23BS1101
LINEAR ALGEBRA & CALCULUS

COMMON TO ALL BRANCHES
(AI&DS/AI&ML/CE/CSE/ECE/EEE/EIE/IT/ME)

Course Category:	Basic Science	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practice:**	3 - 0- 0
Prerequisites:	Fundamentals of Matrices, Fundamentals of Calculus, Integration, Differentiation.	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	30 70 100

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Solve the system of homogeneous and non-homogeneous linear equations
CO2	Examine the nature of a quadratic form by transforming into a canonical form
CO3	Determine maxima and minima of multivariable functions
CO4	Evaluate areas and volumes using double, triple integrals

COURSE CONTENT

UNIT I Matrices

Rank of a matrix by Echelon form, Normal form, Cauchy–Binet formulae (without proof), Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss-Seidel Iteration Methods.

UNIT II Eigenvalues, Eigenvectors and Orthogonal Transformation

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic forms, Reduction of Quadratic form to Canonical forms by Orthogonal Transformation.

UNIT III Differential Calculus

Mean Value Theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof), Problems and applications on the above theorems.

Functions of Several Variables: Continuity and Differentiability, Partial derivatives, Total derivatives, Chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables, Jacobians, Functional dependence, Maxima and Minima of functions of two variables, Method of Lagrange multipliers.

UNIT IV Multiple Integrals (Multi variable Calculus)

Double integrals,Triple integrals, Change of order of integration, Change of variables to polar, cylindrical and spherical coordinates, Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOK

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition

REFERENCE BOOKS

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition
2. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition
3. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition(9th reprint)
4. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition
5. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th Edition
6. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, 3rd Edition (Reprint 2021)

(Course Coordinator)

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Associate Professor & Head
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V.R.Siddhartha Engg.College
VIJAYAWADA-520 007

23BS1102

ENGINEERING PHYSICS (Common to all Branches)

Course Category:	Institutional Core	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practice:**	3 - 0 - 0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the modern optical devices such as Lasers and optical fibers, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

CO1	Elaborate different types of lasers, optical fibers and their applications.
CO2	Familiarize with the basics of crystals and their structures.
CO3	Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO4	Explain the basic concepts of Quantum Mechanics and types of semiconductors using Hall Effect.

COURSE CONTENT

UNIT I Lasers and Fiber Optics **(10 periods)**

Lasers: Introduction, Characteristics of laser, Basic Principles of lasers (absorption, spontaneous emission and stimulated emission), Requirements of lasers (pumping, population inversion and cavity resonance), Einstein's coefficients, different types of lasers: solid-state lasers (Ruby), gas lasers, (He-Ne), Semiconductor laser, applications of lasers in science, engineering and medicine.

Fibre Optics: Introduction, Fundamentals of optic fibre, Propagation of light through optical fiber, Types of optical fibers, Numerical aperture, Fractional Refractive Index change, Fiber optics in communication and its advantages.

UNIT II Crystallography and X-ray diffraction **(10 periods)**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT III Dielectric and Magnetic Materials **(12 periods)**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - Frequency dependence of polarization – complex dielectric constant (Qualitative) – dielectric loss (Qualitative).

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, Para and Ferro magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT IV Quantum Mechanics and Semiconductors **(12 periods)**

Quantum Mechanics: Dual nature of light, Matter waves,Properties and Debroglie's hypothesis, G.P.Thomson experiment,Heisenberg's Uncertainty Principle and its applications (Non existence of electron in nucleus) and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors-Fermi level-Extrinsic semiconductors-Fermi level - Drift and diffusion currents – Einstein's equation – Hall effect and its applications, Photodiode,Light Emitting Diode,Solar cell and its applications.

Textbooks:

T1. Engineering Physics, M. N. Avadhanulu, TVS Arun Murthy, S. Chand Publications, 1st Edition (2024).
T2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

R1. Engineering Physics –T.Vijaya Krishna, T. Madhu Mohan, B.K. Pandey, Manoj K. Harbola and S. Chaturvedi, Cengage Learning, 2nd Edition (2024).
R2. A Text book of Engineering Physics – Dr. Tirupathi Naidu, M. Veeranjaneyulu, VGS Book Links, 4th Edition (2016).
R3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010
R4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

Designation	Name in Capitals	Signature with Date
Course Coordinator	Dr. B. RUPA VENKATESWARA RAO	7/12/2023
Head of the Department	Dr. G. SRIDEVI	7/12/2023

HEAD
Department of Physics
SIDDHARTHA ENGINEERING COLLEGE
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DEPARTMENT OF CIVIL ENGINEERING

V. R. SIDDHARTHA ENGINEERING COLLEGE (AUTONOMOUS)

BASICS OF CIVIL AND MECHANICAL ENGINEERING

Course Outcomes: On completion of the course, the student should be able to:

CO1: Understand various Civil Engineering sub-divisions and appreciate their role in ensuring a better society.

CO2: Understand the basic building components and attain knowledge of Civil Engineering Materials and attain knowledge on prefabricated technology.

CO3: Know the basic concepts, uses and classification of surveying and realize the importance of Transportation in the nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel-Introduction to Prefabricated Construction Techniques

UNIT II

Surveying and Transportation Engineering: Objectives of Surveying- Principles of Surveying- Classification based on function and instruments, Importance of Transportation in Nation's Economic Development- Basics components of Road-Classification of Highways.

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Simple introduction to Dams and Reservoirs.

Textbooks:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012
6. Advances in Civil Engineering (Volume - 5), S. Sathish, AkiNik Publications,2021.

9/12/23

DEPARTMENT OF MECHANICAL ENGINEERING
V. R. SDDHARTHA ENGINEERING COLLEGE (Autonomous)
BASICS OF MECHANICAL ENGINEERING 23 ES 1103 A

Course Objectives: The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

Course Outcomes: On completion of the course, the student should be able to

CO1: Understand the scope of Mechanical Engineering in different sectors and industries and different manufacturing processes.

CO2: Explain the basics of thermal engineering and its applications.

CO3: Describe the working of different mechanical power transmission systems and power plants.

CO4: Describe the basics of robotics and its applications.

UNIT III

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.
Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.
Manufacturing Processes: Principles of Casting, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

UNIT IV

Thermal Engineering –IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Otto cycle,Diesel cycle,Components of Electric and Hybrid Vehicles., Refrigeration and air-conditioning
Working principle of Boilers: classification of Boilers
Power plants – Working principle of Steam, Nuclear power plants.
Mechanical Power Transmission - Belt and Gear Drives, Introduction to Robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.)

Textbooks:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

1. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
2. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
3. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
4. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

Course Co-ordinator
M. Rajesh

Professor & Head
Department of Mechanical Engineering
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3	0	0	3

23ES1104

Introduction to Programming (Common to All Branches)

Course Category:	Engineering Science	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practice:**	3-0-0
Prerequisites:	--	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

COURSE OBJECTIVES

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging on control structures and arrays.
- To foster logical thinking and problem-solving skills on strings and pointers.
- To familiarize students with programming concepts such as functions, structuresand files.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

CO1 Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2 Analyze a problem and develop an algorithm to solve problems on control structures and arrays.

CO3 Implement various problems using strings and pointers.

CO4 Understand the concept of functions, user defined data types and file handling.

UNIT I: Introduction to Programming and Problem Solving

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program-Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT II: Control Structures and Arrays

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue, Arrays indexing, memory model, programs with array of integers, two dimensional arrays.

UNIT III: Strings and pointers

Introduction to Strings. Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers.

UNIT IV: Functions, User Defined Data types and File Handling

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, User-defined data types-Structures and Unions, Basics of File Handling.

Note: The syllabus is designed with C Language as the fundamental language of implementation.

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition.

Course Coordinator		Head of the Department
Name:	S. BABY	Professor & Head
Signature:		

Dept. of Computer Science & Engineering
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VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE (AUTONOMOUS) VIJAYAWADA

DEPARTMENT OF ENGLISH
COMMUNICATIVE ENGLISH (23HS1105)

(Common to All Branches of Engineering)

Course Objectives:

The main objective of introducing this course, *Communicative English,* is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

Course Outcomes:

CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.

CO2: Apply grammatical structures to formulate sentences and correct word forms.

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.

CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.

CO5: Create a coherent paragraph, essay, and resume.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(Short Story)**

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpretingspecific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing, Essay 'Writing, (The Power of Intrapersonal Communication) **Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

UNIT IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes & Report Writing

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons & Technical Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)
3. English: Language, Context and Culture, 1st Edition, OrientBlack Swan, 2023 (Units5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Jayalaxmi.
(COURSE COORDINATOR)

M. Ravichand.
HEAD
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