VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD-31

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SYLLABUS BOOK FOR
B.E (CIVIL) III and IV SEMESTER
UNDER CBCS WITH EFFECT FROM 2025–2026
(For the students admitted in 2024-25)

DEPARTMENT OF CIVIL ENGINEERING

+91-40-23146010, 23146011
Fax: +91-40-23146090
Website: www.vce.ac.in

DEPARTMENT MISSION

"To strive for excellence in order to make the students better citizens with technical knowledge andsocial awareness"

DEPARTMENT VISION

"To impart knowledge in the latest technologies to the students of civil engineering to fulfil the growing needs of the society."

Institution Vision

"Striving for a symbiosis of technological excellence and human values."

Institution Mission

"To arm young brains with competitive technology and nurture holistic development of the individuals for a better tomorrow."

Department Vision

To strive for excellence in order to make the students better citizens with technical knowledge and social awareness

Department Mission

To impart knowledge in the latest technologies to the students of civil engineering to fulfil the growing needs of the society.

Program Educational Objectives (PEOs):

1. To provide a better understanding of basic sciences and fundamentals of civil engineering.

2. To develop competence in latest technologies to serve the industry or pursue higher studies.

3. To inculcate professionalism with effective communication skills and ethical values.

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

1. Understand various concepts of basic engineering sciences and mathematics to learn advanced concepts of Civil Engineering and apply them to practical problems.

2. Apply principles of various specializations of Civil engineering including structural engineering, transportation engineering, environmental engineering, water resources engineering and Geotechnical engineering to tackle engineering problems.

3. Acquire knowledge of ethical practices, communication skills, technical report writing skills and collaborative effort leading to lifelong learning.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-24)
BE (CIVIL ENGINEERING) III-SEMESTER ACADEMIC YEAR 2025-2026
(Students Admitted in 2024-25)

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
U24HS020EH	Human Values and Professional Ethics-II	1	-	-	2	40	30	1
U24HS320EH	Skill Development Course-I (Communication Skills-I)	1	-	-	2	40	30	1
U24BS330MA	Skill Development Course-II (Aptitude-I)	1	-	-	2	40	30	1
U24HS350EH	Critical thinking	1	-	-	2	40	30	1
U24BS310MA	Transform Techniques and Partial Differential Equations	3	-	-	3	60	40	3
U24ES310CE	Programming for Civil Engineering	3	-	-	3	60	40	3
U24PC310CE	Strength of Materials – I	3	-	-	3	60	40	3
U24PC320CE	Surveying	3	-	-	3	60	40	3
U24OEXXXX	Open Elective-I	2	-	-	3	60	40	2
PRACTICALS								
U24ES311CE	Programming for Civil Engineering Lab	-	-	2	3	50	30	1
U24PC311CE	Surveying Lab	-	-	2	3	50	30	1
U24PC321CE	Computer Aided Drafting Lab	-	-	2	3	50	30	1
Student should complete one NPTEL (8 weeks) certificate course equivalent to 2 credits by the end of VI-Semester								
Total		**18**	**-**	**6**		**610**	**410**	**21**
Grand Total		**24**				**1020**		
Note: The left over hours are to be allotted to ECA-I / Sports / Library / Mentor Interaction /CC/RC/TC/PDC based on the requirement.								

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS),
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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

HUMAN VALUES AND PFOFESSIONAL ETHICS-II

(Common to all branches)

SYLLABUS FOR III- SEMESTER

L: T: P (Hrs/Week):1:0:0	SEE Marks: 40	Course Code:U24HS020EH
Credits:1	CIE Marks: 30	Duration of SEE: 2 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to:	At the end of the course, students will be able to:
1. Create an awareness on the interrelation between Society, Ethics and Human Values 2. Understand how ethical dilemmas apply to real life scenarios 3. Develop ethical human conduct and professional competence 4. Understand the role of good ethical practices and apply it in a project	1. Identify ethical risks in everyday life and in societies that can lead to unethical choices, such as structures that diffuse responsibility or a group that has collectively de-stigmatized unethical behaviour 2. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, and the objective presentation of data. 3. Assess their own ethical values and the social context of problems and articulate what makes a particular course of action ethically defensible 4. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

UNIT-I: Normative Ethics & Societal Ethics: This unit deals with normative ethics, the branch of moral philosophy, or ethics, concerned with criteria of what is morally right and wrong. It includes the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like. This unit also covers societal ethics which is the systematic reflection on the moral dimensions of social structures, systems, issues, and communities.

1.1 Ethical Decision-Making Frameworks
1.2 Emerging Ethical Challenges
1.3 Building a Just Society

UNIT-II: Professional Ethics-Need For Ethical Codes: This unit covers the code of Professional Ethics- it is designed to ensure that students learn the necessary skills that groom them to behave like employees should, one that is socially acceptable and respectful of one another. It establishes the rules for behavior and sends a message to every employee that universal compliance is expected.

2.1 The Importance of Ethical Conduct
2.2 Personal & Professional Accountability
2.3 Maintaining Public Confidence
2.4 Understanding Ethical Codes

UNIT-III: Privacy: This unit covers "Cyber ethics" - the code of responsible behavior on the Internet. Just as we are taught to act responsibly in everyday life with lessons such as "Don't take what doesn't belong to you" and "Do not harm others," we must act responsibly in the cyber world as well.
The basic rule is "Do not do something in cyberspace that you would consider wrong or illegal in everyday life."

3.1 Defining Privacy
3.2 Privacy in the Digital Age
3.3 The Ethics of Surveillance

UNIT-IV: Engineering Ethics for Future Innovators: This unit equips students, the future innovators of tomorrow, with a foundation in engineering ethics. Students will explore the ethical responsibilities engineers hold regarding safety, public well-being, and sustainability. Real-world scenarios and case studies will be examined to understand how ethical considerations impact engineering decisions.

4.1 Safety and Public Welfare
4.2 Sustainability and Environmental Impact
4.3 The Ethics of New Technologies

MODE OF DELIVERY

● Questionnaires ● Quizzes ● Case-studies ● Observations and practice ● Home and classroom assignments	● Discussions ● Skits ● Short Movies/documentaries ● Team tasks and individual tasks ● Research based tasks ● Project

Relevant Websites, CD's and Documentaries

- https://plato.stanford.edu/

Learning Resources:

1. Learn.talentsprint.com
2. Moral Machines: Ethical Robotics and Artificial Intelligence by Wendell Wallach
3. Thinking Like an Engineer: Studies in the Ethics of a Profession by Paul Dufour
4. Engineering Ethics: Contemporary and Enduring Debates by Deborah G. Johnson
5. Engineering Ethics: Concepts and Cases by Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, Ray James, and Elaine Englehardt
6. Akash Singh Rathore - On Constitution

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

SKILL DEVELOPMENT COURSE I-COMMUNICATION SKILLS IN ENGLISH-I

(Common to all branches)

SYLLABUS FOR III- SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks: 40	Course Code: U24HS320EH
Credits:1	CIE Marks: 30	Duration of SEE: 2 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to:	At the end of the course, students will be able to:
1. Get students proficient in both receptive and productive skills especially 2. Enable students to understand the importance and method of exchanging information in a formal space- both written and spoken 3. Introduce students to an ideal structure for a presentation and discussion- individually and in groups 4. Develop and improve reading skills needed for college work and reproduce the content based on the situational need.	1. Introduce themselves effectively and converse in a formal environment especially in the online space 2. Write emails with appropriate structure and content 3. Use appropriate structure based on the content employing appropriate transitions in written and spoken communication. 4. Paraphrase and Summarise in Spoken and written formats

UNIT-I:Delight ful Descriptions: Participants learn to introduce themselves confidently, make detailed observations, express opinions, and describe past experiences effectively in various contexts.

1.1 Introductions on an Online Forum

1.2 Making Observations and Giving Opinion

1.3 Recalling and Describing

UNIT-II: Formal Conversation Skills: Focuses on essential professional communication skills such as seeking and providing information, giving constructive feedback, and politely requesting permissions in formal settings.

2.1 Ask for Information

2.2 Give Information

2.3 Give Feedback
2.4 Seek Permission

UNIT-III: Technical Expositions and Discussions: Develops skills to present and discuss technical content logically using structures like classification, sequencing, comparison, cause-effect relationships, and problem-solution formats.
3.1 Classification
3.2 Sequence
3.3 Compare and Contrast
3.4 Cause and Effect
3.5 Problem and solution

UNIT-IV: Rational Recap: Enhances clarity in communication through accurate paraphrasing and summarizing, both in spoken and written forms, ensuring message retention and understanding.
4.1 Paraphrasing - Written
4.2 Summarizing - Written
4.3 Paraphrasing – Spoken
4.4 Summarizing – Spoken

METHODOLOGY	**ASSESSMENTS**
- Case Studies	- Online assignments
- Demonstration	- Individual and Group
- Presentations	
- Expert lectures	
- Writing and Audio-visual lessons	

Learning Resources:
1. They Say / I Say: The Moves That Matter in Academic Writing" – Gerald Graff & Cathy Birkenstein
2. HBR Guide to Persuasive Presentations" – Harvard Business Review
3. Technical Communication" – Mike Markel & Stuart Selber
4. The Only Academic Phrasebook You'll Ever Need" – Luiz Otávio Barros
5. learn.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	20
2	No. of Assignments	: 2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	: 2	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		: 90 Minutes			

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
SKILL DEVELOPMENT COURSE-II APTITUDE- I
(Common to all branches)

SYLLABUS FOR B.E.2/4- III SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks : 40	Course Code :U24BS330MA
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the learners to:	**At the end of the course the learners will be able to: -**
1. Students will be trained to enhance their employability skills. 2. Students will be introduced to higher order thinking and problem solving skills in the following areas - Arithmetic Ability, Numerical Ability and General Reasoning. 3. Students will be trained to work systematically with speed and accuracy while problem solving. 4. Students will be trained to apply concepts like percentages and averages to solve complex problems. 5. Students will be trained to use effective methods like elimination of options and shortcuts to solve problem accurately.	1. Solve questions in the mentioned areas using shortcuts and smart methods. 2. Understand the fundamentals concept of Aptitude skills. 3. Perform calculations with speed and accuracy. 4. Solve complex problems using basic concepts. 5. Use shortcuts with ease for effective problem solving.

UNIT 1: QUANTITATIVE APTITUDE - NUMERICAL ABILITY

1.1 Introduction to higher order thinking skills
1.2 Speed Math
1.3 Number systems
1.4 LCM & HCF

UNIT 2: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY FOUNDATION

2.1 Ratio proportions
2.2 Partnership

2.3 Ages
2.4 Allegations and mixtures
2.5 Averages

UNIT 3: QUANTITATIVE APTITUDE- WORD PROBLEMS PART 1

3.1 Percentages
3.2 Profit and loss

UNIT 4: REASONING ABILITY- GENERAL REASONING PART 1

4.1 Blood Relations
4.2 Number Series
4.3 Coding and decoding

UNIT 5: QUANTITATIVE APTITUDE- WORD PROBLEMS PART 2

5.1 Time and Work
5.2 Chain Rule
5.3 Pipes and Cisterns

Prescribed textbook for theory:

1. Quantitative Aptitude S.CHAND by Dr. R S Aggarwal
2. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading

1. Learn.talentsprint.com/References Courses
2. Quantitative Aptitude Disha Publications
3. LOGICAL Reasoning Disha Publications

The break-up of CIE: Internal Tests + Assignments + Quizzes

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3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

CRITICAL THINKING

(Common to all branches)

SYLLABUS FOR III- SEMESTER

L: T: P (Hrs/Week):1:0:0	SEE Marks: 40	Course Code: U24HS350EH
Credits:1	CIE Marks: 30	Duration of SEE: 2 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to:	At the end of the course, students will be able to:
1. Understand the basics of logic, reasoning, and identifying biases. 2. Learn to evaluate evidence and differentiate between facts and opinions. 3. Introduce frameworks like SWOT and root cause analysis for problem-solving. 4. Develop critical thinking skills through case studies and ethical debates.	1. Students will identify assumptions, biases, and logical fallacies in real-world scenarios. 2. Learn to evaluate evidence and differentiate between facts and opinions. 3. Students will apply structured methods to analyze problems and propose actionable solutions. 4. Students will demonstrate critical thinking through group discussions and case study analyses.

OVERVIEW: In a world where automation and AI are rapidly transforming the workforce, critical thinking has become a vital human skill that sets professionals apart. This course empowers engineering students to think independently, evaluate information logically, and make well-reasoned decisions. Through engaging with real-world problems, ethical dilemmas, and structured problem-solving tools, students will develop the ability to question intelligently, respond thoughtfully, and contribute meaningfully in AI-assisted environments.

UNIT-I: Fundamentals of Critical Thinking: Introduces the foundations of logical thinking and the importance of recognizing faulty reasoning.

1.1 Logic and Reasoning

1.2 Identifying Assumptions

1.3 Bias and Fallacies

Learning Outcomes:

- Understand and apply the basics of logical thinking and structured reasoning
- Identify personal and systemic assumptions in real-world and technical contexts
- Detect common biases and fallacies in digital content and AI-generated outputs

UNIT-II: Analytical Thinking: Equips students to analyze information critically and draw conclusions based on solid evidence.
2.1 Evaluating Evidence
2.2 Drawing Logical Conclusions
2.3 Differentiating Facts from Opinions

Learning Outcomes:

- Evaluate the reliability and relevance of data from human and AI sources
- Draw logical conclusions from complex and sometimes incomplete datasets
- Differentiate between subjective opinions and objective, verifiable information

UNIT-III: Problem-Solving Frameworks: Builds practical decision-making skills using structured, human-driven analytical tools.
3.1 Root Cause Analysis (5 Whys)
3.2 Decision Trees
3.3 SWOT Analysis

Learning Outcomes:

- Break down problems systematically to identify core issues beyond surface symptoms
- Use structured tools to support decision-making in multidisciplinary and tech-enabled environments
- Integrate strategic thinking with ethical judgment when proposing solutions

UNIT-IV: Applications of Critical Thinking: Applies critical thinking to real-life contexts through discussions, debates, and case studies.
4.1 Case Studies
4.2 Group Discussions on Ethical Dilemmas
4.3 Critical Thinking in Action: Debating Complex Engineering Issues

Learning Outcomes:

- Apply critical thinking to analyze real-world problems in engineering, business, and society
- Collaborate effectively and respectfully in group settings, including diverse viewpoints
- Demonstrate ethical reasoning and informed argumentation in AI-influenced scenarios

LEARNING RESOURCES

1. Learn.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

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Duration of Internal Tests		:	90 Minutes			

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

TRANSFORM TECHNIQUES & PARTIAL DIFFERENTIAL EQUATIONS

(Common to Civil, EEE and Mechanical branches)

SYLLABUS FOR III- SEMESTER

L: T: P (Hrs/Week):3:1:0	SEE Marks: 60	Course Code: U24HS310MA
Credits:4	CIE Marks: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to:	At the end of the course, students will be able to:
1. Understand the definition and properties of the Laplace transforms. 2. Understand the definition and properties of the inverse Laplace transforms and its applications to Initial Value Problems. 3. Study the concept of Fourier series and its applications. 4. Learn the formation Partial Differential Equations and solution of linear and non-linear first order partial differential equations. 5. Study the applications of Partial Differential equations.	1. Evaluate Laplace transform of functions and apply Laplace transforms to evaluate integrals. 2. Find Inverse Laplace transforms of functions and apply the Laplace transform to solve linear differential equations. 3. Compute Fourier coefficients and find Fourier series of a function. 4. Formulate the Partial differential equations and solve the linear and non-linear first order Partial differential equations. 5. Solve the one-dimensional wave equation, one-dimensional heat equation.

UNIT-I: Laplace Transforms: Introduction to Laplace transforms - Existence of Laplace Transform - Properties of Laplace Transform - First shifting theorem - Second shifting theorem - Change of scale property - Differentiation of Laplace transform - Integration of Laplace Transform - Laplace Transform of Derivatives - Laplace Transform of Integrals.

UNIT-II: Inverse Laplace Transforms: Introduction to Inverse Laplace transforms - Properties of Inverse Laplace Transform-First shifting theorem - Second Shifting theorem -Change of scale theorem - Multiplication with s - Division by s –Convolution Theorem (without proof)- Applications- Solving

Linear Ordinary Differential Equations with constant coefficients upto 2nd order.

UNIT–III: Fourier Series: Introduction to Fourier series-Conditions for existence of Fourier expansion – Functions having points of discontinuity – Change of Interval - Fourier series expansions of even and odd functions-Half-Range Sine and Cosine series.

UNIT-IV: Partial Differential Equations: Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange's Equation - Non-linear first order equations – Standard Forms.

UNIT-V: Applications of Partial Differential Equations: Method of Separation of Variables - One Dimensional Wave Equation- One Dimensional Heat Equation (Homogeneous condition).

Learning Resources:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, Dr.B.S.Grewal 40th Edition, Khanna Publishers.
3. Advanced Engineering Mathematics, Kreyszig E, 8th Edition, John Wiley & Sons Ltd, 2006.
4. A text book of Engineering Mathematics by N.P. Bali & Manish Goyal, Laxmi Publication.
5. https://onlinecourses.nptel.ac.in/noc24_ma17/preview
6. https://onlinecourses.nptel.ac.in/noc24_ma37/preview

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMMING FOR CIVIL ENGINEERING

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U24ES310CE
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSEOBJECTIVES	**COURSEOUTCOMES** On completion of the course, students will be able to
1. Acquire problem solving skills. 2. Develop flow charts. 3. Understand structured programming concepts. 4. Write programs in C Language.	1. Design flow charts and algorithms for solving a given problem using the fundamentals of programming. 2. Apply decision making, looping constructs and functions to develop programs for a given problem. 3. Store data using arrays and perform searching operation on the data. 4. Design programs on string handling and operations on arrays using dynamic memory management techniques.

UNIT-I: Introduction to C Language: Creating and Running Programs, Flow charts. Number Systems (Binary, Octal, Decimal and Hexadecimal), Identifiers, Data types, Variables, Constants, Input / Output, Expressions, Precedence and Associatively, Evaluating Expressions, Type Conversion, Statements, Operators.

UNIT-II: Selection: simple if, if-else, else if ladder, nested if and switch – case.
Repetition: Introduction to Loops, while, for, do-while Statements, Loop Examples, break, continue, goto.
Functions: Designing Structured Programs, Functions Basics, User Defined Functions, Inter-Function Communication, Standard Functions, Scope, Storage Classes-Auto, Register, Static, Extern, Scope Rules. Recursive Functions

UNIT-III: Arrays: Concepts, One-Dimensional Arrays in C, Array Applications: Linear Search and Binary Search, Two-Dimensional Arrays, Applications: matrix operations

UNIT-IV: Pointers: Introduction, Pointers for Inter-Function Communication, Pointer Arithmetic. Introduction to dynamic memory allocation
Character handling functions: input, output character handling functions, built in character handling functions
Strings: Introduction to strings, Input and Output operations using scanf (), printf(), gets(), puts().String library functions: strlen(), strcpy(), strcat(), strcmp(), strlwr(), strupr(), strrev(); basic programs using string library functions, Array of strings.

UNIT-V: Structure: Definition and Initialization of Structures, Accessing Structures, Arrays of Structures, Structures and Functions, Unions.
Pre-processor Directives: Types of pre-processor directives, examples.

Learning Resources:

1. Forouzan B.A &Richard F. Gilberg, A Structured Programming Approach using C, 3rdEdition (2013), CengageLearning.
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2ndEdition (2015),Prentice-Hall.
3. RajaramanV, The Fundamentals of Computer, 4th Edition (2014), Prentice-Hall of India
4. Steve Oualline, Practical C Programming, 3rdEdition (2006), O'Reilly Press.
5. Jeri R.Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 6thEdition (2009), Pearson Education.
6. BalagurusamyE, Programming in ANSIC, 11thEdition (2024),TMG.
7. Gottfried,Programming with C,10th Edition (2018), TMH.
8. RGDromey,How to Solve it by Computer,1st Edition (2006), Pearson Education.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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DEPARTMENT OF CIVIL ENGINEERING

STRENGTH OF MATERIALS–I

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):3:0:0	SEE Marks:60	Course Code: U24PC310CE
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will:	Upon the completion of course students will be able to:
1. Examine and interpret basic concepts of Strength of materials and analyze statically determinate and indeterminate structures. 2. Analyze simple beams subjected to various types of loading and plot shear force and bending moment diagrams and compute bending stresses. 3. Define and analyze shear stresses in beams and plot shear stress distribution across cross section of beams 4. Define and analyze problem of columns subjected to direct and bending stresses 5. Define the concepts of compound stresses and strains in beams and also Investigate the behaviour of thin cylinder, spherical shells and thick cylinders	1. Express understanding of the basic concepts and principles of Strength of materials and solve problems of composite sections, statically determinate and indeterminate structures. 2. Construct shear force and bending moment diagrams for beams and compute stresses and strains in bending and shear in the cross section of beams subjected to transverse loading. 3. Compute direct and bending stresses in columns and beams subjected to eccentric loading. 4. Identify and interpret the governing equation for compound stress and strains and compute the principal stress and strains 5. Compute stresses in thin cylinders, spherical shells and thick cylinders subjected to internal and external pressure.

UNIT-I: **Simple Stresses and Strains:** Definitions, types of stresses and strains. SI units, and notation. Hooke's law, modulus of elasticity, stress-strain curves for mild steel and typical engineering materials.Ductile and brittle materials.Working stress and factor of safety.Deformation of bars under axial

loads; prismatic and non-prismatic bars.Deformations due to self-weight.Bars of uniform strength.Poisson's ratio; volumetric strain and restrained strains.Relationship between elastic constants.Compound bars and temperature stresses.Statically indeterminate problems in tension and compression.

UNIT-II: Shear Force and Bending Moment: Definitions. Different types of beams and loads; shears force and bending moment diagrams for cantilever and simply supported beams with and without overhangs subjected to different types of loads viz., point loads, uniformly distributed loads, uniformly varying loads and couples. Relationship between loading, shear force and bending moment.

UNIT-III: Bending Stresses in Beams: Theory of simple bending. Moment of resistance, Elastic section modulus of section. Stresses in beams of various cross sections; flitched beams.
Shear Stresses in Beams: Distribution of transverse shear stresses over rectangular, circular, triangular, I- and T- sections.

UNIT-IV: Direct and Bending Stresses: Distribution of stresses over symmetrical sections under combined axial load and bending moment. Cores of solid and hollow circular and rectangular sections.
Compound stresses and strains: Principal stresses. Ellipse of stress.Mohr's circle for biaxial stresses. Principal strains. Introduction to failure theories.

UNIT-V: Thin Cylinders and spherical shells: Thin Cylinders subjected to internal fluid pressure; wire wound cylinders & shells
Thick Cylinders: Stresses under internal and external pressure. Compound cylinders.

Learning Resources:

1. Ferdinand P. Beer, E. Russell Johnston , John T. Dewolf, Mechanics of Materials, 2022.
2. Ramamrutham S., Narayanan R., Strength of Materials, Dhanpat Rai Publishing Company, New Delhi, 2022.
3. Bansal R.K., A text book of Strength of Materials, Laxmi Publications, New Delhi, 2025.
4. Rajput R.K., Strength of Materials, S.Chand Publications, New Delhi, 2016.
5. Junnarkar S.B., Mechanics of Structures (Vol-I & II), Charotar Publishing House, Anand, 2022.

6. Pytel and Singer F.L., Strength of Materials, Harper & Row, New York, 2015.
7. Subramanian R., Strength of Materials, Oxford University Press, 2018.
8. Hibbeler.R., Mechanics of Materials, Pearson Publishers, 2019.
9. Bhavikatti.S.S, Strength of Materials, Vikas Publishers, 2018.
10. NPTEL Course (www.nptel.ac.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
SURVEYING

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):3:0:0	SEE Marks:60	Course Code: U24PC320CE
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will	Upon the completion of this course students will be able to
1. Learn the basic concepts and use of surveying in Civil Engineering 2. Understand the measurement techniques and equipment used in land surveying such as chain/tape, compass, and level with respect to equipments used, methods, errors and analysis of data 3. Acquire knowledge on use of theodolite and total station equipment, its adjustments, measurements, methods employed, errors and computation of data. 4. Study the modern techniques in surveying with GPS, aerial photogrammetry, remote sensing,	1. Employ basic surveying operations and computations for measurement of distances and angles using chain/tape and compass for the given site conditions in field 2. Apply the principles of leveling to measure elevations of objects with respect to known points and prepare contour maps. 3. Interpret the principles of measurement of angles with theodolite and total station, make traverse computations and solve for omitted measurements in traverse . 4. Compute the parameters required for setting out simple circular curve, reverse curve, compound curves and introduce the concepts of transition curves and vertical curves required for layout of roads and railways 5. Apply the concepts of modern tools such as GPS, Remote sensing and aerial photogrammetry for measurement of details on surface of earth and relate to civil engineering problems

UNIT-I: Introduction to Surveying: Surveying Objectives, Plane and Geodetic surveying, Principle of surveying, Classification of surveys.
Distance Measurement: Chains and Tapes, Ranging.

Compass Surveying: Measurement of direction and angles. Types of compass, meridians and bearings, Magnetic declination, Dip, local attraction.

UNIT-II: Levelling: Definitions and principles of levelling, Terms used in levelling, booking and reduction of levels. Fly levelling, Longitudinal leveling, Cross-section leveling, and Reciprocal leveling. Errors in levelling; curvature and refraction corrections.
Contouring: Definition and characteristics of contours, Direct and indirect methods of contouring, Interpolation of contours, Uses of contours.

UNIT-III: Theodolite and Total station surveying: Introduction to theodolite and total station, Electronic distance measurement concepts, Measurement of horizontal and vertical angles, Measurement of distances, Introduction to total station – Concepts, capabilities and functions
Traversing and Computations: Methods of traversing, Checks in open and closed traverse, Computation of latitude and departures, consecutive and independent coordinates, closing error and its adjustment by Bowditch method, Transit rule and Graphical method. Gale's traverse table, omitted measurements in traverse and their computations.

UNIT-IV: Curves: types of curves, elements of curves, setting of simple curves using linear and angular methods. Compound curves – Elements – Solution to different cases. Reverse curves – Parallel straights and Non-parallel straights. Introduction toTransition curves, Vertical curves

Unit V :**Advanced Surveying** : Introduction to remote sensing, Elements of remote sensing, Spectral reflectance, GPS- Overview of GPS, Segments of GPS , working principle of GPS/DGPS, Errors in GPS, Photogrammetry – Basic definitions, scale of a vertical photograph, Introduction to UAV systems - classification and applications

Learning Resources:
1. Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, Surveying, Vol. 1 and 2, Laxmi Publications, 2025.
2. Arora K.R., Surveying, Vol.1, 2 and 3, Standard Publishers Distributors, 2023.
3. Duggal S K, Surveying Volume 1 and 2, Fifth edition, Mc. Graw Hill Education Pvt Ltd 2025.

4. Kanetker T.P. and Kulkarni S.V., Surveying and Levelling, Pune VidyarthiGruhaPrakshan, Pune, 2014.
5. Venkatramaiah C., A Text Book of Surveying, University Press, Hyderabad, 2021.
6. Surveying Theory and Practia, James, M Anderson and Edward M., Tata Mc Graw Hill, 2024.
7. Advanced Surveying: Total Station, GPS, GIS and Remote Sesnign, Gopi Satheesh, R Sathi Kumar, N.Madhen, Pearson education, 2017, 2nd edition.
8. NPTEL course - Surveying course by Prof Bharat Lohani, IIT Kanpur - http://www.nptelvideos.in/2012/11/surveying.html
9. NPTEL course – Digital land Surveying and mapping course by Dr.Jayanta K Ghosh, IIT Roorkee - https://nptel.ac.in/courses/105/107/105107158/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMMING FOR CIVIL ENGINEERING LAB

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : U24ES311CE
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Write, compile and debug programs in C.	1 Choose appropriate data type for implementing programs in C language.
2 Formulate solution to problems and implement in C.	2 Design and implement modular programs involving input output operations, decision making and looping constructs.
3 Effectively choose programming components to solve computing problems.	3 Implement search operation on arrays.
	4 Implement programs on string handling.
	5 Design and implement programs to store data in structures.

Programming Exercise:

1. Finding maximum and minimum of given set of numbers.
2. Finding roots of a quadratic equation.
3. Basic calculator program using switch-case statement.
4. Sin x values using series expansion.
5. Generating pyramid of numbers.
6. Recursion: factorial, Fibonacci.
7. Linear search and binary search.
8. Generating Pascals triangle.
9. Matrix addition, multiplication and transpose using arrays.

10. String copy, palindrome, concatenation .
11. Programs on structures and unions.

Learning Resources:

1. YashavanthKanetkar, "Let us C", 16th Edition, BPB Publications, 2018.
2. BalagurusamyE, Programmingin ANSI C, 11th Edition, TMG, 2024.
3. ReemaTharaja "Introduction to C Programming", Second Edition, OXFORD Press,2016.
4. J.R. Hanly and E.B. Koffman"Problem Solving and Program Design in C", 7th Edition, Pearson education, 2012.
5. PradeepDey and ManasGhosh, "Programming in C", Oxford Press, 2nd Edition, 2017.
6. https://www.tutorialspoint.com/cprogramming/index.htm
7. https://onlinecourses.nptel.ac.in/noc18-cs10/preview.

No. of Internal Tests: 01 Max. Marks for Internal Test: 12
Marks for assessment of each experiment 18
Duration of Internal Test: 2 Hours

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
SURVEYING LAB

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U24PC311CE
Credits: 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course students will be able to
1. Develop skills for applying classroom knowledge to field problems and handling of surveying tools such as chain, compass, Autolevel, theodolite, GPS and Total station.	1. Locate the objects, measure the distances and area and transfer the same on to the drawings 2. Use conventional surveying tools such as chain, compass, autolevel, theodolite and Total station in the field of civil engineering. 3. Practice working as a team member and lead a team 4. Plan a survey appropriately with the skill to understand the surroundings using Total Station and Theodolite. 5. Demonstrate professional behavior in conducting the experiments and present the results effectively

LIST OF EXPERIMENTS:

1. Practice of direct and indirect ranging and measuring the distance using Chain.
2. Traversing by using Compass – plotting and adjustments.
3. Introduction to leveling- flyleveling using auto level
4. Profile leveling using auto level
5. Measurement of horizontal angles by repetition & Reiteration method using Theodolite.

6. Traversing by using Theodolite – Distribution of errors using gales Traverse table
7. Setting of simple curve by Theodolite.
8. Introduction to Total Station and Applications-The introduction includes setting up of Total Station over a station, input values: Measurement of Horizontal & Vertical distance using Total Station
9. Determination of area enclosed in closed traverse having minimum 5 station. Plot the measured values using a AUTOCADD
10. Setting out works using Total Station – Staking out.
11. Determining the RL of the point using Trigonometric levelling.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18

Duration of Internal Test: 2 Hours

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
COMPUTER AIDED DRAFTING LAB

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U24PC321CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to:	*Upon the completion of this course students will be able to*
1. Develop skills to generate civil engineering drawings using a drafting software. 2. Learn various tools and functions of the drafting software.	1. Understand functional planning & orientation of the buildings. 2. Navigate the drafting software user interface. 3. Learn basic tools of the software. 4. Apply the fundamental features of drafting software in a practical situation. 5. Prepare civil engineering drawings in a detailed and visually impressive way.

LIST OF EXPERIMENTS

1. **Building Planning & Orientation:** Functional planning of buildings and Orientation of the building for ventilation.
2. **CAD:** Introduction to Computer Aided Drafting, Advantages and Disadvantages of CAD, List of CACED Software. Introduction and feature of drafting software.
3. **Environment of drafting software:** Workspace, Application Menu, Quick Access Toolbar, Ribbon, Search for information, Pull-down menu, Status bar, Function keys.
   Coordinate systems: absolute and relative, Cartesian and polar coordinate systems.
4. **Basic Managing/ Display control Tools:** New, Save, new, Open, Close, Quit/ Exit, Undo, Redo, Limits, Units, Zoom, Pan, Steering Wheel, View Cube etc.
   Basic Drafting Tools: Line, Polylines, Point, Circle, Arc, Spline, Ellipse, Rectangle, Polygons, Text, Hatch.

5. **Editing/ Inquiry Tools:** Erase, oops, Move, Copy, Mirror, Rotate, Scale, Fillet, Chamfer, Trim, Extend, Break, Join, Stretch, Offset, Array, Distance, Radius, Angle, Area, Volume.
6. **Dimensioning Tools:** Linear, Aligned, Radius, Diameter, Centre, Angular, Baseline, Continuous, Ordinate, Arc Length, Jogged Radius Dimension, Dimension Space, Dimension Break, Inspection Dimension, Multileader and its Style.
7. **Layer Tools:** Concepts and use of Layers in drafting software, drawing, Adding New layers, Editing and Managing Layers, List Properties, Use of Different Types of lines and their weightages.
   Block/W-block and Attributes: Concept and Significance of Blocks in drafting software Drawings, Creating Blocks, Editing and Managing Blocks
8. Drawing of Plans, Elevations and Sections of various types of single StoreyResidentialBuildings.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18

Duration of Internal Test: 2 Hours

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-24)
BE (CIVIL ENGINEERING) III-SEMESTER (Bridge Course) ACADEMIC YEAR 2025-2026
(Students Admitted in 2024-25)

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
UB24ES340CE	Mechanics for Engineers	2	-	-	3	50	-	-
UB24BS300MA	Foundation to Engineering Mathematics	2	-	-	3	50	-	-

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

MECHANICS FOR ENGINEERS

(Common to Civil, Mechanical and EEE)

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks: 50	Course Code: UB24ES340CE
Credits: - - -	CIE Marks: ---	Duration of SEE: 3Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	At the end of the course, students will be able to:
1. Understand the concepts of dynamics and its principles. 2. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, fixed axis rotation of rigid bodies. 3. Impart the concepts of work-energy meDthod and its applications to translation and rotation. 4. Impart the concept of impulse momentum relation	1. Distinguish between statics and dynamics and differentiate between kinematics and kinetics. 2. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear and rotatory motion in rigid body motion. 3. Solve problems using work energy equations for translation and fixed axis rotation. 4. Solve problems using impulse momentum equation

UNIT–I: Kinematics of Particle: Rectilinear motion, Curvilinear motion, Projectile motion, Velocity and acceleration.

UNIT–II: Kinematics of Rigid Bodies: Types of rigid body motion, and its analysis of fixed axis rotation.

UNIT-III: Kinetics of Particle: Analysis as a particle, Dalemberts Principle and its applications

UNIT-IV: Kinetics of Rigid Bodies: Analysis as a rigid body in translation, Fixed axis rotation

UNIT –V: Work Energy: Principles of work-energy and its application to translation.

Impulse and momentum: Introduction, linear impulse-momentum, principle of conservation of linear momentum, loss of kinetic energy.

Learning Resources:

1. Singer F.L "Engineering Mechanics", Harper & Collins, Singapore, 3rd Edition 2023.
2. Timoshenko S.P and Young D.H., J V Rao, Sukumar Patil, "Engineering Mechanics (SI Units)", McGraw Hill, 5th edition.2013.
3. Andrew Pytel, JaanKiusalaas, "Engineering Mechanics", Cengage Learning, 4th edition, 2016.
4. Beer F.P & Johnston E.R Jr. "Vector Mechanics for Engineers", TMH, 12th edition, 2019.
5. Hibbeler R.C Sharma D P & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2012.
6. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
7. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press,2nd edition, 2014.
8. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 4th edition, 2008.
9. NPTEL Course (www.nptel.ac.in)
10. Virtual labs (www.vlab.co.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

FOUNDATION TO ENGINEERING MATHEMATICS

BRIDGE COURSE (Common to all branches)

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks: 50	Course Code: UB24BS300MA
Credits: - - -	CIE Marks: ---	Duration of SEE: 3Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	At the end of the course, students will be able to:
1. Study the concepts of vector differentiation, Directional derivative, Divergence and Curl of a vector point function. 2. Understand the concepts of Descriptive Statistics. 3. Learn the basics of Set theory, Permutations and Combinations and Probability. 4. Understand the concept of Rank of a matrix, Echelon form, System of Linear Equations and Eigen Values and Eigen Vectors.	1. Solve problems on fitting of a straight line to the given data and also to find co-efficient of correlation and to determine regression lines and their application problems. 2. Apply the concepts of Descriptive Statistics to calculate Mean, Median, Mode, Measures of Dispersion, Mean Deviation and Standard Deviation. 3. Solve the problems on Permutations, Combinations and Probability. 4. Compute the Rank of a matrix and Eigen values and Eigen vectors of a matrix.

UNIT–I: Calculus: Differentiation of standard functions (Formulae) - Partial Derivatives – Scalar and Vector point functions -Vector Differentiation-Level Surfaces-Gradient of a scalar point function- Normal to a level surface-Directional Derivative – Divergence and Curl of a Vector field -Solenoidal and Irrotational vector

UNIT–II: Descriptive Statistics: Mean-Median-Mode-Measures of Dispersion: Range-Mean Deviation-Standard Deviation

UNIT–III: Basics of Probability: Basics concepts of set theory- Permutations & Combinations - Random event & Experiment-Sample space - Classical definition of Probability - Axioms of probability.

UNIT–IV: Matrices: Rank of matrix- Echelon form - System of Linear Equations- Consistency of Homogeneous and Non-homogeneous system of equations- Eigen values and EigenVectors.

Learning Resources:

1 Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2 Higher Engineering Mathematics, Dr.B.S. S Grewal 40th Edition, Khanna Publishers.
3 Fundamentals of Mathematical Statistics, S. C. Gupta, V.K. Kapoor, S Chand & Sons

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN B.E. III SEMESTER

Dept	Course Code	Name of the Course	Stream Type	Stream Name	credits
Civil	U24OE310CE	Green Buildings	General	-	2
CSE	U24OE310CS	Introduction to Python Programming	General	-	2
CSE	U24OE320CS	Programming Essentials in Python	Stream	AI&ML	2
ECE	U24OE310EC	Mathematical Programming for Engineers	General	-	2
EEE	U24OE310EE	Non Conventional Energy Sources	General	-	2
IT	U24OE310IT	Fundamentals of Python Programming	General	-	2
IT	U24OE320IT	Computing using Python	Stream	AI&ML	2
Mech.	U24OE320ME	Fundamentals of Unmanned Aerial Vehicles	General	-	2
Mech.	U24OE310ME	Introduction to Industrial Robotics	Stream	Robotics	2
Chemistry	U24OE310CH	Corrosion Science and Technology	General	-	2
Physics	U24OE310PH	Fundamentals of smart materials and applications	General	-	2
H&SS	U24OE370EH	Introduction to Journalism	General	-	2

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

GREEN BUILDINGS (OPEN ELECTIVE-I)

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:60	Course Code: U24OE310CE
Credits: 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course the students will be expected to:
1. Learn the principles of planning and orientation of buildings. 2. Environmental implications of natural and building materials along with green cover 3. Acquire knowledge on various aspects of green buildings	1. Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting. 2. Analyse the aspects of energy, water and waste management in buildings. 3. Understand the concepts of green building technologies. 4. Understand rating systems of GRIHA IGBC and LEED.

UNIT-I: Planning of buildings: Principles of planning, Relevant building bylaws, site selection for buildings, orientation of buildings, Provision of rain water harvesting

UNIT-II: Building-Energy-Implications: Environmental implications of buildings energy, carbon emissions, water use, waste disposal; Building materials: sources, methods of production and environmental Implications. Green building materials and recycling, Green cover and built environment

UNIT-III: Green Building Technologies: Introduction- Necessity - Concept of Green building. Principles of green building – Site selection criteria for Green Buildings – effective cooling and heating systems – effective electrical systems-Passive solar architecture - effective water conservation systems

UNIT-IV: Certification Systems: Certification systems- Green Rating for Integrated Habitat Assessment (GRIHA), Indian Green Building Council (IGBC) and Leadership in Energy and Environmental Design (LEED), case studies

Learning Resources:

1. Kumara Swamy N.Kameswara Rao A., Building Planning And Drawing, Charotar, Publications, 2013.
2. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
3. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.
5. Mili Majumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
6. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2009.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:		90 Minutes		

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

INTRODUCTION TO PYTHON PROGRAMMING

(OPEN ELECTIVE-I)

(Common for Civil, ECE, EEE & MECH)

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks : 60	Course Code :U24OE310CS
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Acquire problem solving skills	1 Design python programs using arithmetic expressions and decision making statements
2 Learn programming and solve problems using Python language	2 Design modular python programs using functions 3 Develop programs using strings and list 4 Develop programs using tuples and dictionaries

UNIT-I: **Introduction to Python**: Variables, expressions and statements, order of operations
Conditionals: Modulus operators, Boolean expressions, logical operators, conditional execution, alternative executions, chained conditional, nested conditional
Iteration: while statement

UNIT-II: Functions: Function calls, type conversion and coercion, mathematical functions, User-defined functions, parameters and arguments. Recursion

UNIT-III: Strings: string length, string traversal, string slices and string comparison with examples, strings are immutable, find function, string module
List: list values, accessing elements, list traversal, list length, list membership, list and for loop, list operations with examples

UNIT-IV: **Tuples**: Mutability, tuple assignment, tuple as return values
Dictionaries: dictionary operations, dictionary methods, aliasing and copying, counting letters using dictionaries

Learning Resources:

1. Downey A, How to think like a Computer Scientist :Learning with Python, 1st Edition(2015), John Wiley
2. Lambert K.A, Fundamentals of Python –First Programs, 1st Edition(2015), Cengage Learning India
3. Perkovic L, Introduction to Computing using Python,2/e, (2015), John Wiley
4. Stewart Venit and Elizabeth Drake, Prelude to Programming: Concepts and Design, 6th Edition(2015),Pearson India
5. Mark J Guzdial, Introduction to Computing and programming in Python, 3rdEdition(2013), Pearson India
6. Allen Downey, Think Python, 2nd Edition(2015),Shroff Publisher Orielly
7. http://nptel.ac.in/courses/117106113/34
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/
9. www.scipy-lectures.org/intro/language/python_language.html

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD–500 031

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROGRAMMING ESSENTIALS IN PYTHON

Stream - Artificial Intelligence & Machine Learning

(OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks : 60	Course Code :U24OE320CS
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Acquire problem solving skills 2 Learn programming and solve problems using Python language	1 Design python programs using arithmetic expressions and decision making statements 2 Design modular python programs using functions 3 Develop programs using strings and list 4 Develop programs using tuples and dictionaries

UNIT-I: **Introduction to Python**: Variables, expressions and statements, order of operations
Conditionals: Modulus operators, Boolean expressions, logical operators, conditional execution, chained conditional, nested conditional
Iteration: while statement

UNIT-II: Functions: Function calls, Type conversion and coercion, mathematical functions, User-defined functions, parameters and arguments. Recursion

UNIT-III: Strings: string length, string traversal, string slices and string comparison with examples, strings are immutable, find function, string module
List: list values, accessing elements, list traversal, list length, list membership, list and for loop, list operations with examples

UNIT-IV: **Tuples**: Mutability, tuple assignment, tuple as return values
Dictionaries: dictionary operations, dictionary methods, aliasing and copying, counting letters using dictionaries

Learning Resources:

1. Downey A, How to think like a Computer Scientist :Learning with Python, 1st Edition(2015), John Wiley
2. Lambert K.A, Fundamentals of Python–First Programs, 1st Edition (2015), Cengage Learning India
3. Perkovic L, Introduction to Computing using Python,2/e, (2015), John Wiley
4. Stewart Venit and Elizabeth Drake, Prelude to Programming: Concepts and Design, 6th Edition(2015),Pearson India
5. Mark J Guzdial, Introduction to Computing and programming in Python, 3rd Edition(2013), Pearson India
6. Allen Downey, Think Python, 2nd Edition(2015),Shroff Publisher Orielly
7. http://nptel.ac.in/courses/117106113/34
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/
9. www.scipy-lectures.org/intro/language/python_language.html

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	: 2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	: 2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	: 2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MATHEMATICAL PROGRAMMING FOR ENGINEERS

(General Pool: Open Elective - I)

(Common to Civil, CSE, AI&ML, EEE, IT, Mechanical)

SYLLABUS FOR B.E. III – SEMESTER

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U24OE310EC
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the basic environment and interface of MATLAB, including its windows, file types, and built-in help system. 2. To develop proficiency in MATLAB basics such as variables, arrays, vectors, matrices, and script/function file creation and execution. 3. To build programming skills using MATLAB, including understanding data types, control structures, loops, and debugging techniques. 4. To enable students to generate 2D and 3D plots and visualizations, using MATLAB's wide range of graphic functions. 5. To apply MATLAB for solving mathematical and engineering problems such as numerical integration, linear algebra, interpolation, and root finding.	On completion of the course, students will be able to 1. Demonstrate familiarity with the MATLAB environment, file handling, and basic operations including help utilities. 2. Create and manipulate matrices, vectors, and arrays using built-in functions and scripts in MATLAB. 3. Write and debug MATLAB programs using control structures, loops, and logical operations. 4. Generate and customize 2D and 3D plots for data visualization and analysis. 5. Solve mathematical problems using MATLAB, including linear and nonlinear equations, interpolation, differentiation, and numerical integration.

UNIT-I:Introduction: Basics of MATLAB,MATLAB windows, Advantages of MATLAB,on-line help, file types.

MATLAB Basics: Variables and Constants –Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating,Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if-else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB.

Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots-subplots-specialized 2D plots: stem-,bar, hist, pi, stairs, loglog, semilog,polar,comet 3D plots: Mesh,Contour,Surf,Stem3,ezplot.

UNIT - III : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, MATLAB functions for integration.

Linear Equations-Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigenvectors, Matrix factorizations.

UNIT - IV : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation.

Solution of Ordinary differential Equations(ODEs)-ODE Solvers in MATLAB, Solving First-order equations using ODE23 and ODE45.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxford publications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt. Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition-Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Math works.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siauw Alexandre Bayen,Elsevier-18th April 2014.
5. https://nptel.ac.in/courses/103106118/2
6. https://www.udemy.com/numerical-methods/

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2. No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

NON CONVENTIONAL ENERGY SOURCES (OPEN ELECTIVE-I)

SYLLABUS FOR B.E. III SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code:U24OE310EE
Credits:2	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES The course will enable the students to:	**COURSE OUTCOMES** On completion of the course, students will be able to
To provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state- of -the-art energy systems.	1. Demonstrate the generation of electricity from various Non-Conventional sources of energy and solar power generation 2. Illustrate the generation of energy from wind and generation of energy from waste 3. Demonstrate the generation of energy by biomass and fuel cells 4. Illustrate the ocean and geo thermal energy generation

UNIT-I: Introduction and Solar Energy: Introduction: Need for Non-conventional energy sources, Types of Non-Conventional energy sources. Renewable energy across the Global and in India. Renewable energy for rural applications, Renewable energy for urban, industrial and commercial applications

Solar Energy: Solar cell fundamentals: Semiconductors, Photovoltaic effect, Solar PV cell, module, panel, array, Solar cell operating characteristics: Voltage-current characteristic, energy losses, maximising the performance. Applications of solar energy, Solar energy program in India, Case study

UNIT-II: Wind Energy and Waste to Energy: Wind Energy: Nature of wind, Basic components of Wind Energy Conversion System(WECS), Power extraction from the wind, Applications of wind energy. Wind energy program in India, Case Study

Waste to Energy: Key issues, Waste recovery management, Case study

UNIT-III: Biomass Energy and Fuel Cells: BiomassEnergy: Definition, Bio fuels, Biomass resources, Biomass conversion technologies: Incineration-Thermo chemical conversion- Bio- chemical conversion. Advantages and disadvantages of biomass energy, Case study

Fuel Cells: Definition-Classification of fuel cells, Principle of operation, Hydrogen-oxygen fuel cell, Alkaline fuel cell, Proton exchange membrane fuel cell, Molten carbonate fuel cell, Solid oxide electrolyte cells, Comparison of fuel cells- Advantages and Disadvantages of fuel cells-Applications of Fuel cells. Case study

UNIT-IV: Ocean Energy and Geothermal Energy: Ocean Energy: Ocean thermal electric conversion (OTEC) methods: Open cycle and Closed cycle- Principles of tidal power generation-Advantages and limitations of tidal power generation, Case study

Geothermal Energy: Geothermal resources- Vapour dominated geothermal plant- Liquid dominated geothermal plant- Applications of Geothermal Energy, Case study

Learning Resources:

1. B H KHAN, Non-Conventional Energy Resources, McGraw Hill, 2nd Edition, 2009.
2. G. S. Sawhney, Non-Conventional Energy Resources, PHI Learning Pvt Ltd, 2012
3. ShobhNath Singh, Non-Conventional Energy Resources, Pearson, 2016
4. G.D. Rai, Non-Conventional Energy Sources ,Khanna Publishers, New Delhi, 2011.
5. Ashok Desai V, Non-Conventional Energy, Wiley Eastern Ltd, 1990.
6. Mittal K.M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, 1997.
7. Ramesh R, Kurnar K.U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 1997.

The break-up of CIE : Internal Tests+Assignments+Quizzes

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	30
2.	No. of Assignments	: 2	Max. Marks for each Assignment	:	5
3.	No. of Quizzes	: 2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests :90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031,

DEPARTMENT OF INFORMATION TECHNOLOGY

FUNDAMENTLAS OF PYTHON PROGRAMMING

(GENERAL POOL STREAM: OPEN ELECTIVE-I)
(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. III SEMESTER

L:T:P(Hrs./week):2:0:0	SEE Marks :60	Course Code:**U24OE310IT**
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course:	*On completion of the course, students will be able to*
Acquire problem solving skills for writing python scripts	1. Understand the fundamentals of python and implement control structures. 2. Understand basic knowledge on strings,lists and tuples. 3. Implement programs using dictionaries, and sets. 4. Implement OOP concepts in python.

UNIT – I: Basics of Python Programming: Features of Python, variables and identifiers, operators and expressions.
Decision control statements: Selection/Conditional branching statements,basic loop structures/iterative statements, nested loops, break, continue and pass statements.
Functions: Definition, function call, more on defining functions, recursive functions.

Unit – II: Strings: Introduction, accessing strings, basic operations, string slice, String function and methods, Regular Expressions,introduction to lists.
Tuples: Introduction, operations on tuples, packing and unpacking, nested tuples, tuple methods and functions.

UNIT – III: Set: Introduction, Set operations.
Dictionaries: Basic operations, sorting items, looping over dictionary, nested dictionaries, built-in dictionary functions.

UNIT – IV: OOPS Concepts: Introduction, classes and object, class method and self-argument, the __init__()method, class variables and object variables, public and private data members, Inheritance, Operator Overloading.
Files: Reading and writing files.

Learning Resources:

1. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly publications,2nd Edition.
2. Reema Thareja, "Python programming using problem solving approach ", Oxford university press.
3. Mark J Guzdial, Introduction to Computing and programming in Python, 3rd Edition (2013), Pearson India
4. https://onlinecourses-archive.nptel.ac.in/noc19_cs09/
5. http://nptel.ac.in/courses/117106113/34
6. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electricalengineering-and-computer-science-i-spring-2011/python-tutorial/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTING USING PYTHON

(AI&ML TRACK: OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. III SEMESTER

L:T:P(Hrs./week):2:0:0	SEE Marks :60	Course Code:U24OE320IT
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course:	*On completion of the course, students will be able to*
Acquire problem solving skills for writing python scripts	1. Understand the fundamentals of python and implement control structures. 2. Understand string, lists and tuples and perform the key operations on these data containers. 3. Implement dictionaries and set operations in python. 4. Implement OOP concepts in python.

UNIT – I: Introduction to Python: Features of Python, variables and identifiers, operators and expressions.
Decision making and repetition: if, if else, nested if-else and else if, while loops and for loops, nested loops, break, continue, pass
Functions: Definition, function call, more on defining functions, recursive functions.

Unit – II: Strings: Introduction, accessing strings, basic operations, string slice, String function and methods, Regular Expressions.
Lists: Introduction, Operations on lists, nested list, list methods, list comprehension.
Tuples: Introduction, operations on tuples, packing and unpacking, nested tuples, tuple methods and functions.

UNIT – III: Set: Introduction, Set operations.
Dictionaries: Basic operations, sorting items, looping over dictionary, nested dictionaries, built-in dictionary functions.

UNIT – IV: OOPS Concepts: Introduction, classes and object, class method and self-argument, the __init__()method, class variables and object variables, public and private data members, Inheritance, Operator Overloading.
Files: Reading and writing files, serialization using JSON and pickle

Learning Resources:

1. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly publications,2nd Edition.
2. Reema Thareja, "Python programming using problem solving approach ", Oxford university press.
3. Mark J Guzdial, Introduction to Computing and programming in Python, 3rd Edition (2013), Pearson India
4. https://onlinecourses-archive.nptel.ac.in/noc19_cs09/
5. http://nptel.ac.in/courses/117106113/34
6. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electricalengineering-and-computer-science-i-spring-2011/python-tutorial/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

FUNDAMENTALS OF UNMANNED AERIAL VEHICLES

(**General Pool**)
(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U24OE320ME
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE	**COURSE OUTCOMES**
	On completion of the course, students will be able to
The objective of this Course is to understand the features, basics of flight, manufacturing and analysis of UAV and Artificial Intelligence in UAV systems.	1. classify various types of UAVs, describe their characteristics, and analyze their applications. 2. illustrate, explain and interpret the fundamental concepts of aerodynamics relevant to flight vehicles. 3. fabricate, and analyse UAV components using appropriate tools and techniques. 4. identify, explain, and evaluate the role of Artificial Intelligence in UAV systems for autonomous operations.

UNIT-I: Introduction to UAV: UAV: Definition, History; Difference between aircraft and UAV; DGCA Classification of UAVs; Types and Characteristics of Drones: Fixed, Multi-rotor, and Flapping Wing; Applications: Defense, Civil, Environmental monitoring.

UNIT-II: Basics of Flight: Different types of flight vehicles; Components and functions of an airplane; Forces acting on Airplane; Physical properties and structure of the atmosphere; Aerodynamics – aerofoil nomenclature, aerofoil characteristics, Angle of attack, Mach number, Lift and Drag, Propulsion and airplane structures.

UNIT-III: Manufacturing and Analysis of UAV: Drone Manufacturing, Additive Manufacturing, Health Evaluation and Failsafe, Introduction to CAD; Design of UAV components; Structural Analysis using CAE; Aerodynamic Analysis using CFD; Manufacturing of the components of UAVs: 3D printing; Case studies;

UNIT-IV: Artificial Intelligence in UAV Systems: Components: Arms, motors, propellers, electronic speed controller (ESC), flight controller; Propulsion; Data Link; Sensors and Payloads: GPS, IMU, Light Detection and Ranging (LiDAR), Imaging cameras, Classification of payload based on applications; Hyper-spectral sensors; Laser Detection and Range (LADAR); Synthetic Aperture Radar (SAR); Thermal cameras; ultra-sonic detectors; Case study on payloads. Introduction to navigation systems and types of guidance; Mission Planning and Control.

Learning Resources:

1. Andey Lennon, "Basics of R/C Model Aircraft Design" Model Airplane News Publication
2. John Baichtal, Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs.
3. K Valavanis, George J Vachtsevanos, Handbook of Unmanned Aerial Vehicles, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.
4. DGCA RPAS Guidance Manual, Revision 3 – 2020

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO INDUSTRIAL ROBOTICS

(Stream: Robotics)

(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U24OE310ME
Credits :02	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE The objective of the course is to	**COURSE OUTCOMES** On completion of the course, students will be able to
study industrial robot components, configuration, sensors, drives, applications and programming through experiential learning.	1. explain configuration of industrial robots and summarize various applications. 2. interpret various elements of the industrial robots 3. Develop methodology to represent position and orientation of industrial robot links in spatial coordinate system. 4. classify various sensors used in industrial robots and interface between the human user and an industrial robot using various programming languages.

UNIT-I:Robot Basics: Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot configurations-cartesian, cylindrical, polar, articulated and SCARA. Parallel robots

Robot Applications: Application in industry – material handling, loading & unloading, processing, welding & painting, assembly and inspection

UNIT-II: Robot Elements: End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot joints types, Robot drive system types: Electrical, pneumatic and hydraulic.

UNIT-III: Robot Coordinate Systems: Coordinate frames, Rotation matrix, Euler angles, Roll pitch and yaw angle representation, Composite rotations, Homogeneous Transformation matrix.

UNIT-IV: Robot Sensors: Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors
Robot programming: On line programming, teach pendant control, Lead through, Walk through, off line programming, Task programming.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata Mc Graw-Hill Publishing Company Limited, 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata Mc Graw Hill Publishing Company Limited, 2010.
3. Klafter R.D, Chmielewski T.A, and Negin. M, "Robotic Engineering: An Integrated Approach",Prentice Hall of India Pvt. Ltd.,1994.
4. K.S. Fu, R.C. Gonzalez and C.S.G. Lee, "Robotics control, sensing, vision and intelligence", Tata Mc Graw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I. J. Nagrath"Robotics and Control", Tata Mc Graw-Hill Publishing Company Limited,2003.

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CHEMISTRY

CORROSION SCIENCE AND TECHNOLOGY
(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U24OE310CH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

OBJECTIVES	OUTCOMES
The course will enable the students :	**At the end of the course students should be able to:**
1. To acquaint with the causes of corrosion and different types of corrosion. 2. To understand the factors influencing corrosion and Controlling Corrosion by Inhibitors and Organic Coatings 3. To know various industrial methods like electroplating, electroless plating. 4. To familiarize with various preventive methods of corrosion such as cathodic protection and surface conversion.	1. Explain different types of corrosion with suitable examples 2. Discuss different factors that affect corrosion and protection by organic coatings and inhibitors. 3. Select a suitable metallic coating for corrosion control of the equipment in a given application 4. Discuss the principles and application of cathodic protection and surface conversion coatings for corrosion control

UNIT-I: Chemical and Electrochemical Corrosion: Introduction - gravity, cause**,** Chemical and Electrochemical corrosion - Mechanism, Pilling – Bed worth rule, effect of nature of oxide layer on rate of chemical corrosion, electrochemical series and galvanic series. Formation of anodic and cathodic areas, Galvanic corrosion, Differential aeration corrosion -pitting, water line corrosion & crevice corrosion, stress corrosion, corrosion fatigue.

UNIT-II: Corrosion Control Methods
INHIBITORS AND ORGANIC COATINGS

A. Factors influencing corrosion
Nature of metal: Relative position of metal in galvanic series, over voltage, relative areas of anode & cathode and nature of corrosion product.
Nature of environment: temperature, pH and humidity.

B. Corrosion Control by Inhibitors and Organic Coatings
Corrosion Inhibitors: Anodic, Cathodic and vapor phase inhibitors.
Organic Coatings: Paints – constituents and their functions, vitreous enamel coatings, varnishes and lacquers.

UNIT-III: Metallic Coatings: Passivation of metals, polarization curve of passivating metals, effect of pH and potential-pH diagram for iron (Pourbaix Diagram) and polarization curve of iron, application of Pourbaix diagram for corrosion mitigation.

Metallic coatings: Types - anodic & cathodic. Surface pre-treatment of base metal.

Methods of application of metallic coatings: Hot dipping- galvanization - applications of galvanized RCC steel bars. Cladding, electro plating & electroless plating- principle and their differences.
Electroplating of Cu coating on Fe, Electroless plating of Ni coating on Insulators, Preparation of PCB using Electroless plating.

UNIT-IV: Cathodic Protection and Surface Conversion: Cathodic protection: Principle, sacrificial anodic protection (SAP), impressed current cathodic protection (ICCP). Application of cathodic protection for bridges, ship hulls and underground pipelines.
Surface conversion coatings: Carburizing, Nitriding, Cyaniding.

Learning Resources:
1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. 3. O.G. PALANNA, Engineering Chemistry, TMH Edition.
4. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
5. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).

6. Principles and prevention of corrosion: Denny A Jones, Prentice Hall, 1996.
7. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993
8. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering corrosion Engineering: Mars G Fontana, Mc Graw Hill, 1987

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
Ibrahimbagh, Hyderabad-50031

DEPARTMENT OF PHYSICS

FUNDAMENTALS OF SMART MATERIALS AND APPLICATIONS
OPEN ELECTIVE COURSE

SYLLABUS FOR BE III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U24OE310PH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

Course Objectives	Course Outcomes
The student will be able to 1. To introduce various types of smart materials used in engineering. 2. Grasp the concepts of piezo and ferroelectric materials. 3. Learn fundamentals of pyro and thermoelectric materials 4. Gain knowledge on shape memory alloys	**the student should at least be able:** 1. Identify various smart materials and their significant applications. 2. Summarize various properties and applications of peizo and ferroelectric materials. 3. Apply fundamental principles of pyro and thermoelectricity in relevant fields of engineering. 4. Explain types of shape memory alloys and their properties and applications

UNIT-I: Introduction to Smart Materials: Characteristics of metals, polymers and ceramics. Introduction to smart materials, need for smart materials, Classification of smart materials, Components of a smart System, Applications of smart material, role of smart materials in developing intelligent systems and adaptive structures.

UNIT-II: Piezo and Ferro Electric Materials: Piezo electric effect and inverse piezoelectric effect, Piezo electric materials, Structure of Quartz crystal, piezoelectric oscillator, Magnetostriction, Magnetostriction oscillator, piezo-electric sensors, applications of Piezo-electric materials. Characteristics and properties of ferroelectric materials, Curie-Weiss law, applications of Ferro electric materials.

UNIT-III: Pyro and Thermo-Electric Materials: Pyro electricity: pyro electric effect, pyro electric materials, pyro-electric detector.

Thermoelectricity: thermoelectric effect, Seebeck effect, Peltier effect, thermocouple, Principle and working of thermoelectric generator and Thermoelectric cooler, applications of thermoelectric materials

UNIT IV: Shape Memory Materials: Introduction to shape memory alloys (SMA)- Shape Memory Effect (SME), Austenite, Martensite phases, Properties and characteristics SMAs**,** one-way and two-way shape memory effects, Properties of Ni-Ti shape memory alloy, Cu-based shape memory alloys, and their applications, Applications of SMAs.

Learning Resources:

1. Mukesh V. Gandhi, Brian S Smart Materials and Structures, Thompson, Springer, May- 1992
2. D. Patranabis, Sensors and Transducers, PHI Learning Pvt. Ltd., 2022
3. Nachiketa Tiwari, B. Bhattacharya, Smart Material, Adaptive Structures & Intelligent Mechanical systems

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD-50031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

INTRODUCTION TO JOURNALISM
(Common to all branches)

SYLLABUS FOR B.E. III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U24OE370PH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
What the course aims to achieve: 1. To introduce students to the fundamentals of journalism and mass communication. 2. To develop skills in news writing, reporting, editing, and media production. 3. To explore the role and responsibilities of media in society and democracy. 4. To familiarize students with different types of media—print, broadcast, digital, and social. 5. To instill ethical standards and legal awareness in media practices.	What students should be able to demonstrate after the course: 1. Explain key concepts, history, and theories of journalism and mass communication. 2. Create accurate, clear, and engaging content for various media platforms. 2. Critically analyze the role of media in shaping public opinion and policy. 3. Use appropriate tools and technologies in media production and dissemination. 4. Apply journalistic ethics and understand media laws in professional practice.

UNIT-I: Mass communication: Nature and Concept of Mass communication: Defining Mass Communication - Nature - Functions and Scope of Mass Communication - Mass Communication as Distinct from Other Forms of Communication - Mass Communication and Mass Media: Advantages and Limitations - Process of Mass Communication - Interactive Communication- Mass Communication in a Democratic (and Developing) Nation

UNIT-II: Mass Media and Society: Medium: Concept, Role and Functions – Scope of Media in the Indian Context – Classification of Media – Medium is

the Message – Mass Media – Society and Development – Media Scene in India – Media Reach

UNIT-III: Introduction to Journalism and Principles of Journalism: Journalism: Definition and Functions – Role, Nature and Scope of Journalism in the Indian Context (Democracy, Secularism and Development) - Press as Fourth Estate.
Journalism as Information & Communication – Objectivity - Comment is free, Facts are Sacred - Its Discontents, Truthfulness, Humanness, Social Responsibility, Social Good – Qualities of a Journalist – Duties and Responsibilities of Journalist – Code of Ethics

UNIT -IV: Types of Journalism (Media And Subject Specific): Media Specific: Print Journalism, Broadcast Journalism, Cyber Journalism, Investigative Journalism, Photo Journalism, Global Media Journalism, Yellow Journalism - Subject Specific: Development Journalism, Environmental Journalism, Civic Journalism, Lifestyle Journalism, Business Journalism, Sports Journalism and Health Journalism

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-24)
BE (CIVIL ENGINEERING) IV-SEMESTER ACADEMIC YEAR 2025-2026
(Students Admitted in 2024-25)

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
U24BS410MA	Numerical Methods, Probability and Statistics	3	-	-	3	60	40	3
U24BS430MA	Skill Development Course-III (Aptitude-II)	1	-	-	2	40	30	1
U24ES410CE	Principles of Data Structures for Civil Engineering	3	-	-	3	60	40	3
U24PC410CE	Strength of Materials – II	3	-	-	3	60	40	3
U24PC420CE	Concrete technology	3	-	-	3	60	40	3
U24PC430CE	Fluid Mechanics	3	-	-	3	60	40	3
U24PE410CE	Skill Development Course-IV (Technical Skills-I)	1	-	-	2	40	30	1
U24OEXXXXX	Open Elective-II	3	-	-	3	60	40	3
PRACTICALS								
U24ES411CE	Principles of Data Structures for Civil Engineering Lab	-	-	2	3	50	30	1
U24PC411CE	Strength of Materials Lab	-	-	2	3	50	30	1
U24PC421CE	Fluid Mechanics Lab	-	-	2	3	50	30	1
Student should complete one NPTEL (8 weeks) certificate course equivalent to 2 credits by the end of VI-Semester								
Total		**20**	**-**	**6**		**590**	**390**	**23**
Grand Total		**26**				**980**		
Note: The left over hours are to be allotted to CCA-I / Sports / Library / Mentor Interaction /CC/RC/TC/PDC based on the requirement.								

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

NUMERICAL METHODS, PROBABILITY AND STATISTICS

(Common to Civil, EEE & Mechanical Engg.)

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code : U24BS410MA
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	At the end of the course students will be able to:
1. Understand the concepts of interpolation and to learn various methods for interpolating data points and approximating functions. 2. Learn Numerical techniques for solving first-order ordinary differential equations. 3. Understand random variables and its probability distributions 4. Study the concept of hypothesis testing employed for small samples. 5. Understand the principles of curve fitting using the method of least squares and the concept of correlation.	1. Apply numerical methods to interpolate data points with equal and unequal intervals. 2. Use Numerical techniques to solve first-order ordinary differential equations. 3. Differentiate between discrete and continuous random variables and apply various probability distributions to solve practical problems 4. Formulate Null and Alternative Hypotheses and apply the tests of hypothesis for small samples. 5. Apply the method of least squares to fit various curves to the given data and Calculate Karl Pearson's coefficient of correlation.

UNIT–I: Interpolation: Finite Differences- Interpolation- Newton's Forward and Backward Interpolation Formulae – Interpolation with unequal intervals – Lagrange's Interpolation Formula – Divided differences – Newton's Divided difference formula.

UNIT–II: Numerical Solutions of ODE: Numerical Solutions of Ordinary Differential Equations of first order - Taylor's Series Method - Euler's Method – Modified Euler's Method - Runge-Kutta of 4^{th} order (without proofs)

UNIT-III: Probability Distributions: Random Variables - Discrete and Continuous Random Variables – Mass and density functions – Cumulative distribution functions - Definitions of Mean, Median, Mode and Variance of Probability distributions – Continuous Distributions - Normal Distribution – Properties.

UNIT-IV: Test of Hypothesis: Introduction -Testing of Hypothesis- Null and Alternative Hypothesis -Errors- -Level of Significance – Confidence Intervals- Tests of Significance for small samples - t-test for single mean - F- test for comparison of variances.

UNIT-V: Curve Fitting: Curve fitting by the Method of Least Squares- Fitting of Straight line-Second order curve (parabola)--Correlation – Karl Pearson's Co-efficient of Correlation.

Learning Resources:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, Dr.B.S. S Grewal 40th Edition, Khanna Publishers.
3. Probability, Statistics and Random Processes, T. Veera Rajan, Tata McGraw Hill Education Private Ltd.
4. Advanced Engineering Mathematics, Kreyszig E, 8th Edition, John Wiley & Sons Ltd, 2006.
5. A text book of Engineering Mathematics by N.P.Bali& Manish Goyal, Laxmi Publication.
6. Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand& sons, New Delhi.
7. https://onlinecourses.swayam2.ac.in/cec24_ma19/preview
8. https://onlinecourses.nptel.ac.in/noc24_ma39/preview

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031

DEPARTMENT OF MATHEMATICS

SKILL DEVELOPMENT COURSE-III (APTITUDE-II)

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):2 : 0 : 0	SEE Marks:40	Course Code: U24BS430MA
Credits: 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
APTITUDE	**APTITUDE**
1. Build further on aptitude skills and enhance employability skills	1. Solve questions in the mentioned areas using shortcuts and smart methods
2. Enhance higher order thinking skills and problem solving in the following areas - Arithmetic ability, Numerical ability and General reasoning	2. Understand the fundamentals concept of Aptitude skills
3. Train to work systematically with speed and accuracy while problem solving	3. Perform calculations with speed and accuracy

UNIT 1: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED

- Time speed and distance
- Boats and Streams
- Problems on trains

UNIT 2: REASONING ABILITY- LOGICAL REASONING

- Seating Arrangements- Linear; Circular; Complex
- Venn diagrams
- Syllogism
- Cubes & Cuboids
- Dices

UNIT 3: REASONING ABILITY- NON VERBAL REASONING

- Figure Series
- Directions
- Clocks
- Calendars

UNIT 4: QUANTITATIVE APTITUDE -

- Mensuration Part -1
- Mensuration Part -2
- Logarithms

UNIT 5: QUANTITATIVE APTITUDE

- Permutations and combinations
- Probability

METHODOLOGY ASSESSMENTS

- Demonstration
- Online assignments
- Presentations
- Individual and Group
- Expert lectures
- Audio-visual lessons

Learning Resources:

learn.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

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DEPARTMENT OF CIVIL ENGINEERING

PRINCIPLES OF DATA STRUCTURES FOR CIVIL ENGINEERING

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U24ES410CE
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	At the end of the course students will be able to:
1. Explain Basic linear and non-linear data structures and learn techniques of recursion 2. Explain concepts of Linked lists 3. Describe Concepts of Stacks and queues 4. Describe Concepts of Trees 5. Explain Concepts of Graphs and different sorting and searching	1. Understand the basic concepts of data structures. 2. Understand the different types linked lists 3. Implements stacks and queues 4. Implements tree transversal 5. Understand search and sorting techniques.

UNIT-I : Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time- space tradeoff.
Recursion: Introduction, format of recursive functions, recursion Vs. Iteration, examples.

UNIT-II: Linked Lists: Introduction, Linked lists and types, Representation of linked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays.

UNIT-III: Stacks and Queues: Introduction to stacks, applications of stacks, implementation, and comparison of stack implementations. Introduction to queues, applications of queues and implementations, Priority Queues and applications.

UNIT-IV: Trees: Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Representations of Trees, Tree Traversals, Binary search Tree.

UNIT-V: Searching and Sorting: Linear searching, binary Searching, sorting algorithms: bubble sort, selection sort, quick sort, merge sort.

Learning Resources:

1. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", Career Monk Publications, 2023
2. Horowitz E, Sahni S., and Susan Anderson-Freed," Fundamentals of Data structures in C", Silicon Pr; 2 edition, 2018
3. Reema Thareja, "Data Structures using C", 2nd edition, Oxford, 2014.
4. Kushwaha D. S. and Misra A. K, "Data structures A Programming Approach with C", 2nd edition, PHI, 2013.
5. Seymour Lipschutz," Data Structures with C", 2nd edition McGraw Hill Education,2017.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

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DEPARTMENT OF CIVIL ENGINEERING
STRENGTH OF MATERIALS – II

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: U24PC410CE
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will be able to	Upon the completion of this course students will be able to
1. Examine and interpret the deflection of simply supported, cantilever and overhanging beams 2. Analyze propped cantilevers, fixed and continuous beams for deflection, shear and bending moment 3. Locate shear centre and draw shear flow in simple sections. 4. Analyse torsion of circular shafts and analyse helical and bending springs and examine the concept of strain energy 5. Investigate the behaviour of columns and struts.	1. Express understanding of methods of double integration, conjugate beam and Mohr's theorems to solve problems of deflection of beams and construct shear force and bending moment diagrams 2. Determine shear centre for simple sections. 3. Compute the torsional shear stress across the cross section of circular shafts. 4. Compute stresses in helical springs and compute strain energy in bars subjected to axial and flexural deformation 5. Compute the axial and bending stresses in columns using various formulae

UNIT-I:**Deflections:** Slope and deflection by the double integration method for cantilever and simply supported beams, and beams with overhangs carrying point loads, uniformly distributed and varying load over entire span. Moment area method for single beams having different moment of inertia.

UNIT-II: Propped Cantilevers: Cantilever beams on elastic and rigid props for point loads and uniformly distributed loads. Bending moment and shear force diagrams, and deflections.

Fixed Beams: Determination of shear force, bending moment, slope and deflection in fixed beams with and without sinking of supports for point loads, uniformly distributed loads, and uniformly varying load over entire span. SFD, BMD - Elastic curve.

UNIT-III: Continuous Beams: Determination of moments in continuous beams with and without sinking of supports by the theorem of three-moments; bending moment and shear force diagrams. Elastic curve.

UNIT-IV: Torsion: Theory of torsion in solid and hollow circular shafts; shear stress, angle of twist, strength and stiffness of shafts. Transmission of power. Combined torsion and bending with and without end thrust. Determination of principal stresses and maximum shear stress.Equivalent Bending Moment and Twisting Moment.
Springs: Close and open coiled helical springs under axial load and axial twist.

UNIT-V: Strain Energy: Strain energy of resilience in determinate bars subjected to gradually applied loads and impact loads. Resilience of beams.Castigliano's theorem and its applications to beams.Theorem of reciprocal deflections.
Columns and struts: Euler's theory. Rankine – Gordan's formula, straight-line formula, effect of end conditions, slenderness ratio, eccentrically loaded columns, and Secant and Perry's formulae.

Learning Resources:

1. Ramamrutham S., Narayanan R., "Strength of Materials", Dhanpat Rai Publishing Company, New Delhi, 2022.
2. Bansal R.K., A text book of "Strength of Materials", Laxmi Publications, New Delhi, 2025.
3. Rajput R.K., "Strength of Materials" S.Chand Publications, New Delhi, 2022.
4. Junnarkar S.B., "Mechanics of Structures" (Vol-I & II), Charotar Publishing House, Anand, 2022.
5. Pytel and Singer F.L., "Strength of Materials", Harper & Row, New York, 2018.
6. Subramanian R., "Strength of Materials", Oxford University Press, 2020.
7. Ferdinand P. Beer, E. Russell Johnston Jr, John T. Dewolf, David F.Mazurek, "Mechanics of Materials", 2024.
8. NPTEL Course (www.nptel.ac.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

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DEPARTMENT OF CIVIL ENGINEERING
CONCRETE TECHNOLOGY

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):3 : 0 :0	SEE Marks:60	Course Code: U24PC420CE
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

Course objectives	Course Outcomes
Objectives of this course are to	Upon completion of this course the students will be expected to:
1. Learn the properties of concrete in its fresh state and hardened state. 2. Design the concrete mixes using admixtures by different methods. 3. Learn the properties and applications of different types of special concretes.	1. Understand the properties of concrete in its fresh state 2. Understand the properties of concrete in its hardened state 3. Design the concrete mixes by I.S. and ACI methods. 4. Use chemical and mineral admixtures in making concrete of desired properties. 5. Identify different types of special concretes for specific use.

UNIT-I: Constituents of Concrete: Types of cements and their composition. Tests on various properties of aggregates.
Properties of fresh Concrete: Mixing and batching. Workability, factors effecting workability, various tests procedures. Segregation and bleeding. Vibration of concrete. Types of vibrators and their influence on composition. Analysis of fresh concrete.

UNIT-II: Properties of Hardened Concrete: Strength of concrete. Water cement ratio., Gelspaceratio. Effective water in the mix. Short term and long term properties of concrete Tests and procedure, Influence of various parameters on strength of concrete. Relationship between various mechanical strength of concrete. Non-destructive testing methods-codal provisions for NDT. Curing of concrete. Maturity concept. Stress-strain curves on concrete.

UNIT-III: Mix design of concrete: Basic considerations, Parameters of mix design. Factors in the choice of mix proportions and their influence. Quality control. Various methods of mix design. I.S. Code method and ACI methods.

UNIT-IV: Admixtures used in concrete: Classification of admixtures. Chemical and mineral admixtures. Influence of various admixtures on properties of concrete. Applications, Concept of ready mixed concrete. Fly ash concrete-properties and proportion of fly ash, applications; Recycled aggregates concrete.

UNIT-V: Special Concrete: High strength concrete, High performance concrete, Light weight concrete, High density concrete. Self-compacting concrete- their specialties and applications.
Fibre Reinforced Concrete: Need for Fibre reinforced concrete (FRC) Mechanism of FRC, types of fibres, fibre shot concrete.

Learning Resources:

1. Shetty M.S., and Jain.A.K, Concrete Technology, 8th edition,S.Chand& Company, 2019.
2. Neville A.M., and Brooks.J.J., Concrete technology, 2nd edition , pearson paper back, 2019
3. Mehta P.K., and Paulo J.M.M., Concrete-Microstructure-Properties and Material, 4th edition,McGraw Hill Education, 2017.
4. Krishnaraju N., Design of Concrete Mixes, 5th edition, CBS Publishers, 2018
5. Gambhhir M.L., Concrete Technology, 5th edition, McGraw Hill Education , 2017.
6. Santhakumar , A.R.,Concrete Technology, 2nd edition, Oxford University Press, 2018.
7. IS: 456-2000, Indian standard code of practice for plain and reinforced concrete, Bureau of Indian standards
8. IS:10262-2019, Indian standard code of practice for design of concrete mixes, Bureau of Indian standards

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
FLUID MECHANICS

SYLLABUS FOR B.E.IV-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks:60	Course Code: U24PC430CE
Credits: 3	CIE Marks:40	Duration of SEE : 3Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will	Upon the completion of this course students will be able to
1. Learn the properties of fluids 2. Apply the laws of conservation of mass, energy and momentum for fluid flow. 3. Assess the phenomenon of flow in pipes and boundary layer	1. Compute properties of fluid and discuss about fluid statics 2. Understand various aspects of Fluid kinematics 3. Formulate equations based on conservation of mass, energy and momentum. Analyse forces on nozzles and describe devices use for discharge. 4. Compute Reynolds number, formulate equations for laminar and turbulent flow through pipes and water hammer in pipes. 5. Explain growth and separation of boundary layer and evaluate drag & lift forces for various shapes of bodies in a medium

UNIT-I: **Fluid Properties:** Definition of fluid, properties of fluids, density, specific weight, specific volume, specific gravity, bulk modulus, vapour pressure, viscosity. Newton's law of viscosity and its applications.Capillarity and surface tension.
Measurement of Pressure: Piezometer and U tube Manometers. Bourdon Gauge.Absolute pressure and Gauge pressure.

Hydro Statics: Pascal law, buoyancy, metacentre and metacentric Height, Total pressure and centre of pressure on Horizontal plane and vertical plane surfaces.

UNIT-II: **Fluid Kinematics:** Classification of fluid flow; steady, unsteady, uniform, non- uniform, one, two and three-dimensional flows, Rotational and irrotational flows.Concepts of streamline, stream tube, path line and streak line.Law of mass conservation.Continuity equation from control volume and system analysis. Stream function and velocity potential function.Convective and local acceleration, flow net and its uses.

UNIT – III: Fluid Dynamics: Body forces and surface forces. Euler's equation of motion in three dimensions.
Law of Energy Conservation: Bernoulli's equation from integration of Euler's equation. Significance of the Bernoulli's equation, limitations, modifications and application to realfluid flows, venture meter and orifice meter.
Impulse Momentum Equation: Application of the impulse momentum equation to evaluate forces on nozzles and bends.Vortex flow; forced and free vortex.
Measure of Discharge in Free Surface Flows: Notches and weirs.

UNIT-IV: Flow through Pressure Conduits: Reynold's experiment and its significance. Upper and lower critical Reynold's Numbers. Critical velocity, Hydraulic gradient and Engergy gradient line.Laminar flow through circular pipes.Hagen – Poiseuille equation.Charateristics of turbulent flow.Head loss in pipes.Darcy – Weisbach equation.Friction factor. Moody's diagram. Minor losses. Pipes in series and pipes in parallel. Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden valve closure.

UNIT-V: Boundary layer: Boundary layer growth and separation, methods to control separation, drag and lift forces, drag on airfoil and sphere, Principle of streamlining. Displacement, energy & momentum thickness streamlined body and bluff body, Magnus effect.

Learning Resources:

1. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics including Hydraulics Machines, Standard Book House, Delhi, 2019.
2. Bansal R.K., A Textbook Of Fluid Mechanics And Hydraulic Machines, Laxmi Publications, 2018.
3. Ojha C.S.P., Berndtsson R., Chandramouli P.N., Fluid Mechanics and Machinery, Oxford University Press, 2012.

4. Rajput R.K., Fluid Mechanics and Hydraulic Machines, S. Chand & Co., 2013.
5. K Srinivasa Raju and D Nagesh kumar, " Fluid Mechanics problem solving using MATLAB" Prentice Hall of India, 2020
6. NPTEL Course (www.nptel.ac.in)
7. MIT Open Course Ware: *Fluid Dynamics*, https://ocw.mit.edu/courses/2-06-fluid-dynamics-spring-2013/

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests	: 2	Max. Marks for each Internal Test		: 30
2	No. of Assignments	: 3	Max. Marks for each Assignment		: 5
3	No. of Quizzes	: 3	Max. Marks for each Quiz Test		: 5
Duration of Internal Tests			:	90 Minutes	

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DEPARTMENT OF CIVIL ENGINEERING
SKILL DEVELOPMENT COURSE-IV (TECHNICAL SKILLS-I)

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):1:0:0	SEE Marks:40	Course Code: U24PE410CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

INTRODUCTION TO MAT LAB

1. **Getting Started with MATLAB**
   Navigate the desktop, Editor and Command Window
   Work with variables, arrays and matrices
   Basic arithmetic and matrix operations

2. **Scripts, Functions & Control Flow**
   Writing scripts vs. functions
   Input/output arguments
   Conditional statements
   Loops

3. **Data I/O & Visualization**
   Importing/exporting, Excel files
   Basic plotting (plot, scatter, histogram)
   Customizing plots (labels, legends, styles)

4. **Supervised Learning: Regression**
   Dataset splitting (train/test), cross-validation
   Evaluation metrics (MSE, accuracy, confusion matrix)
   Linear regression (fitlm)
   Visualizing model fits

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests	: 1	Max. Marks for each Internal Test		: 30
2	No. of Assignments	: -	Max. Marks for each Assignment		: -
3	No. of Quizzes	: -	Max. Marks for each Quiz Test		: -

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

PRINCIPLES OF DATA STRUCTURES IN CIVIL ENGINEERING LAB

SYLLABUS FOR B.E. IV-SEMESTER
(COMMON FOR CIVIL & MECH)

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : U24ES411CE
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	At the end of the course student will be able to:
Design and implement abstractions of various data structures and their practical applications.	1. Perform operations on vanous abstractions like stacks, queues, linked lists. 2. Implement problems involving trees. 3. Choose the right data structure based on the requirements of the problem.

1. Menu driven program that implements Stacks using arrays for the following operations
   a) create b)push c)pop d) peek
2. Implementation of Infix to Postfix Conversion and evaluation of postfix expresstion.
3. Menu driven program that implements Queues using arrays for the following operations
   a)create b)insert c)delete d) display
4. Menu driven program that implements Circular Queues for the following operations
   a)create b)Insert c)delete d) display
5. Implementation of Singly Linked List, Stack using Singly Linked List, Queue using Singly Linked List.
6. Implementation of polynomial operations using Linked List.
7. Implementation of Doubly Linked List, Circular linked list.

8. Implementation of Operations on Binary Tree (Insert, Delete, Level Order, Search)
9. Implementation of Recursive and Iterative Traversals on Binary Trees
10. Implementation of Operations on Binary Search Tree.
11. Implementation of Quick Sort.
12. Implementation of merge Sort.

Learning Resources:

1. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", Career Monk Publications, 2023
2. Horowitz E, Sahni S., and Susan Anderson-Freed," Fundamentals of Data structures in C", Silicon Pr; 2 edition, 2018
3. Reema Thareja, "Data Structures using C", 2nd edition, Oxford, 2014.
4. Kushwaha D. S. and Misra A. K, "Data structures A Programming Approach with C", 2nd edition, PHI, 2013.
5. Seymour Lipschutz," Data Structures with C", 2nd edition McGraw Hill Education,2017.

No. of Internal Tests: 01 Max. Marks for Internal Test: 12
Marks for day-to-day laboratory class work 18
Duration of Internal Test: 2 Hours

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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DEPARTMENT OF CIVIL ENGINEERING
STRENGTH OF MATERIALS LAB

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 0 : 0 : 2	SEE Marks:50	Course Code: U24PC411CE
Credits: 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to:	*Upon the completion of this course students will be able to*
1. Determine the properties of materials under the action of various loads.	1. Determine Young's Modulus of materials of beams by conducting deflection tests. 2. Assess the properties of materials by conducting hardness test, impact test, tension test and compression test. 3. Determine modulus of rigidity of materials by conducting torsion test and tests on springs. 4. Practise working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

List of Experiments

1. Determination of Young's modulus by conducting deflection test on Cantilever beam
2. Determination of Young's modulus by conducting deflection test on Simply supported beam
3. Izod Impact test
4. Direct tension test on metal rods
5. Brinnell and Rockwell Hardness test
6. Compression test on brittle and ductile materials
7. Determination of modulus of rigidity by conducting tension test on a helical spring

8. Determination of modulus of rigidity by conducting compression test on a spring
9. Determination of modulus of rigidity by conducting torsion test
10. Determination of modulus of elasticity by conducting deflection test on fixed beam
11. Determination of modulus of elasticity by conducting deflection test on continuous beam
12. Bend test on metal rod – Virtural Mode experiment

No. of Internal Tests: 01 Max. Marks for Internal Test: 12
Marks for day-to-day laboratory class work 18
Duration of Internal Test: 2 Hours

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DEPARTMENT OF CIVIL ENGINEERING

FLUID MECHANICS LAB

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):0 : 0 : 2	SEE Marks:50	Course Code: U24PC421CE
Credits: 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will	Upon the completion of this course students will be able to
1. Provide practical knowledge in verification of principles of fluid flow 2. Impart knowledge in measuring coefficient of discharge for various devices.	1. Determine coefficient of discharge for various measuring devices such as orifice, venturimeter, mouth piece, notches, weirs and hemi-spherical vessel and Validate Bernoulli's theorem. 2. Calculate Reynolds number and classify types of flows. 3. Estimate Darcy's friction factor for turbulent flow in pipes. 4. Practise working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

List of Experiments

1. Determination of C_d, C_v and C_c for Circular Orifice
2. Determination of C_d for Mouthpiece
3. Determination of C_d for V-notch
4. Determination of C_d for Rectangular notch
5. Determination of C_d for Venturimeter
6. Determination of types of flows using Reynolds Apparatus
7. Determination of Darcy's coefficient of friction.
8. Verification of Bernoulli's Theorem (Virtual Mode)

https://eerc03-iiith.vlabs.ac.in/exp/bernoullis/

9. Determination of C_d for Orifice Meter
10. Determination of coefficient of sudden contraction (minor losses)

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-24)
BE (CIVIL ENGINEERING) IV-SEMESTER (Bridge Course) ACADEMIC YEAR 2025-2026
(Students Admitted in 2024-25)

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
UB24HS410EH	English Language and Communication Skills	2	-	-	3	50	-	-
UB24HS411EH	English Language and Communication Skills Lab	-	-	2	3	50	-	-

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
ENGLISH LANGUAGE COMMUNICATION (Theory)
BRIDGE COURSE FOR LATERAL ENTRY STUDENTS

SYLLABUS FOR B.E. IV-SEMESTER

L: T: P (Hrs/Week) : 2	SEE Marks: 50	CourseCode:UB24HS410EH
Credits: nil	CIE Marks: - - -	Duration of SEE: Hours : 2

COURSE OBJECTIVES	**COURSE OUTCOMES**
The Course will enable the Learners to:	**At the end of the course the students will be able to :**
1. Converse effectively in various context. 2. Listen for general and specific comprehension and write paragraphs. 3. Understand the elements of a good paragraph 4. Speak appropriately in daily conversations	1. Use language in appropriate contexts 2. Listen for global comprehension and to infer meaning from spoken discourses 3. Write paragraphs coherently. 4. Use phrases, essential vocabulary and polite expressions in every day conversations.

UNIT-1 1.0: Communication & Functional English
1.1 Role and Importance of Communication, Process of Communication, Non-verbal communication, barriers to Communication. Conversational phrases: greetings, introductions, apology, compliments, agreeing and disagreeing, polite forms in everyday conversations.

UNIT 2 2.0: Listening
2.1 Importance of listening, Active listening

Unit 3. 3.0: Writing
1.1 Paragraph writing, coherence and cohesion.
Unit 4 4.0: Grammar and Vocabulary
a. Common Errors, one word substitutes, Phrasal-verbs, collocations.

Unit-5 5.0: Reading
5.1 Prose text- Yesterday was beautiful' by Roald Dahl

Prescribed textbook for theory:

Technical communication - Principles and Practice (2nd Edition 2014) - Meenakshi Raman and Sangeeta Sharma- Oxford University Press.

Suggested Reading

1. E.Sureshkumar, P. Sreehari and J. Savithri - Essential English
2. Reading comprehension - Nuttal.J.C - Orient Blackswan
3. SunithaMishra,C. Murali Krishna, Communication Skills for Engineers, Pearson, 2004.
4. M. Ashraf Rizvi. Effective Technical Communication. Tata Mcgraw Hill, 2005.
5. Allen and Waters., How English Works.
6. Willis Jane., English through English.

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCE
ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (ELCS)
Bridge Course for Lateral Entry Students
(Common to all branches)

SYLLABUS FOR B.E. IV-SEMESTER

L: T: P (Hrs/Week) : 2	SEE Marks: 50	Course Code: UB24HS411EH
Credits: -	CIE Marks: - -	Duration of SEE:3

COURSE OBJECTIVES	COURSE OUTCOMES
The Course will enable the Learners to:	At the end of the course the students will be able to :
1. Converse in various situations. 2. Make paper and power point presentations. 3. Speak effectively using discourse markers.	1. Research and sift information to make presentations. 2. Listen for gist and make inferences from various speeches. 3. Use connectives and make transitions effectively while speaking.

ELCS – Component - INTERACTIVE COMMUNICATION SKILLS LAB

1 Public speaking: Do's and Dont's of public speaking, Listening to speeches of great personalities in history to understand the nuances of public speaking

2 Presentation Skills: Making effective presentations, research on various topics, use of Audio visual aids, coping with nerves.

3 Group discussion: Objectives of GD, Types of GDs; Initiating, Continuing, and concluding a GD.

4 Presentation Skills :Making effective presentations, using non-verbal communication , coping with stage fright , use of Audio visual aids researching on various topics.

Learning Resources:

1. BalaSubramanian : A textbook of English phonetics for Indian students, Macmillan, 2008.
2. Priyadarshini Patnaik: Group discussion and interviews, Cambridge University Press India private limited 2011.
3. Daniel Jones: Cambridge English Pronouncing Dictionary – A Definitive guide to contemporary English Pronunciation.

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN B.E. IV SEMESTER

Dept	Course Code	Name of the Course	Stream Type	Stream Name	credits
Civil	U24OE410CE	Solid Waste Management	General	-	3
CSE	U24OE410CS	Basics of Java Programming	General	-	3
CSE	U24OE420CS	Mathematical Computing for AI & Ml With Python	Stream	AI&ML	3
ECE	U24OE410EC	Sensors for Engineering Applications	General	-	3
EEE	U24OE410EE	Mathematical Programming for Numerical Computation	General	-	3
IT	U24OE410IT	Object Oriented Programming using Java	General	-	3
IT	U24OE420IT	Essentials of Mathematics for Machine learning using Python	Stream	AI&ML	3
Mech.	U24OE420ME	Operations Research	General	-	3
Mech.	U24OE410ME	Kinematics and Dynamics of Robotics	Stream	Robotics	3
H&SS	U24OE380EH	Introduction to Sociology	General	-	3
Civil	U24OE410CE	Solid Waste Management	General	-	3

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

SOLID WASTE MANAGEMENT (Open Elective-II)

SYLLABUS FOR B.E.IV-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks:60	Course Code:U24OE410CE
Credits: 3	CIE Marks:40	Duration of SEE : 3Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will	Upon the completion of this course students will be able to
1. Understand characteristics of solid waste and legislation of solid waste management. 2. Understand processing, collection and transportation of solid wastes. 3. Gain insight into transformation, energy recovery and disposalof solid waste. 4. Grasp the fundamentals ofhazardous waste and its management. 5. Understand the solid waste management practices adoptedactual practical scenarios.	1. Understand types, characteristics, composition of solid waste and rules laid for its managementas per legislation. 2. Apply gained knowledge of waste reduction methods, collection techniques, resource recovery/recycling, energy recovery, transport & transfer options for solid waste management. 3. Identify appropriate technologies for transformation and disposal of solid waste. 4. Categorize solid waste as hazardous or non- hazardous based on solid waste toxicology principles. 5. Analyze and apply solid waste management techniques in actual practice.

UNIT- I: Solid waste generation and material flow, sources and types of solid waste,characterization of solid waste, physical and chemical properties of solid waste, Hierarchy of solid waste management, solid waste management rules-2016.

UNIT- II: Storage of solid waste, Collection of Solid Waste: Primary and secondary collection, type of waste collection systems- Hauled and Stationary collection system, Waste handling and Processing: unit operations used for separation and processing, materials recovery,Transfer and Transport of solid waste, transfer station.

UNIT-III: Solid waste transformation:aerobic and anaerobic composting,combustion,Thermal conversion- Incineration and pyrolysis system, Gasification, RDF- recovery of energy from conversion products. Energy recovery systems, Solid waste disposal- Land farming, deep well injections, Landfills: Site selection, method, drainage and leachate collection systems, requirements and technical solutions.

UNIT–IV: Definition and identification of hazardous wastes,toxicology principles, sources and characteristics, hazardous wastes in Municipal Waste, Hazardous waste management, Introduction of Biomedical waste and E-waste, Hazardous waste regulations.

UNIT –V: Integrated solid waste management, Overview of solid waste management practices- National and International- Case studies, solid waste management practices adopted in industries- overview and case studies. Technological advancements in solid waste management.

Learning Resources:

1. P. A. Vesilind, Worrell W and Reinhart, "Solid Waste Engineering", Cengage Learning India Pvt. Ltd. 2nd Edition, 2016.
2. Tchobanoglous," Integrated Solid Waste Management", Mc-Graw Hill International, 1st Edition, New York, 2014.
3. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.
4. CPHEEO, "Manual on Municipal Solid waste management", Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000.
5. A. D. Bhide and B. B. Sundaresan, "Solid Waste Management, Collection, Processing and Disposal",Nagpur. 2001.
6. https://archive.nptel.ac.in/courses/105/103/105103205/

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests	: 2	Max. Marks for each Internal Test		: 30
2	No. of Assignments	: 3	Max. Marks for each Assignment		: 5
3	No. of Quizzes	: 3	Max. Marks for each Quiz Test		: 5
Duration of Internal Tests		:	90 Minutes		

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
BASICS OF JAVA PROGRAMMING
(OPEN ELECTIVE-II)
(COMMON FOR CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U24OE410CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Apply object oriented principles for developing an application using Java constructs. 2 Design GUI using existing Java classes and interfaces.	1 Adopt the fundamentals of Object oriented system development for developing a application. 2 Apply basic features of OOP to design an application. 3 Employ runtime error handling, concurrent programming practices to develop a parallel processing application. 4 Perform string handling, read and write operations using console and files IO streams.

UNIT-I: Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.
Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements.

UNIT-II: Building blocks of OOP: Classes and Methods, Constructor, Parameterized constructor, Garbage Collection, this, static, final keywords, Inheritance, types of inheritance, Method Overriding, Abstract class, Nested class, Interface, Package.

UNIT-III: Exception Handling: try, catch, throw, throws, finally, creating user defined exceptions
Multithreaded Programming: Types of Thread creation, multiple threads, isalive, join, thread priority, Thread Synchronization, Inter process communication.

UNIT-IV:String Handling: String constructors, operations, character extraction, comparison, search, modification. StringBuffer, methods, StringBuilder, StringTokenizer
Util: Date, Calendar, Random, Timer, Observable
IO: Files and Directories, I/O Classes and Interfaces, Byte Streams classes and Character Stream classes

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill 2005.
2. P. Radha Krishna, Object Oriented Programming through Java, Universities Press, 2007.
3. Sachin Malhotra, Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford Press, 2014.
4. https://docs.oracle.com/javase/tutorial/java

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MATHEMATICAL COMPUTING FOR AI & ML WITH PYTHON

Stream- Artificial Intelligence & Machine Learning
(OPEN ELECTIVE-II)
(COMMON for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E IV SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code:U24OE420CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objective	Course outcomes
Students should be able to	At the end of the course, students will be able to
1. Implementation with Python for mathematical computation to deepen the knowledge.	1. Develop a deep understanding of array usage with Numpy 2. Understanding and Analysing the Pandas Dataframe. 3. Basic concepts of data visualization and its importance in data analysis 4. Solve real life problem using the Linear Regression technique 5. Data representation using Scikit-learn library in Python

UNIT-I:Numpy Fundamentals: Creating arrays, array indexing, Basic Array Operations, one dimensional and n dimensional array, Creating Matrices using Numpy arrays, Matrix multiplication.

UNIT-II:Introduction to Pandas: Importing Pandas, Read CSV Files, Analysing Data, Cleaning Data, Pandas Data Structures- Series and Dataframe, Data Correlation.

UNIT-III: Data Visualization: Introduction to matplotlib, Data exploration with matplotlib- Loading the data, Pie chart, Scatter plot, Box Plot, Bar Chart, 3D plot.

UNIT-IV:Regression: Introduction to Regression, Linear Regression, Multiple Linear Regression, Polynomial Regression, Logistic Regression

UNIT-V: Scikit Learn – Introduction, Import packages and classes, Dataset Loading, Splitting the Dataset, Train the Model, Simple Linear Regression With scikit-learn, Multiple Linear Regression With scikit-learn.

Learning Resources:

1. Python Packages By Tomas Beuzen, Tiffany Timbers, 1st edition in 2022 by Chapman & Hall
2. Lambert K.A, Fundamentals of Python –First Programs, 1st Edition(2015), Cengage Learning India
3. Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter, Third Edition by Wes McKinney in 2022 published by Oreilly.
4. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2 by by Sebastian Raschka (Author), Vahid Mirjalili by packt publication on December 2019.
5. https://www.udemy.com/course/machine-learning-basics-building-regression-model-in-python/
6. https://www.geeksforgeeks.org/data-visualization-with-python/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SENSORS FOR ENGINEERING APPLICATIONS

(General Pool: Open Elective - II)
(Common to Civil, CSE, CSE (AI&ML) EEE, IT & Mech.)

SYLLABUS FOR B.E. IV - SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U24OE410EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Understand Sensor Principles and Classification 1. Analyzing Sensor Characteristics and Response 2. Exploring Different Types of Sensors 3. Understanding Environmental Factors and Sensor Reliability 4. Explore the applications of sensors in various engineering fields	Upon completion of the course, students will be able to 1. Understand the fundamental principles of sensors and transducers and their importance in various engineering applications. 2. Demonstrate various mechanical sensors used for measuring displacement, acceleration, force, fluid flow, level, pressure, and stress. 3. Explain the working principles and applications of thermal and optical sensors. 4. Comprehend the principles and applications of magnetic sensors and acoustic sensors. 5. Explore electrical sensors, and high-frequency sensors and their use in various engineering applications.

UNIT-I: Introduction to sensors and transducers. Need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors. Static and dynamic characteristics of sensors - zero, I, and II order sensors – Response to impulse, step, ramp, and sinusoidal inputs. Environmental factors and reliability of sensors.

UNIT-II: Mechanical Sensors Displacement - acceleration and force – the flow of fluids - level indicators - pressure in fluids - stress in solids. Typical sensors - wire and film strain gauge, anemometers, piezoelectric and magneto strictive accelerometers, potential metric sensors, LVDT.

UNIT – III: Thermal and Optical Sensors temperature – temperature difference – heat quantity. Thermometers for different situations – thermocouples thermistors – color pyrometry. light intensity - wavelength and color - light dependent resistors, photodiode, phototransistor, CCD, CMOS sensors. Radiation intensity, particle counter – Gieger Muller courter (gas based), Hallide radiation detectors.

UNIT – IV: Magnetic and Acoustic Sensors magnetic field, magnetic flux density – magneto resistors, Hall sensors, superconducting squids. Intensity of sound, frequency of sound in various media, various forms of microphones, piezoelectric sensors.

UNIT – V: Electrical and High-Frequency Sensors conventional volt and ammeters, high current sensors, (current transformers), high voltage sensors, High power sensors. High frequency sensors like microwave frequency sensors, wavelength measuring sensors. MEMs and MEM based sensors.

Lab Experiments:

1. Measurement of displacement, and velocity with Pmod ACL with 3-axis Digital Accelerometer.
2. Sense the temperature with Pmod TMP3 with Ambient Temperature sensor.
3. Sense the ambient light with Pmod ALS with an Ambient light sensor.
4. Characteristics of photocell using myRIO with Photocell, API PDV-P9203.
5. Study of IR range sensor to measure the distance between the sensor and reflective target using IR range finder GP2Y0A21YK0F
6. Working principle of Hall effect using US1881 Hall-effect latch.
7. Study of acoustic sensor, to record audio signals and to monitor acoustic level using Chenyum CY-502 computer microphone.
8. Estimate the range for a given IR and ultrasonic sensor using QRB1134 IR sensors and MAXSONAR ultrasonic sensor.

Learning Resources :

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.
4. JocobFraden," Handbook of Modern Sensors, Physics, Designs, and

Applications", Springer.
5. ManabendraBhuyan," Intelligent Instrumentation Principles and Applications", CRC Press.
6. Randy Frank," Understanding Smart Sensors", Second edition, Artech House.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2. No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MATHEMATICAL PROGRAMMING FOR NUMERICAL COMPUTATION

Open Elective-II

SYLLABUS FOR B.E. IV SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code:U24OE410EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the students to:	On completion of the course, students will be able to
To provide fundamental knowledge of programming language for solving problems.	On completion of the course, students will be able to 1. Generate arrays and matrices for numerical problemssolving. 2. Represent data and solution in graphicaldisplay. 3. Write scripts and functions to easily execute series of tasks in problemsolving. 4. Use arrays, matrices and functions in Engineeringapplications 5. Design GUI for basic mathematical applications.

UNIT - I : Introduction: Basics of MATLAB,MATLAB windows, Advantages of MATLAB,on- line help, file types.

MATLAB Basics: Variables and Constants –Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating ,Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy ofoperations, Relational and logical operators, if-end structure, if- else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions: Script Files, Function Files, Debugging methods in MATLAB.

Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots- subplots-specialized 2D plots: stem-,bar, hist, pi, stairs, loglog , semilog ,polar ,comet 3D plots: Mesh,Contour,Surf,Stem3,ezplot.

UNIT - III : Numerical Methods Using MATLAB: Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, Simpson's 1/3 Rule for Numerical Integration. MATLAB functions for integration.
Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations, Advanced topics.

UNIT - IV : Nonlinear Equations: System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation, Straight line fit using Least Square Method, Curve fitting using built-in functions ployval and polyfit ,
cubic fit using least square method. Finding roots of a polynomial - roots function, Newton-Raphson Method.

UNIT - V: Solution of Ordinary differential Equations(ODEs)-The 4th order Runge-kutta Method, ODE Solvers in MATLAB,Solving First – order equations using ODE23 and ODE45.
Structures and Graphical user interface(GUI): Advanced data Objects, How a GUI works, Creating and displaying a GUI. GUI components, Dialog Boxes.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxfordpublications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt.Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Mathworks.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siauw Al exandre Bayen, Elsevier-18th April 2014.
5. https://nptel.ac.in/courses/103106118/2

The break-up of CIE : Internal Tests+ Assignments + Quizzes

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	30
2.	No. of Assignments	: 3	Max. Marks for each Assignment	:	5
3.	No. of Quizzes	: 3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests :90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

OBJECT ORIENTED PROGRAMMING USING JAVA

(GENERAL POOL : OPEN ELECTIVE-II)

(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. IV SEMESTER

L:T:P (Hrs/week):3:0:0	SEE Marks: 60	Course Code: U24OE410IT
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*On completion of the course, students will be able to*
Explain the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, building simple GUI applications.	1. Understand fundamental concepts in Object oriented approach. 2. Develop object-oriented programs using the concepts of exception handling. 3. Demonstrate the usage of Java I/O streams to handle user input and output. 4. Design and develop GUI programs. 5. Develop applets for web applications.

UNIT-I: Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables-scope and lifetime, Operators, Control statements, Structure of a Java class, Classes, Methods, Inheritance, and Command Line Arguments.
Arrays: One-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two-dimensional arrays.
Packages: Creation, importing a package and user defined package.
Interfaces: Defining interfaces, extending interfaces, implementing interfaces.

UNIT- II: Exception Handling: Introduction, types of exceptions, syntax of exception handling code, multiple catch statements, using finally statement, user-defined exceptions.

UNIT- III: Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes, Character Streams.
Exploring java.lang: Object, Wrapper classes, String, StringBuffer, System

UNIT- IV: Introducing Awt,Awt Controls: Event Handling: The Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces.
Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, CheckboxGroup, Choice Controls, Using Lists, Managing Scroll Bars, Using TextField, Using TextArea, Understanding Layout Managers, Menu bars and Menus, Dialog Boxes, FileDialog, Exploring the controls, Menus ,and Layout Managers.

UNIT-V: Applet Programming: Introduction,how applets differ from applications, building applet code,applet life cycle,HTML Applet tag,passing parameters to applets.

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th edition, McGraw Hill Publishing, 2010.
4. Y. Daniel Liang , An Introduction to JAVA Programming, Tata McGraw Hill, 2009.
5. Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.
6. https://docs.oracle.com/javase/tutorial/
7. https://nptel.ac.in/courses/106105191/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031

DEPARTMENT OF INFORMATION TECHNOLOGY

ESSENTIALS OF MATHEMATICS FOR MACHINE LEARNING USING PYTHON

(AI&ML Stream : Open Elective-II)

(Common for ECE, EEE, MECH & CIVIL)

SYLLABUS FOR B.E IV-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U24OE420IT
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	Course Outcomes
The course will enable the students to:	At the end of the course student will be able to:
Introduce the essential maths principles of linear algebra, vector calculus, probability theory and statistical methods along with exposure to Python libraries for understanding and applying machine learning to real-world problems.	1. Understand the fundamentals of linear algebra – vectors and matrices. 2. Understand and apply various matrix norms, Eigenvectors and PCA techniques. 3. Understand basics of derivatives, integrals and optimization. 4. Understand various data distributions and apply probabilistic techniques to handle uncertainty. 5. Define basic descriptive and inferential statistical measures.

UNIT-1 Basics of Linear Algebra

- Scalars, Vectors, Matrices, Tensors for Data Representation and Analysis
- Matrix Analysis (Rank, Determinant, Trace, Orthogonal basis & Inverse)
- Operations: Addition, Subtraction, Scalar Multiplication, Matrix Multiplication, Dot Product, Cross Product Feature Interactions for Data Manipulation
- Python experiments

Unit-2 Matrix

- Matrix Norms: L0 Norm, L1 Norm, L2 Norm; Linear Regression & Regularization
- Eigenvalues and Eigenvectors, Principal Component Analysis
- Python experiments

Unit-3 Vector Calculus

- Derivatives and Gradients
- Differential Operators - Laplacian operator, Gradient operator: for Gradient Descent in Optimization
- Integrals for cumulative distribution function
- Python Experimentation

Unit 4 Probability Theory

- Define Random Variables, Probability Distributions – Gaussian, Bernoulli, Binomial, and Poisson distributions model specific types of events
- Bayes' theorem, uncertainty modelling - updating beliefs based on observed evidence
- Python Experiments

Unit -5 Statistical Methods

- Descriptive Statistics - Expectation, Variance and Covariance
- Central Limit Theorem – Sampling distribution
- Inferential Statistics - Hypothesis Testing – Chi square test, T-Test
- Python Experiments

Learning Resources:

1. Mathematics for Machine Learning, by Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, Cambridge University Press, 2020.
2. Mathematical Foundation for Machine Learning and AI, https://www.udemy.com/course/mathematical-foundation-for-machine-learning-and-ai/
3. Essential Mathematics for Machine Learning: https://onlinecourses.nptel.ac.in/noc21_ma38/preview

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

OPERATIONS RESEARCH

(General Pool : Open Elective-II)
SYLLABUS FOR B.E. IV-SEMESTER

Instruction : 3Hrs /week	SEE Marks : 60	Course Code : U24OE420ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: 1. understand the application of mathematics for real time problem solving to LPP, sensitivity analysis under set of constraints, applying mathematical techniques to solve transportation problem and assignment problems, applying time value money and ignoring the same to find the optimal replacement of machines, applying Johnsons rules to find the best sequence to minimize elapsed time and minimum no of servers to minimize waiting time of the customers and optimal utilisation of servers.	On completion of the course, the student will be able to: 1. Apply optimization in multidisciplinary areas through linear programming under different working conditions. 2. Analyze linear programming for a dynamic changes of a customer requirements to suit various Organizations. 3. Reduce total cost to apply for transportation techniques for the transshipment of Goods and products for a product based industry. 4. Estimate the time for replacement of a machine by considering or ignoring time value of money using individual/group replacement policy. 5. Estimate elapsed time for sequencing problem processed through different machines. Minimize waiting time of the customer and optimization of no. of servers.

UNIT – I: Introduction: Definition and scope of operations research.
Linear programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, Simplex method, maximization and minimization, degeneracy in LPP, unbounded and infeasible solutions. Introduction of software to solve LPP.

UNIT – II: Duality: Definition, Relationship between optimal primal and dual

solutions. Economic interpretation, Post optimal analysis (restricted to variation of resources i.e., RHS), Dual simplex method.

Transportation model: Finding an initial feasible solution– north west corner method, least cost method, Vogel's approximation method, finding the optimal solution, optimal solution by stepping stone and MODI method, special cases in transportation problems – Unbalanced transportation problem.

UNIT-III: Assignment Problem: Hungarian method of assignment problem, maximization in assignment problem, unbalanced problem, problems with restrictions, travelling salesman problem.

Replacement models: Introduction, Replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – individual replacement policy, group replacement policy.

UNIT-IV: Game theory: Introduction, 2 person zero sum games, maximin–minimax principle, principle of dominance, solution for mixed strategy problems graphical method for 2 x n and m x 2 games.

UNIT-V:Sequencing models: Introduction, General assumptions, processing n jobs through 2 machines, processing n jobs through m machines processing 2 jobs through n machines.
Queuing theory: Introduction, Single channel – Poisson arrivals – exponential service times with infinite population and finite population.

Learning Resources:

1. Hamady A. Taha, "Operations Research – An introduction", 6th Edition, PHI Pvt. Ltd., 1997.
2. S.D. Sharma, "Operations Research", Kedarnath, Ramnath& Co., Meerut, 2009.
3. Harvey M. Wagner, "Principles of Operations Research", 2nd Edition, PHI Pvt. Ltd., 1980.
4. V.K. Kapoor, "Operations Research", S. Chand Publishers, New Delhi, 2004.
5. S.S. Rao, "Engineering Optimization – Theory and Practice", 4th Edition, John Wiley & Sons Inc., 2009.

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

KINEMATICS AND DYNAMICS OF ROBOTICS

(OPEN ELECTIVE-II)
(Stream: Robotics)

SYLLABUS FOR B.E. IV – SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U24OE410ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE The objective of the course is to	**COURSE OUTCOMES** On completion of the course, students will be able to
To develop the fundamental knowledge and skills required to analyze, design and control robotic systems	1. Analyze the kinematics of robotic systems and apply them to solve real world problems 2 Apply differential kinematics and statics concepts to design and control robotic systems 3 Analyze the dynamics of serial manipulators using lagrangianmethod. 4 Analyze the dynamics of serial manipulators using lagrangian and Newton-Euler mechanics. 5 Generate and analyze robot trajectories for various applications

UNIT-I: Robot Kinematics: Forward Kinematics: Forward/direct kinematic analysis of serial manipulators. Inverse Kinematics: General properties of inverse kinematic solution. Inverse kinematics of serial manipulators.

UNIT-II: Differential Kinematics: Linear and angular velocity of links, Manipulator Jacobian for serial manipulators, Jacobian Singularities.

UNIT-III: Static Analysis: Force and moment balance.
Dynamics of serial manipulators: Lagrangian formulation for equations of motion for RP, RR serial manipulators,

Unit-IV: Dynamics of serial manipulators: Recursive dynamics using Newton-Euler formulation of RP and RR serial manipulator.

UNIT-V: Trajectory Generation

Joint-Space Techniques: Cubic Polynomial Trajectories, Linear Segments with Parabolic Blends-without and with via points

Cartesian-Space Techniques: Straight line path, Circular Path, Position Planning, Orientation Planning.

Learning Resources:

1. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, "Robotics: Modelling, Planning and Control", Springer Science & Business Media, 2010.
2. M.W.Spong and M.Vidyasagar,"Robot Dynamics and Control", 1st Edition, John Wiley and sons,1990.
3. R.K.Mittal and I.J.Nagrath, "Robotics and Control", Tata McGraw-Hill, 2003.
4. Subir Kumar Saha, "Introduction to Robotics", Tata McGraw-Hill Education, 2014.
2. Howie M. Choset, Seth Hutchinson, Kevin M. Lynch, "Principles of Robot Motion: Theory, Algorithms, and Implementation", MIT Press, 2005.

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS),
IBRAHIMBAGH, HYDERABAD-500031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

INTRODUCTION TO SOCIOLOGY

SYLLABUS FOR BE IV-SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U24OE420MA
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introducethe basic concepts, theories, and perspectives in sociology. 2. To develop critical thinking about social structures and processes. 3. To examine social institutions such as family, education, religion, and economy. 4. To foster an understanding of social diversity, inequality, and global interdependence. 5. To equip students with research skills for analyzing social issues.	1. Identify and explain key sociological concepts and theoretical approaches. 2. Analyze how social structures influence individual and group behaviour. 3. Evaluate the functions and impact of major social institutions. 4. Demonstrate awareness of social issues like class, gender, race, and globalization. 5. Apply sociological research methods to real-world social questions.

UNIT-I Defining Sociology:

1: Genesis of Sociology: History, Context and Evolution
2: Nature, Scope and Significance of Sociology
3: Relationship between Individual and Society

UNIT-II: Basic Concepts:

4: Social Groups, Community, Society, Associations, and Institutions, Status and Role
5: Family, Marriage, Culture, Religion and Kinship
6: Caste, Polity, State, Education and Economy

UNIT-III: Socialization:

7: Meaning and Significance of Socialization

8: Agencies of Socialization

9: Social Control

UNIT-IV: Social Structure, Social Stratification and Social Interaction

10: Meaning and Characteristics of Social Structure

11: Meaning and Characteristics of Social Stratification

12: Meaning and Characteristics of Social Interaction

UNIT-V: Social Change

13: Meaning and Characteristics of Social Change

14: Factors of Social Change

15: Types of Social Change

Learning Resources:-

1. Principles of Sociology with an Introduction to Social Thought - Book by C N Shankar Rao
2. Sociology: Themes and Perspectives -Textbook by Martin Holborn and Michael Haralambos

The break-up of CIE: Internal Tests + Assignments + Quizzes

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2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes