill Education.
2. Computers as Components –Wayne Wolf, Morgan Kaufmann (second edition).

REFERENCE BOOKS:

1. Embedded System Design -frank vahid, tony grivargis, john Wiley.
2. Embedded Systems- An integrated approach - Lyla b das, Pearson education 2012.
3. Embedded Systems – Raj Kamal, TMH

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Programme Structure	**B. Tech (Computer Science & Engineering)**
Subject Code	**ETCS623**
Course Name	**Intellectual property Right**
Course Credits	**2 (L)**
Total Course Credit	**181**

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.Intellectual property is the currency of the tech world, with the world's most valuable intellectual property assets dwarfing the value of their real-world counterparts.

2 Prerequisite:

Intellectual Property Rights Concept and Theories Kinds of Intellectual Property Rights Economic analysis of Intellectual Property Rights Need for Private Rights versus Public Interests Advantages and Disadvantages of IPR.

3 Objective of the Syllabus:

1. The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
2. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.
3. Further teacher will have to demonstrate with products and ask the student to identify the

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different types of IPR's.Course Outcomes**:**

4. Course Outcome

S. No.	Course Outcomes (Cos)
CO1	The students once they complete their academic projects, they get awareness of acquiring the Patent.
CO2	They also learn to have copyright for their innovative works.
CO3	They also get the knowledge of plagiarism in their innovations which can be questioned legally.

5. Syllabus:

Unit-1

INTRODUCTION TO IPR: Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights – 2 hours Introduction to TRIPS and WTO. – 2 hours Kinds of Intellectual property rights— Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge.

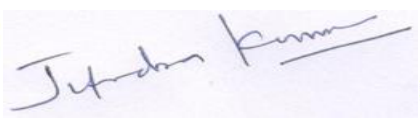
Unit-2

PATENT RIGHTS AND COPY RIGHTS— Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. – 6 hours COPY RIGHT—Origin, Definition &Types of Copy Right, Registration procedure, Assignment & licence, Terms of Copy Right, Piracy, Infringement, Remedies, Copy rights with special reference to software.

Unit-3

TRADE MARKS— Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties. – 4 hours Domain Names on cyber space

Unit-4



DESIGN- Meaning, Definition, Object, Registration of Design, Cancellation of Registration, International convention on design, functions of Design.Semiconductor Integrated circuits and layout design Act-2000.

Unit-5

BASIC TENENTS OF INFORMATION TECHNOLOGY ACT-2000 – IT Act - Introduction E-Commerce and legal provisions E- Governance and legal provisions Digital signature and Electronic Signature. Caber rimes.

TEXT BOOKS:

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy
2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra
3. IPR by P. Narayanan
4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.

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Programme Structure	B. Tech (Computer Science & Engineering)
Semester	6th
Subject Code	ETCS624
Course Name	Machine Learning
Course Credits	3 (L) + 0(P)= 3
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

This course introduces principles, algorithms, and applications of machine learning from the point of view of modelling and prediction. lt includes formulation of learning problems and concepts of representation, over-fitting, and generalization..

2. Prerequisite: The prerequisites for a machine learning course include a stronghold of linear algebra, calculus, programming skills, probability, and statistics. Most of the topics can be quickly understood while working on solved projects by Project Pro that resemble how solutions are implemented in the real world**. Objective of the Syllabus:**

The purpose of machine learning is to figure out how we can build computer systems that improve over time and with repeated use. This can be done by figuring out the fundamental laws that govern such learning processes.

4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
CO3	Demonstrate proficiency in applying scientific method to models of machine learning.
CO4	Discuss the basics of ANN and different optimizations techniques.

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5. Syllabus:

1. **Introduction:** Objective, scope and outcome of the course.
2. **Supervised learning algorithm:**

   Introduction, types of learning, application, Supervised learning: Linear Regression Model, Naive Bayes classifier Decision Tree, K nearest neighbour, Logistic Regression, Support Vector Machine, Random Forest algorithm

3. Unsupervised learning algorithm: Grouping unlabelled items using k-means clustering, Hierarchical Clustering, Probabilistic clustering, Association rule mining, Apriori Algorithm, f-p growth algorithm, Gaussian mixture model

4. **Introduction to Statistical Learning Theory**, Feature extraction - Principal component analysis, Singular value decomposition. Feature selection – feature ranking and subset selection, filter, wrapper and embedded methods, Evaluating Machine Learning algorithms and Model Selection.

5. **Semi supervised learning, Reinforcement learning:** Markov decision process (MDP), Bellman equations, policy evaluation using Monte Carlo, Policy iteration and Value iteration, Q-Learning, State- Action-Reward-State-Action (SARSA), Model-based Reinforcement Learning.

Text Book: 1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGraw Hill 2. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press. 3. Artificial Neural Network, B. Yegnanarayana, PHI, 2005

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Reference Book: 1. Christopher M. Bishop. Pattern Recognition and Machine Learning (Springer)
2. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Prentice Hall of India

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Programme Structure	**B. Tech (Computer Science & Engineering)**
Subject Code	**ETCS625**
Course Name	**Computational Intelligence**
Course Credits	**3 (L) + 0(P)= 3**
Total Course Credit	**181**

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

This is an introductory course into the field of artificial intelligence (AI), with particular focus on search as the fundamental technique for solving AI problems. The problem of

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navigating a road map with a known layout is a typical example of a problem studied in this course. Problems such as this one can be solved by enumerating all possible sequences of moves until a solution is found. Such a naive idea, however, is rarely applicable in practice because the size of the search space is typically vast.

2 **Prerequisite:**

Students are expected to use Java/python in practicals. This course does not cover any aspects of Java programming: the students are expected to have learned Java/python elsewhere. No knowledge of Java or any other programming language is required in order to pass the exam.

3 Objective of the Syllabus:

To provide a strong foundation on fundamental concepts in Computational Intelligence. To enable Problem-solving through various searching techniques. To apply these techniques in applications which involve perception, reasoning and learning. To apply Computational Intelligence techniques for information retrieval

To apply Computational Intelligence techniques primarily for machine learning.

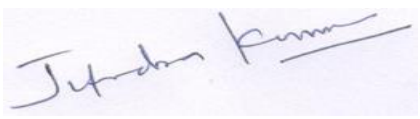
4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Provide a basic exposition to the goals and methods of Computational Intelligence.
CO2	Study of the design of intelligent computational techniques
CO3	Apply the Intelligent techniques for problem solving
CO4	Improve problem solving skills using the acquired knowledge in the areas of, reasoning, natural language understanding, computer vision, automatic programming and machine learning.

5. Syllabus:

UNIT I INTRODUCTION

Introduction to Artificial Intelligence-Search-Heuristic Search-A* algorithm-Game Playing-Alpha- Beta Pruning-Expert systems-Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.



UNIT II KNOWLEDGE REPRESENTATION AND REASONING

Proposition Logic - First Order Predicate Logic – Unification – Forward Chaining -Backward Chaining

- Resolution – Knowledge Representation - Ontological Engineering - Categories and Objects – Events

- Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with DefaultInformation - Prolog Programming.

UNIT III UNCERTAINTY

Non monotonic reasoning-Fuzzy Logic-Fuzzy rules-fuzzy inference-Temporal Logic-TemporalReasoning-Neural Networks-Nero-fuzzy Inference.

UNIT IV LEARNING

Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees – Regression and Classification with Linear Models - Artificial Neural Networks – Non-parametric Models - Support Vector Machines - Statistical Learning - Learning with Complete Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning

UNIT V INTELLIGENCE AND APPLICATIONS

Natural language processing-Morphological Analysis-Syntax analysis-Semantic Analysis-AII applications – Language Models - Information Retrieval – Information Extraction - Machine Translation – Machine Learning - Symbol-Based – Machine Learning: Connectionist – Machine Learning.

TEXT BOOKS:

1. Stuart Russell, Peter Norvig, —Artificial Intelligence: A Modern Approach‖, Third Edition,Pearson Education / Prentice Hall of India, 2010.
2. Elaine Rich and Kevin Knight, —Artificial Intelligence‖, Third Edition, Tata McGraw-Hill,2010.

REFERENCES:

1. Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
2. Dan W.Patterson, —Introduction to Artificial Intelligence and Expert Systems‖, PHI, 2006.
3. Nils J. Nilsson, —Artificial Intelligence: A new Synthesis‖, Harcourt Asia Pvt. Ltd., 2000.

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Programme Structure	**B. B. Tech (Computer Science & Engineering)**
Subject Code	**ETCS626**
Course Name	**Genetic Algorithm**
Course Credits	**3 (L) + 0(P)= 3**
Total Course Credit	**181**

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

Genetic Algorithm combines the knowledge of mathematics, computer science and statistics to solve exciting data-intensive problems in industry and in many fields of science. Data scientists help organizations make sense of their data. As data is collected and analysed in all areas of society, demand for professional data scientists is high and will grow higher.

4. **Prerequisite:**

● We expect you to have a solid background in Python programming and understand basic statistics and machine learning. The following classes are required/recommended**.**

● If you do not have the required/recommended courses, you need the instructor's consent. ● This class includes topics from statistical mathematics g, Parallel Processing, and Machine Learning, making the course very compact for a six-week online course.

5. Objective of the Syllabus:

On successful completion of this course, students will be able to:

learn advanced statistical technique and apply them to the analysis of real data sets from different fields.

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4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Having an ability to apply mathematics and science in engineering applications
CO2	Provide advanced statistical background for analysing data and drawing inferences from that analysis..
CO3	Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice.
CO4	Predicative Analytics using liner and generalized liner model.

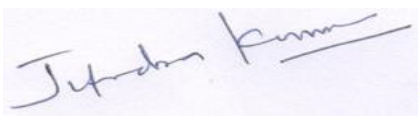
5. Syllabus:

Unit – I:

Introduction to Genetic Algorithms: Robustness of Traditional Optimization and Search Methods, Goals of Optimization, Difference between Genetic Algorithms and Traditional Methods, Simple Genetic Algorithm and its operators, Example using Genetic Algorithm, Similarity Templates. Mathematical Foundations: Fundamental theorem, Schema Processing, Two- armed and Charmed bandit problem, Building block hypothesis, Minimal deceptive Problem, Similarity templates as hyper planes

Unit – II:

Computer Implementation of Genetic Algorithms: Data structures, Reproduction, Crossover and Mutation, Mapping objective functions to fitness form, Fitness scaling. Applications Of Genetic Algorithms: De Jong and Function optimization, Structural optimization via genetic algorithm, Medical image registration with genetic algorithms, Iterated prisoner's dilemma problem Introduction to Genetic Algorithms: Robustness of Traditional Optimization and Search Methods, Goals of Optimization, Difference between Genetic Algorithms and Traditional Methods, Simple Genetic Algorithm and its operators, Example using Genetic Algorithm, Similarity Templates. Mathematical Foundations: Fundamental theorem, Schema Processing,



Two- armed and K- armed bandit problem, Building block hypothesis, Minimal deceptive Problem, Similarity templates as hyper planes.

Introduction to Genetic Algorithms: Robustness of Traditional Optimization and Search Methods, Goals of Optimization, Difference between Genetic Algorithms and Traditional Methods, Simple Genetic Algorithm and its operators, Example using Genetic Algorithm, Similarity Templates. Mathematical Foundations: Fundamental theorem, Schema Processing, Two- armed and K- armed bandit problem, Building block hypothesis, Minimal deceptive Problem, Similarity templates as hyper planes.

Unit – III:

Advanced Operators And Techniques In Genetic Algorithm Search: Dominance, Diploidy and Abeyance, Inversion and other Re-ordering Operators, Other Micro operators, Niche and Specialization, Multi objective optimization. Knowledge based techniques, Genetic Algorithms and Parallel processors, Genetic Based machine learning, Classifier systems.

Unit – IV:

Industrial Application Of Genetic Algorithms: Data Mining using genetic Algorithms,Evaluation – Prediction and Decision Making.

Text Books:

1. David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Pearson Education, 6th Edition ISBN81-7808-130-X
2. Charles L Karr and L. Michael Freeman, Industrial applications of Genetic Algorithms, CRC Press, Washington DC, 1999 ISBN:0-8493-9801-0

Reference Books:

1. Intelligent agent's adaptive control: Industrial applications- L.C.Jain and C.W. deSilva
2. Handbook of Genetic Algorithms -Davis, Lawrence, ISBN:0-442-00173-8.
3. An Introduction to Genetic Algorithms-Melanie Mitchell, ISBN:81-203-1358-5

Text Books:

1. David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Pearson Education, 6th Edition ISBN81-7808-130-X
2. Charles L Karr and L. Michael Freeman, Industrial applications of Genetic Algorithms, CRC Press, Washington DC, 1999 ISBN:0-8493-9801-0

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SEMESTER – VII

Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS701
Course Name	INTERNET OF THINGS
Course Credits	3(T)
Total Course Credit	181

Abbreviations: T-Theory

1.Course Overview: This Course focuses on hands-on IoT concepts such as sensing, actuation and communication. It covers the development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication—to help you develop skills and experiences. The Internet of Things (IOT) is the next wave, world is going to witness. Today we live in an era of connected devices the future is of connected things.

2.Prerequisite:

They need to know a lot about statistics that have to do with Machine Learning. Simultaneous use of artificial intelligence, Need to know something about sensors for this subject,should know how to use JavaScript and Python. & Node JS environment.

3.Objective of the Syllabus:

- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT device
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.
CO3	Market forecast for IoT devices with a focus on sensors.
CO4	Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry

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CO5	Difference and similarities between IOT and M2M, Software defined networks, network function virtualization.

5.Syllabus

UNIT I Introduction: Objective, scope and outcome of the course.

UNIT II Introduction to IoT: Definition and characteristics of IoT, Design of IOT: Physical design of IOT, Logical Design of IOT- Functional Blocks, communication models, communication APIs, IOT enabling Technologies- Wireless Sensor Networks, Cloud computing, big data analytics, embedded systems. IOT Levels and deployment templates.

UNIT III IoT Hardware and Software: Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS.

UNIT IV Architecture and Reference Model: Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs). Challenges in IoTDesign challenges, Development challenges, Security challenges, Other challenges.

UNIT V IOT and M2M: M2M, Difference and similarities between IOT and M2M, Software defined networks, network function virtualization, difference between SDN and NFV for IoT.

UNIT VI Case study of IoT Applications: Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyles.

TEXT BOOKS: 1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547 2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759 3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

REFERENCE BOOKS: 1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan

2. Peter Friess,'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014

3. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014

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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS702**
Course Name	**ARTIFICIAL INTELLIGENCE WITH DEEP LEARNING**
Course Credits	**3(T) +2(P)=5**
Total Course Credit	**181**

Abbreviations: T-Theory

Course Overview: To L earn new concepts from industry experts

,Gain a foundational understanding of a subject or tool,Develop job-relevant skills with hands-on projects Earn a shareable career certificate

2.Prerequisite: Strong Knowledge of MathematicsGood knowledge of Programming knowledge like Python, R, LISP, Java, C++, Prolog, etc. Strong Analytical skills.

3.Objective of the Syllabus:

- Gain a historical perspective of AI and its foundations.
. • Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models
- Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

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CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
CO4	Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
CO5	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications

5.Syllabus

UNIT I:

Introduction, What is Artificial Intelligence, I Technique, Level of the Model, Problem Spaces, and Search Defining the Problem as a State Space Search, Production Systems, Problem, Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-first Search, Problem Reduction, Constraint Satisfaction, Means-end Analysis, Knowledge, Means-ends Analysis, Knowledge

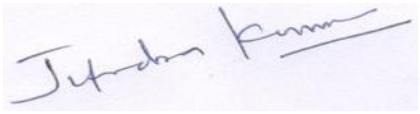
UNIT II:

Using Predicate Logic, Representing Simple Facts in Logic, Representing , Instance and ISA Relationships Computable Functions and Predicates, Resolution, Natural Deduction, Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem-solver Depth-first Search, Breadth-first Search, Semantic Nets, Frames, Conceptual Dependency Scripts Weak and Strong Slot-and-Filler Structures: Semantic

UNIT III : Game Playing, The Minimax Search Procedure, Adding Alpha-beta Cutoffs, Iterative Deepening
The Blocks World, Components of a Planning System, Components of a Planning System
Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning Other Planning Techniques. What is Understanding, What Makes Understanding Hard? Understanding as Constraint Satisfaction.

UNIT IV : Learning, Rote Learning, Learning by Taking Advice, Learning by Taking Advice, Learning in Problem-solving, Learning, Learning from Examples: Induction, Explanation-based Learning, Discovery, Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning

UNIT V: Expert Systems, Representing and Using Domain Knowledge, Expert System Shells Knowledge Acquisition

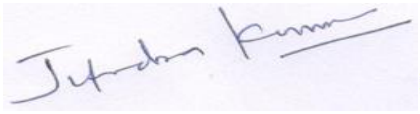



TEXT BOOKS:

1. Introduction to Artificial Intelligence by Rajendra Akerkar, PHI
2. Introduction to Artificial Intelligence by Eugene Charniak, Pearson Educat ion.
3. Artificial Intelligence by Rich & Knight. Tata McGraw Hills.
4. Introduction to Artificial Intelligence & Expert system by Dan W. Patterson, PHI

REFERENCE BOOKS:

1. Artificial Intelligence. A Modern Approach by Stuart Russell. Peter Norving and Pearson E ducation.
2. Introduction to Expert System, Peter Jackson. Pearson Education.
3. Artificial Intelligen



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ARTIFICIAL INTELLIGENCE WITH DEEP LEARNING LAB SUB CODE: ETCS-712 CREDIT 2

LIST OF EXPERIMENTS:

Week: 1 Write a program in prolog to implement simple facts and Queries
Week: 2 Write a program in prolog to implement simple arithmetic
Week: 3 Write a program in prolog to solve Monkey banana problem
Week: 4 Write a program in prolog to solve Tower of Hanoi
Week :5 Write a program in prolog to solve 8 Puzzle problems
Week: 6 Write a program in prolog to solve 4-Queens problem
Week: 7 Write a program in prolog to solve Traveling salesman problem
Week: 8 Write a program in prolog for Water jug problem
Week: 9. Write a program to implement a Tic-Tac-Toe game.
Week: 10. Write a python program to implement simple Chatbot?

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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS721**
Course Name	**Distributed Computing**
Course Credits	**2 (L)**
Total Course Credit	**181**

Abbreviations: T-Theory, P-Practical

2. **Course Overview:**

Distributed Systems combine the computational power of multiple computers to solve complex problems. The individual computers in a distributed system are typically spread over wide geographies, and possess heterogeneous processor and operating system architectures. Hence, an important challenge in distributed systems is to design system models, algorithms and protocols that allow computers to communicate and coordinate their actions to solve a problem.

3. **Prerequisite:** To understand the basic computer organization, operating system structures, networks and related programming.

4. **Objective of the Syllabus:**

Our aim in this course is to introduce you to the area of distributed systems. You will examine and analyze how a set of connected computers can form a functional, usable and high performance distributed system.

5. **Course Outcomes:**

S.No.	CourseOutcomes(Cos)
CO1	To learn the principles, architectures, algorithms and programming models used in distributed systems.

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CO2	To examine state-of-the-art distributed systems, such as Google File System.
CO3	To design and implement sample distributed systems.

6. **Syllabus:**

UNIT I

Fundamentals, Definition Evaluation of distributed Computing System, Distributed Computer System Models, Distributed Operating System Designing a distributed Operating System, Introduction of distributed computing Environment.

UNIT II

Message Passing, Basics, Design features, Issues in IPC by message passing, Issues in IPC by message passing, Synchronization, Synchronization Buffering, Multidiagram messages, Encoding and decoding message data Remote Procedure Calls, Basics, The RPC Model, The RPC Model

UNIT III

Transparency of RPC, Implementing RPC mechanism RPC messages server management, Parameter-passing and call semantic, Communication protocols for RPC's

UNIT IV

Distributed Shared Memory & Resource Management, Architecture of DSM Systems Design and Implementation, Granularly, Structure shared memory space Consistency models, Replacement strategy, Thrashing., Desirable feature, Task assignment approach, Load-balancing approach, Load-sharing , approach

UNIT V

Process Management & Distributed File System, Process Migration, Threads, Intake, Desirable features, File model, File accessing models, File-sharing semantic, File-catching schemes, File replication, Fault tolerance, Automatic transactions, Design principle.

REFERENCE BOOKS:

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1. Tanenbaum, A.S. and Van Steen, M., 2007. Distributed systems: principles and paradigms. Prentice-Hall.

2. Sinha, P.K., 1998. Distributed operating systems: concepts and design. PHI Learning Pvt. Ltd..
3. Liu, M.L., 2003. Distributed computing: principles and applications. Pearson Education Inc..
4. Lynch, N.A., 1996. Distributed algorithms. Elsevier.

5. Coulouris, G.F., Dollimore, J. and Kindberg, T., 2005. Distributed systems: concepts and design.pearson education.

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Programme Structure	B. Tech (Computer Science & Engineering)
Subject Code	ETCS722
Course Name	Big Data Analytics
Course Credits	2 (L)
Total Course Credit	181

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

Formal languages and automata theory deals with the concepts of automata, formal languages, grammar, computability and decidability. The reasons to study Formal Languages and Automata Theory are Automata Theory provides a simple, elegant view of the complex machine that we call a computer. Automata Theory possesses a high degree of permanence and stability, in contrast with the ever-changing paradigms of the technology, development, and management of computer systems.

2. **Prerequisite:**

● We expect you to have a solid background in Python programming and understand basic statistics and machine learning. The following classes are required/recommended**.**

● If you do not have the required/recommended courses, you need the instructor's consent. ● This class includes topics from Cloud Computing, Parallel Processing, and Machine Learning, making the course very compact for a six-week online course.

● To implement the assignments, students need to have excellent knowledge of the Python programming language and some basic Linux knowledge. Assignments are very time-consuming, and you should take this course when you have at least 20 hours per week.

3. Objective of the Syllabus:

On successful completion of this course, students will be able to:

• Understand the importance of Data Science and Big Data Analytics in decision-making

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• Perform analytics on unstructured data using Big Data technologies, including Hadoop, HDFS, HIVE, Spark, and others
• Use NoSQL for Big data database management and basic analysis
• Use modern Databricks as a Big Data cloud development platform
• Use Databricks SQL to query data and visualize queries in a dashboard
• Use Spark and Spark MLlib for data queries and data analytics
• Use R or Python for statistical analysis
• Use Microsoft Azure Virtual Machine (VM) for stream data analytics and Internet of Things (IoT)
• Understand Big Data security, and how Big Data is used in combination with Cloud and IoT

4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Having an ability to apply mathematics and science in engineering applications
CO2	Having an ability to design and conduct experiments, as well as to analyze and interpret data, and synthesis of information.
CO3	Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice.
CO4	Having a clear understanding of professional and ethical responsibility.

5. Syllabus:

UNIT I INTRODUCTION TO BIG DATA

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High-Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model

UNIT II CLUSTERING AND CLASSIFICATION

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes„ Theorem - Naïve Bayes Classifier.

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ETCS722A Total Quality Management

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytic

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UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION

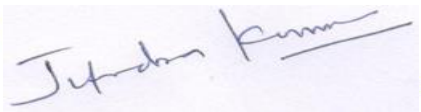
NoSQL Databases : Schema-less Models‖: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.

TEXT BOOKS:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory Languages and Computation, 3rdedition, Pearson Education, India.

REFERENCE BOOKS:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.



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Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS723**
Course Name	**Human Computer Interaction**
Course Credits	**2 (T)**
Total Course Credit	**181**

Abbreviations: T-Theory, P-Practical

7. Course Overview:

This course will introduce the idea of proper usage of computers by humans, The responsibilities of people and organizations , possible hazards and how Computers can be used in fruitful ways.

8. **Prerequisite:** To understand the basic computer organization.

9. Objective of the Syllabus:

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

10. Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	Design effective dialog for HCI
CO2	Design effective HCI for individuals and persons with disabilities.
CO3	Assess the importance of user feedback.
CO4	Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
CO5	Develop meaningful user interface.

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11. Syllabus:

UNIT I FOUNDATIONS OF HCI

The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case Studies

UNIT II DESIGN & SOFTWARE PROCESS

Interactive Design: Basics –process–scenarios–navigation –screen design – Iteration and

prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in

practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques– Universal Design

UNIT III MODELS AND THEORIES

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV MOBILE HCI

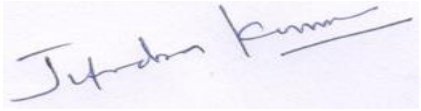
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies

UNIT V WEB INTERFACE DESIGN

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd



Edition, Pearson Education, 2004 (UNIT I , II & III)

2. Brian Fling, "Mobile Design and Development", First Edition , O"Reilly Media Inc., 2009
(UNIT –IV)

3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O"Reilly, 2009.
(UNIT-V)

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Programme Structure	**B. Tech (Computer Science & Engineering)**
Subject Code	**ETCS724**
Course Name	**Introduction to Data Science**
Course Credits	**3 (L) + 0(P)= 3**
Total Course Credit	**181**

Abbreviations: L-Lecture, P-Practical

1. Course Overview:

Data science combines the knowledge of mathematics, computer science and statistics to solve exciting data-intensive problems in industry and in many fields of science. Data scientists help organisations make sense of their data. As data is collected and analysed in all areas of society, demand for professional data scientists is high and will grow higher.

2. **Prerequisite:**

● We expect you to have a solid background in Python programming and understand basic statistics and machine learning. The following classes are required/recommended**.**

● If you do not have the required/recommended courses, you need the instructor's consent. ● This class includes topics from statistical mathematics g, Parallel Processing, and Machine Learning, making the course very compact for a six-week online course.

3. Objective of the Syllabus:

On successful completion of this course, students will be able to:

learn advanced statistical technique and apply them to the analysis of real data sets from different fields.

4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Having an ability to apply mathematics and science in engineering applications
CO2	Provide advanced statistical background for analysing data and drawing inferences from that analysis..

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CO3	Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice.
CO4	Predicative Analytics using liner and generalized liner model.

5. Syllabus:

ETCS724 Introduction to Data Science

INTRODUCTION TO DATA SCIENCE

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Unit – I: Introduction

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a

Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II:

Data Collection and Data Pre-Processing, Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data, Integration and Transformation – Data Reduction – Data Discretization.

Unit – III:

Exploratory Data Analytics, Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV:

Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample

Evaluation – Prediction and Decision Making.

Unit – V:

Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing

Multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”,

PACKT, 2016.

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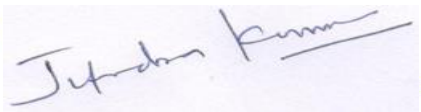
2. Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly, 2015.

3. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013

4. Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big Data Analytics", IGI Global.



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Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS725
Course Name	Wireless Ad hoc & Sensor Networks
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

This course will introduce the core concepts of wireless and ad hoc networks, Allow the learner to design , troubleshoot and effectively use such networks.

2. Prerequisite: To understand the basic computer networks and operating system structures.

3. Objective of the Syllabus:

- To learn about the issues and challenges in the design of wireless ad hoc networks.
- To understand the working of MAC and Routing Protocols for ad hoc and sensor networks
- To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks.
- To understand various security issues in ad hoc and sensor networks and the corresponding solutions.

4. Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	Appreciate the importance of Adhoc and sensor networks for applications like environment monitoring, habitat monitoring, health care and data acquisition systems.
CO2	Understanding of data transmission technologies of the Adhoc and sensor devices with focus on channel access routing and security.
CO3	Appreciate the need and importance of converged networks, ubiquitous environment and 'Internet of things' in the context of Adhoc and sensor networks.
CO4	Capable of model building ,new protocol design and strategies simulation of the sys-tems that include the above.

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CO5	

5. Syllabus:

UNIT - I

INTRODUCTION TO ADHOC NETWORKS: Overview and Communication aspects of Manet, Challenges, Topologies, Routing classification approaches, Proactive, Reactive, Position based and Other Routing Protocols

UNIT - II

BROADCASTING, MULTICASTING AND GEOCASTING IN MANETS : Introduction, The Broadcast Storm

Broadcasting in a MANET, Flooding-Generated Broadcast Storm, Redundancy Analysis, Rebroadcasting Schemes, Multicasting - Issues in Providing Multicast in a MANET, Multicast Routing Protocols, Comparison, Geocasting - Geocast Routing Protocols, Comparison..

UNIT - III

WIRELESS SENSOR NETWORK : Introduction, The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications of Sensor Networks.

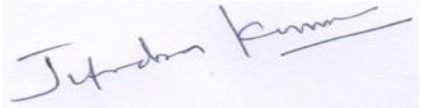
UNIT - IV

DATA RETRIEVAL IN SENSOR NETWORKS : Introduction, Classifications of WSNs, MAC layer Design issues and Protocols, Routing Protocols of Sensor Networks - Network Structure Based Routing, Flat versus Hierarchical Routing, Multipath and Query Based Routing, Location-Based Routing, Transport Layer, High-Level Application Layer Support, Adapting to the Dynamic Nature of WSNs.

UNIT - V

SECURITY AND CONNECTIVITY TO OTHER NETWORKS : Introduction, Security in Ad Hoc Networks, Distributed Systems Security, Key Management, Secure Routing, Cooperation in MANETs, Security of Wireless Sensor Networks, Intrusion Detection Systems, Ingredients of a Heterogeneous Architec-ture, Protocol Stack, Comparison of the Integrated Architecture

TEXTBOOKS:




1. Carlos Cordeiro and Dharma P Agarwal, Ad hoc sensor networks-Theory and Applications by World Scientific publications March 2006

2. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “, Prentice Hall Professional Technical Reference, 2008.

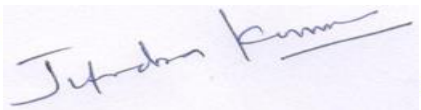
REFERENCEBOOKS:

1. Feng Zhao and Leonides Guibas, “Wireless Sensor Networks”, Elsevier Publication – 2002.

2. Holger Karl and Andreas Willig “ Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005

3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.

4. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.



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Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS726
Course Name	C# & .NET Programming
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1 Course Overview:

This course will introduce the core concepts of .NET programming to the Learner and enable him to create desktop as well as web-based applications Using the .NET Technology.

2. Prerequisite: To understand the basic computer programming using C ,C++ & Java.

3. Objective of the Syllabus:

- To learn basic programming in C# and the object oriented programming concepts.
- To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET.
- To study the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.
- To implement mobile applications using .Net compact framework
- To understand the working of base class libraries, their operations and manipulation of data using XML.

4. Course Outcomes:

S.No.	CourseOutcomes(Cos)
CO1	Write various applications using C# Language in the .NET Framework.
CO2	Develop distributed applications using .NET Framework.
CO3	Create mobile applications using .NET compact Framework.

5. Syllabus:

UNIT I C# LANGUAGE BASICS

.Net Architecture - Core C# - Variables - Data Types - Flow control - Objects and Types- Classes and Structs - Inheritance- Generics – Arrays and Tuples - Operators and Casts - Indexers

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UNIT II C# ADVANCED FEATURES

Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection

UNIT III BASE CLASS LIBRARIES AND DATA MANIPULATION

Diagnostics -Tasks, Threads and Synchronization - .Net Security - Localization - Manipulating XML- SAX and DOM - Manipulating files and the Registry- Transactions - ADO.NET- Peer-to-Peer Networking - PNRP - Building P2P Applications - Windows Presentation Foundation (WPF).

UNIT IV WINDOW BASED APPLICATIONS, WCF AND WWF

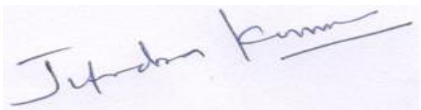
Window based applications - Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities – Workflows

UNIT V .NET FRAMEWORK AND COMPACT FRAMEWORK

Assemblies - Shared assemblies - Custom Hosting with CLR Objects - Appdomains - Core XAML - Bubbling and Tunneling Events- Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices

TEXT BOOKS:

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner . —Professional C# 2012 and .NET 4.5‖, Wiley, 2012
2. Harsh Bhasin, —Programming in C#‖, Oxford University Press, 2014.



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School of Engineering & Technology.

Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS727**
Course Name	**Cyber Security**
Course Credits	**3 (L)**
Total Course Credit	

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   The course introduces the learner to the various causes ,methods and preventive actions for cyber crimes.

2. **Prerequisite:**

   Basic to advanced knowledge of Linux , Internet , Networking and Web Technologies.

3. **Objective of the Syllabus:**

   Given the rate of increase in various cyber crimes , the syllabus will Introduce the learner to various causes of cyber crimes. It will also Give the learner an idea of modus operandi as well as laws and preventive methods for cyber crimes.

4. **Course Outcomes:**

S.No.	CourseOutcomes(Cos)
CO1	Know the characteristics of various cyber crimes
CO2	Understand the utilization of software in cyber crimes
CO3	Understand the laws and penalties for various cyber crimes
CO4	Learn the modus operandi of various cyber crimes
CO5	Have an understanding of various preventive methods for handling cyber attacks

5. **Syllabus:**

UNIT I

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Introduction to cyber crime, Challenges of cyber crime,Classification of cyber crime, Email spoofing,spamming, Internet Time Theft, Salami Attack/ Salami Technique

UNIT II

Web jacking, online fraud, Software Piracy, Computer network Intrusion, Password Sniffing, Identity theft, Cyber terrorism, virtual Crimes, Perception of Cyber Criminals, hackers, Insurgents and extremists groups, etc. web servers Hacking, Session Hijacking.

UNIT III

Cyber Crime and Criminal justice: Concepts of cyber crime and the IT act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and Email abuse, Other IT offenses, Monetary penalties, Jurisdictions and Cyber Crime, Nature of Criminality, Strategy to tackle cyber crime and trends.

UNIT 1V

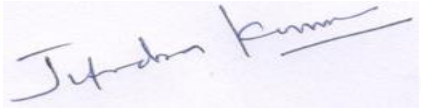
The Indain Evidence Act 1872 v Information Technology Act, 2000, Status of Electronic Records as Evidence, Proof and Management of electronic records, Relevancy, Admissibility and Probative Value of E – Evidence, Proving Digital Signature, Proof of electronics agreements, proving electronics messages.

UNIT V

Tools and Methods in cyber crime: proxy servers and Anonymizers , password cracking, key logger and spyware , virus and worms, Trojan Horses and backdoors, DoS and DDoS attack, buffer and overflow, Attacks on wireless networks, Phishing: methods of Phishing and Phishing techniques

Text Books

a. Cybersecurity For Beginners- Raef Meeuwisse
b. Hacking for Beginners – Ramon Nastase
c. The Art Of Invisibility – Kevin Mitnick
d. Hacking: The Art of Exploitation – Jon Erickson
e. Cyber Threat Hunting – Nadhem AlFardan
f. Ethical Hacking – Daniel G. Graham
g. Social Engineering – Christopher Hadnagy
h. Applied Cryptography – Bruce Schneier
i. Black Hat Python – Justin Seitz
j. Practical Malware Analysis – Michael Sikorski and Andrew Honig



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Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS728
Course Name	Cloud Computing
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. Course Overview:

This course will introduce the core concepts of cloud computing and use of various Tools and technologies over a cloud setup.

2. Prerequisite: To understand the basic computer organization, operating system structures, networking etc.

3. Objective of the Syllabus:

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

4. Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
CO2	Learn the key and enabling technologies that help in the development of cloud.

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CO3	Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
CO4	Evaluate and choose the appropriate technologies, algorithms and approaches implementation and use of cloud.

5. Syllabus:

UNIT I INTRODUCTION

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT II CLOUD ENABLING TECHNOLOGIES

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Virtualization Support and Disaster Recovery.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

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UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS

Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine –— Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

BOOKS

1. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security‖, CRC Press, 2017.

REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing‖, Tata Mcgraw Hill, 2013.

2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach‖, Tata Mcgraw Hill, 2009.

3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the
Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)‖, O'Reilly, 2009.

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Programme Structure	B. Tech (Computer Science & Engineering)
Semester	7th
Subject Code	ETCS705
Course Name	Bioinformatics
Course Credits	3 (L)
Total Course Credit	181

Abbreviations: L-**lectures per week**

1. Course Overview:

This course serves as an introductory exploration into the interdisciplinary field of bioinformatics, where biology, computer science, and information technology converge to analyze and interpret biological data. Students will delve into the fundamental concepts, techniques, and tools used to process, manage, and analyze biological information, ranging from DNA sequences to protein structures. Through a blend of theoretical lectures, hands-on exercises, and practical applications, participants will gain a comprehensive understanding of how bioinformatics plays a crucial role in modern biological research and its implications in fields such as genetics, medicine, agriculture, and environmental science.

2. Prerequisite: Basic understanding of biology and genetics, Familiarity with computer programming (preferred but not mandatory) & Knowledge of basic statistics and mathematics.

3. Objective of the Syllabus:

Understand the basic principles and goals of bioinformatics, Learn various computational methods for sequence analysis, including sequence alignment, motif finding, and phylogenetic analysis & Develop critical thinking and problem-solving skills through practical applications and case studies in bioinformatics research.

4. Course Outcomes:

S. No.	Course Outcomes (Cos)
CO1	Explain the fundamental principles and goals of bioinformatics, including its interdisciplinary nature and its significance in modern biological research.
CO2	Navigate and utilize biological databases effectively, understanding various data formats and retrieval techniques.
CO3	Apply structural bioinformatics techniques to predict protein structures, perform molecular modeling, and analyze structural similarities and differences.
CO4	Communicate effectively about bioinformatics concepts, methods, and findings through written reports, oral presentations, and scientific discussions.

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CO5	Apply bioinformatics techniques and methodologies to analyze real-world biological data sets and address research questions or problems effectively .

5. Syllabus:

Module I: Human Physiology and Basics

Brief introduction to human physiology, Basic components of bio-medical instruments, bioelectric signals, action potentials, Bio-electrodes

Module II: Transducers

Biomedical Transducers: displacement, velocity, force, acceleration, flow, temperature, potential, dissolved ions and gases

Module III: Electro-Physiological Measurements

Analysis of EEG, ECG, EMG, EOG, & Bio-Potential Amplifiers for ECG, EMG, EEG, etc

Module IV: Electrical Parameter Measurements

Cardiovascular measurement-blood pressure, blood flow, stroke volume, Impedance Plethysmography, Cardiac output, heart sound etc. Instrumentation for respiratory & nervous systems

Module V: Monitoring, Assisting, Therapeutic Equipment's And Safety

Patient care & monitoring system, Remote monitoring through telephone, Internet, Satellite link, Safety aspects associated with Biomedical Instrumentation. Recent advances in Bio-Medical Instrumentation, Microprocessor based systems, Laser & optical Fiber systems

BOOKS AND REFERENCES

Text Books

1. Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Prentice-Hall,
2. Handbook of Biomedical Instrumentation, R. S. Khandpur, McGraw Hill
3. Biomedical Instrumentation, M. Arumugam, Anuradha Agencies.
4. Introduction to Biomedical Engineering, Domach, Pearson Education.

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SEMESTER – VIII

Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS-801
Course Name	Cryptography
Course Credits	3 (T)
Total Course Credit	181

Abbreviations: T-Theory

1. **Course Overview:**

This course will introduce the core concepts of Network,its types and security also how to overcome problem of cyber crime. Encryption and decryption ,Key concept.

2. **Prerequisite:**

Basic knowledge of Network and dIfferent types of Network.

3. **Objective of the Syllabus:**

To understand Cryptography Theories, Algorithms and Systems.

• To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer network.

4. **Course Outcomes:**

S.No.	CourseOutcomes(Cos)
CO1	•Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms
CO3	• Apply the different cryptographic operations of public key cryptography
CO4	Apply the various Authentication schemes to simulate different applications

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CO5	Understand various Security practices and System security standards

5. Syllabus:

UNIT I INTRODUCTION

What is cryptology: (cryptography + cryptanalysis), Overview of cryptology: How cryptography works?, how to break a cryptographic system ? Classical conventional encryption, modern conventional encryption. public key encryption, hashing algorithm. OSI Security Architecture, Cryptanalysis of Classical Cryptosystems, Shannon's Theory

UNIT II SYMMETRIC CIPHER

Classical Encryption Techniques, Symmetric Cipher Model, Block Cipher Principles, DES, Triple DES, Cryptanalysis of Symmetric Key Ciphers: Differential and Linear Cryptanalysis Block Cipher Design Principle, The Euclidean Algorithm, Finite field of Form GP(p) Advance Encryption Standard (AES), AES Cipher,Multiple Encryption and Triple DES Stream Cipher and RC4, Placement of Encryption Function, Traffic Confidentiality, Key Distribution Random number generation. System Security: Intrusion detection, Password Management Virus countermeasure, Denial of Service Attack, Firewall design principles, Trusted System.

UNIT III PUBLIC KEY CRYPTOGRAPHY

Key Management - The Discrete Logarithm Problem (DLP) The Diffie Hellman Key Exchange algorithm, Cryptanalysis of DLP, Elliptic Curve Architecture and Cryptography, Confidentiality using Symmetric Encryption - Public Key Cryptography RSA, Primality Testing, Factoring Algorithms, Other attacks on RSA and Semantic Security of RSA ElGamal Cryptosystems. Authentication and Hash Function: Authentication requirements - Authentication functions.

UNIT IV MESSAGE AUTHENTICATION CODES

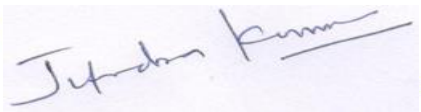
Hash Functions -Security of Hash Functions, Hash functions: The Merkle Damgard Construction and MACs.

UNIT V MD5 MESSAGE DIGEST ALGORITHM

Secure Hash Algorithm - RIPEMD– HMAC, CMAC Whirlpool and Comparative analysis Digital Signatures - Authentication Protocols - Digital Signature Standard.

TEXT BOOK: 1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCES:



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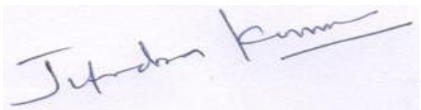
1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2



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Programme Structure	B. Tech (Computer Science & Engineering))
Subject Code	ETCS821
Course Name	Fundamentals of Data Communication
Course Credits	3 (L) =3
Total Course Credit	181

Abbreviations: T-Theory, P-Practical

1. **Course Overview:**

   This course will introduce the core concepts of data communication , transmission media, And hardware components to the learner . The learner will be able to implement the knowledge in real life situations and work out solutions for issues.

2. **Prerequisite:** To understand basics of Computer Networking

3. **Objective of the Syllabus:**

   This course teaches the design and implementation techniques essential for engineering robust networks. Topics include networking principles, Transmission Control Protocol/Internet Protocol, naming and addressing (Domain Name System), data encoding/decoding techniques, link layer protocols, routing protocols, transport layer services, congestion control, quality of service, network services, programmable routers and overlay networks.

4. **Course Outcomes:**

S.No.	Course Outcomes(Cos)
CO1	Will be able to understand fundamentals of network architecture and Protocols
CO2	Demonstrate the knowledge of the transmission media and related concepts
CO3	Have a knowledge of various hardware components involved in data communication
CO4	Gain practical knowledge of how to implement the concepts in actual world situations
CO5	

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5. Syllabus:

UNIT-I INTRODUCTION

Data Communication, Network Architecture, Protocols & Standard. Signal, Noise, Modulation & Demodulation: Signal analysis, Signal-to-noise ratio, Bit rate, Baud, Digital Modulation.

Unit-II Transmission Media

Guided transmission Media, Wireless Transmission. Digital transmission. Multiplexing: Time Division Multiplexing, Frequency Division Multiplex, Frequency Division multiplexing. Data Communication Codes, Error Control and Data Format: Data communication Character codes, Bar codes, Error Control & Detection, Character Synchronization.

Unit-III Data Communication Hardware

Data Communication Hardware & circuits, serial interfaces. Data Communication Equipment : Digital service Unit, Channels service Unit, Bell- system Compatible voice band modem. Asynchronous and Synchronous voice band modem.

Unit-IV Circuit Switching

Switching Networks, Circuit Switching Networks, Circuit Switching concepts, Routing in Circuit Switching Networks Control Signaling. Packet Switching : Packet Switching Principles, outing, X .25.

Unit-V Asynchronous transfer mode

Protocol Architecture, ATM Logical Connection, ATM Cell, Transmission of ATM Cells, ATM Service categories, ATM adaptation layer. Routing in Switched Network : Routing in circuit-switching & Packet switching network. Integrated Service Data Network : Public Switch Data Network. X. 25 user-to-network Interface protocol. ISDN.

Suggested Reading:

1. Introduction to data Communication and Networking by Wayne Tomasi Pearson Education.
2. Data and Computer Communication by William Stallings, Pearson Education.

Communication system and network by Ray Horak, Wiley India

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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS822**
Course Name	**Information Security**
Course Credits	**3 (L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview: Understanding the importance of information security Threats, vulnerabilities, and risks Understanding the importance of information security. Risk management process: risk assessment, risk mitigation, risk acceptance

2.Prerequisite: information security encompass a range of elements to ensure the protection, integrity, and confidentiality of data and systems

3.Objective of the Syllabus: To understand the basics of Information Security ,
To know the legal, ethical and professional issues in Information Security

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Discuss the basics of information security .
CO2	Illustrate the legal, ethical and professional issues in information security.
CO3	Demonstrate the aspects of risk management.
CO4	Become aware of various standards in the Information Security System.
CO5	Design and implementation of Security Techniques.

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5. Syllabus

UNIT I INTRODUCTION

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II SECURITY INVESTIGATION

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies

UNIT III SECURITY ANALYSIS

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem

UNIT IV LOGICAL DESIGN

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V PHYSICAL DESIGN

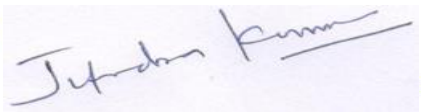
Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TEXT BOOK:

1. Michael E Whitman and Herbert J Mattord, —Principles of Information Security‖, Vikas Publishing House, New Delhi, 2003

REFERENCES:

1. Micki Krause, Harold F. Tipton, — Handbook of Information Security Management‖, Vol 1-3 CRCPress LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed‖, Tata McGraw- Hill, 2003
3. Matt Bishop, —Computer Security Art and Science‖, Pearson/PHI, 2002.



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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS823**
Course Name	**Software Defined Network**
Course Credits	**3(L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview: Software-defined networking (SDN) is an approach to designing, building, and managing networks that separates the network's control (brains) and forwarding (muscle) planes to better optimize each.

2.Prerequisite:. SDN stands for Software Defined Network which is a networking architecture approach. It enables the control and management of the network using software applications. Through Software Defined Network (SDN) networking behavior of the entire network and its devices are programmed in a centrally controlled manner through software applications using open APIs.

3.Objective of the Syllabus: To learn the fundamentals of software defined networks. ,understand the separation of the data plane and the control plane. study about the SDN Programming. To study about the various applications of SDN.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Analyze the evolution of software defined networks
CO2	Express the various components of SDN and their uses
CO3	Explain the use of SDN in the current networking scenario
CO4	Design and develop various applications of SDN
CO5	Learn about Data Center Orchestration

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5.Syllabus

UNIT I INTRODUCTION

History of Software Defined Networking (SDN) – Modern Data Center – Traditional Switch Architecture – Why SDN – Evolution of SDN – How SDN Works – Centralized and Distributed Control and Date Planes

UNIT II OPEN FLOW & SDN CONTROLLERS

Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts

UNIT III DATA CENTERS

Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE

UNIT IV SDN PROGRAMMING

Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications

UNIT V SDN

Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

TEXT BOOKS:

1. Paul Goransson and Chuck Black, —Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.
2. Thomas D. Nadeau, Ken Gray, —SDN: Software Defined Networks, O'Reilly Media, 2013.

REFERENCES:

1. Siamak Azodolmolky, —Software Defined Networking with Open Flow, Packet Publishing, 2013.
2. Vivek Tiwari, —SDN and Open Flow for Beginners‖, Amazon Digital Services, Inc., 2013.
3. Fei Hu, Editor, —Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS824**
Course Name	**Neural Network and its Application**
Course Credits	**4(L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview:

This course will introduce Neural Networks as computational models that mimic the complex functions of the human brain. The neural networks consist of interconnected nodes or neurons that process and learn from data, enabling tasks such as pattern recognition and decision making in machine learning. The article explores more about neural networks, their working, architecture and more.

2.Prerequisite: Basic knowledge of mathematics, including algebra, calculus, and probability. Proficiency in programming, especially in languages such as Python or R.Familiarity with machine - learning concepts, including supervised and unsupervised learning, overfitting, and bias/variance trade-off.A strong foundation in computer science principles, such as data structures and algorithms

3.Objective of the Syllabus: This Unit examines mathematical and computational fundamentals of artificial neural networks and their applications in signal and image processing, pattern recognition and modelling. Basic knowledge of vectors and matrices is assumed. Introduction to AI .tudents should be able to apply the concept of Neural Networks into different domains of AI, Data Mining etc.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Understand the basic operation of the neurons in the brain. Describe the basic elements of an artificial neuron
CO2	Understand the various learning methods and Neural Network architectures.
CO3	Design and computer the parameters of perceptron neural network ,adaline and madaline neural networks, a multilayer neural network with the backpropagation algorithm.
CO4	Understand the main factors involved in learning and generalization in neural networks.
CO5	Design and implement multilayer neural network with the backpropagation algorithm with

5.Syllabus:

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UNIT-I Basic concepts of Neurocomputing :

Artificial Neural Networks (ANN) and their biological roots and motivations. ANNs as numerical data/signal/image processing devices. Encoding (training phase) and decoding (active phase).Taxonomy of neural networks: feedforward and recurrent networks with supervised and unsupervised learning laws. Static and dynamic processing systems. Basic data structures: mapping of vector spaces, clusters, principal components.

UNIT-II Basic terminology related to an artificial neuron :

a summing dendrite, synapses and their weights, preand post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions.

UNIT-III The Perceptron and its learning law.

Classification of linearly separable patterns, Structure and learning of perceptrons, Pattern classifier - introduction and Bayes' classifiers, Perceptron as a pattern classifier. Perceptron convergence, Limitations of a perceptrons. Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms, Practical and design issues of back propagation learning, Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettalk.

UNIT-IV Self-Organizing systems :

Unsupervised Learning. Local learning laws. Generalised Hebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis --- Karhunen-Loeve transform.

UNIT-V Competitive Learning : MinNet and MaxNet networks. Clustering. Learning Vector Quantisation. Codebooks. Application in data compression. Fuzzy Neural Networks- Neuro-fuzzy systems, Background of fuzzy sets and logic, Design of fuzzy stems, Design of fuzzy ANNs.

Reference Book:

1. Simon Haykin, Neural Networks -- a Comprehensive Foundation, Prentice Hall, 2nd ed., 1999 2. Andrew P. Paplinski -- Lecture notes: ~app/CSE5312

3. H. Demuth, M. Beale, Neural Network Toolbox User's Guide. For use with MATLAB, The MathWorks Inc, (file:/sw/matlab/help/fulldocset.html from Unix workstations)

4. Martin T. Hagan, H. Demuth, M. Beale, Neural Network Design,

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BERAUTI, NEPURA, BIHARSHARIF, NALANDA, BIHAR-803115.
School of Engineering & Technology.
Department of Computer Science & Engineering.

Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS-825**
Course Name	**NATURAL LANGUAGE PROCESSING**
Course Credits	**4(L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview: It enables computers to comprehend, generate, and manipulate human language. Natural language processing has the ability to interrogate the data with natural language text or voice.

2.Prerequisite: Fundamental concepts of deep learning, including neural networks and their training processes.

3.Objective of the Syllabus: To learn the fundamentals of natural language processing , understand the use of CFG and PCFG in NLP , understand the role of semantics of sentences and pragmatics & To apply the NLP techniques to IR applications.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	To tag a given text with basic Language features
CO2	To design an innovative application using NLP components.
CO3	To implement a rule based system to tackle morphology/syntax of a language
CO4	To design a tag set to be used for statistical processing for real-time applications
CO5	To compare and contrast the use of different statistical approaches for different types of NLP applications

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5.Syllabus

UNIT I

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures

UNIT IV

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V

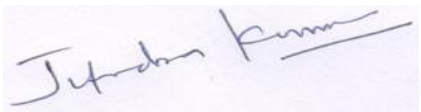
Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python‖, First Edition, O_Reilly Media, 2009.

REFERENCES:

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, —Natural Language Processing with Java‖, O_Reilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval‖, Oxford University Press, 2008.



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Programme Structure	**B. Tech (Computer Science & Engineering))**
Subject Code	**ETCS826**
Course Name	**Parallel Algorithms**
Course Credits	**4(L)**
Total Course Credit	**181**

Abbreviations: T-Theory

1.Course Overview: Parallel computing is the study and process of using algorithms to make multiple computers solve computational problems simultaneously.

2.Prerequisite:. C programming language, Data structures and algorithms

3.Objective of the Syllabus: To understand the concepts Parallel Computers, Data and Temporal Parallelism.,To learn Structures of Parallel Computers.To understand the concepts of Operating Systems for ParallelComputers.

4.Course Outcomes:

S.No.	Course Outcomes(Cos)
CO1	Solve the Problems in Parallel.
CO2	Have knowledge on Different Structures of Parallel Computers.
CO3	Understand the Performance Evaluation of Parallel Computers.
CO4	Get acquaintance on CUDA.

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CO5	Develop Parallel Programs In CUDA C.

5.Syllabus

UNIT 1

Inroduction:

Why do we Need High Speed Computing, How do we Increase the Speed of Computers , History of Parallel Computers. **Solving problems in parallel:** Utilizing Temporal Parallelism , Utilizing Data Parallelism , Comparison of Temporal and Data Parallel Processing , Data Parallel Processing with Specialized Processors.

UNIT 2

Structure of parallel computers: A Generalized Structure of a Parallel Computer, Classification of Parallel Computers, Vector Computers, A Typical Vector Super Computer, Array Processors, Shared Memory Parallel Computers, Distributed Shared Memory Parallel Computers, Message Passing Parallel Computers.

UNIT 3

Operating systems for parallel computers: Resource Management , Process Management , Process Synchronization , Inter-process Communication , Memory Management , Input/output (Disk Arrays) , Basics of Performance Evaluation , Performance Measurement Tools.

UNIT 4

Computer unified device architecture: The age of parallel processing, The rise of GPU computing, CUDA, Applications of CUDA, Development Environment-CUDA Enabled Graphics Processors, NVIDIA Device driver, CUDA Development Tool kit, Standard C compiler.

UNIT 5

CUDA C:

Introduction to CUDA C: First program, Querying Devices, Using Device Properties, **Parallel Programming in CUDA C:** CUDA Parallel Programming- Summing Vectors program

Text Books

1. Parallel Computers Architecture and Programming, V. Rajaraman, C. Siva Ram Murthy,PHI.
2. CUDA By Example, Jason Sanders, Edward Kandrot, Addison_Wesley.

References

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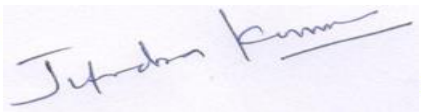
1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Pearson Education.
2. Parallel Computing Theory and Practice, Michel j.Quinn



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