ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
REGULATIONS – 2019
CHOICE BASED CREDIT SYSTEM

VISION OF THE DEPARTMENT:

To educate students with conceptual knowledge and technical skills in the field of Information Technology with moral and ethical values to achieve excellence in academic, industry and research centric environments.

MISSION OF THE DEPARTMENT:

1. To inculcate in students a firm foundation in theory and practice of IT skills coupled with the thought process for disruptive innovation and research methodologies, to keep pace with emerging technologies.
2. To provide a conducive environment for all academic, administrative, and interdisciplinary research activities using state-of-the-art technologies.
3. To stimulate the growth of graduates and doctorates, who will enter the workforce as productive IT engineers, researchers, and entrepreneurs with necessary soft skills, and continue higher professional education with competence in the global market.
4. To enable seamless collaboration with the IT industry and Government for consultancy and sponsored research.
5. To cater to cross-cultural, multinational, and demographic diversity of students.
6. To educate the students on the social, ethical, and moral values needed to make significant contributions to society.

Attested

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates can

- Utilize their proficiencies in the fundamental knowledge of basic sciences, mathematics, Artificial Intelligence, data science and statistics to build systems that require management and analysis of large volumes of data.
- Advance their technical skills to pursue pioneering research in the field of AI and Data Science and create disruptive and sustainable solutions for the welfare of ecosystems.
- Think logically, pursue lifelong learning and collaborate with an ethical attitude in a multidisciplinary team.
- Design and model AI based solutions to critical problem domains in the **real world**.
- Exhibit innovative thoughts and creative ideas for effective contribution towards economy building.

PROGRAMME OUTCOMES (POs):

After going through the four years of study, our Information Technology Graduates will exhibit ability to:

PO#	Graduate Attribute	Programme Outcome
1	Engineering knowledge	Apply knowledge of mathematics, basic science and engineering science.
2	Problem analysis	Identify, formulate and solve engineering problems.
3	Design/development of solutions	Design a system or process to improve its performance, satisfying its constraints.
4	Conduct investigations of complex problems	Conduct experiments & collect, analyze and interpret the data.
5	Modern tool usage	Apply various tools and techniques to improve the efficiency of the system.
6	The Engineer and society	Conduct themselves to uphold the professional and social obligations.

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7	Environment and sustainability	Design the system with environment consciousness and sustainable development.
8	Ethics	Interact in industry, business and society in a professional and ethical manner.
9	Individual and team work	Function in a multidisciplinary team.
10	Communication	Proficiency in oral and written communication.
11	Project management and finance	Implement cost effective and improved system.
12	Life-long learning	Continue professional development and learning as a life-long activity.

PROGRAM SPECIFIC OUTCOMES (PSOs):
Graduates should be able to:

1. Apply the theoretical knowledge of AI and Data Science for effective decision making in business and governance domains.
2. Develop the skills in data analytics and data visualization, pertaining to knowledge acquisition, knowledge representation and knowledge engineering, and hence capable of coordinating complex projects.
3. Accomplish research to cater the critical needs of the society through cutting edge technologies of AI.

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CHOICE BASED CREDIT SYSTEM
I - VIII SEMESTER CURRICULA AND I AND II SYLLABI

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS5151	Technical English	HSMC	4	0	0	4	4
2	MA5158	Engineering Mathematics I	BSC	3	1	0	4	4
3	PH5151	Engineering Physics	BSC	3	0	0	3	3
4	CY5151	Engineering Chemistry	BSC	3	0	0	3	3
5	GE5153	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICALS								
6	BS5161	Basic Sciences Laboratory	BSC	0	0	4	4	2
7	GE5161	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
			TOTAL	**16**	**1**	**8**	**25**	**21**

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS5251	Professional Communication	HSMC	4	0	0	4	4
2	MA5252	Engineering Mathematics II	BSC	3	1	0	4	4
3	AZ5201	Object Oriented Programming and Data Structures	PCC	3	0	0	3	3
4	EE5251	Basics of Electrical and Electronics Engineering	ESC	3	0	0	3	3
5	GE5151	Engineering Graphics	ESC	1	0	4	5	3
PRACTICALS								
6	AZ5211	Data Structures Laboratory	PCC	0	0	4	4	2
7	EE5261	Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
			TOTAL	**14**	**1**	**12**	**27**	**21**

HS5151 **TECHNICAL ENGLISH** **L T P C**
4 0 0 4

OBJECTIVES:

- To familiarise first year students of engineering and technology with the fundamental aspects of technical English.
- To develop all the four language skills by giving sufficient practice in the use of the skills in real life contexts.
- To enhance the linguistic and communicative competence of first year engineering and technology students.

UNIT I INTRODUCING ONESELF **12**

Listening: Listening and Filling a Form, Listening to Speeches by Specialists From Various Branches of Engineering and Completing Activities such as Answering Questions, Identifying the Main Ideas of the Listening Text, Style of the Speaker (Tone and Tenor) – **Speaking**: Introducing Oneself – Introducing Friend/ Family – **Reading:** Descriptive Passages (From Newspapers / Magazines) – **Writing**: Writing a Paragraph (Native Place, School Life) – **Grammar:** Simple Present, Present Continuous – **Vocabulary Development**: One Word Substitution.

UNIT II DIALOGUE WRITING **12**

Listening: Listening to Conversations (Asking for and Giving Directions) – **Speaking:** Making Conversation Using (Asking for Directions, Making an Enquiry), Role Plays-Dialogues – **Reading:** Reading a Print Interview and Answering Comprehension Questions-**Writing**: Writing a Checklist, Dialogue Writing – **Grammar**: Simple Past – Question Formation (Wh-Questions, Yes or No Questions, Tag Questions) – **Vocabulary Development**: Stress Shift, Lexical Items Related to the Theme of the Given Unit.

UNIT III FORMAL LETTER WRITING **12**

Listening: Listening to Speeches by Famous People and Identifying the Central Message of the Speech – Answering Multiple-Choice Questions) – **Speaking:** Giving Short Talks on a Given Topic-**Reading:** Reading Motivational Essays on Famous Engineers and Technologists (Answering Open – Ended and Closed Questions) – **Writing:** Writing Formal Letters/ Emails (Complaint Letters) – **Grammar**: Future Tense Forms of Verbs, Subject and Verb Agreement-**Vocabulary Development**: Collocations – Fixed Expressions.

UNIT IV WRITING COMPLAINT LETTERS **12**

Listening: Listening to Short Talks (5 Minutes Duration and Fill a Table, Gap-Filling Exercise) Note Taking/Note Making – **Speaking:** Small Group Discussion, Giving Recommendations – **Reading:** Reading Problem – Solution Articles/Essays Drawn From Various Sources – **Writing:** Making Recommendations – Writing a Letter/ Sending an Email to the Editor – Note Making – **Grammar:** Modals – Phrasal Verbs – Cause and Effect Sentences – **Vocabulary Development**: Connectives, Use Of Cohesive Devices In Writing, Technical Vocabulary.

UNIT V WRITING DEFINITIONS AND PRODUCT DESCRIPTION 12

Listening: Listening to a Product Description (Labeling and Gap Filling) Exercises – **Speaking:** Describing a Product and Comparing and Contrasting it with Other Products – **Reading**: Reading Graphical Material for Comparison (Advertisements) – **Writing:** Writing Definitions (Short and Long) – Compare and Contrast Paragraphs- **Grammar:** Adjectives – Degrees of Comparison – Compound Nouns – **Vocabulary Development**: Use of Discourse Markers – Suffixes (Adjectival Endings).

TOTAL : 60 PERIODS

LEARNING OUTCOMES

On completion of the course, the students will able to:

1. Exposure to basic aspects of technical English.
2. Gain confidence to communicate effectively I various academic situations.
3. Learn the use of basic features of Technical English.

TEXTBOOKS:

1. Revised Edition of 'English for Engineers and Technologists' Volume 1 published by Orient Black Swan Limited 2019.

Assessment Pattern

- Assessments will assess all the four skills through both pen and paper and computer based tests.
- Assessments can be pen and paper based, quizzes.

MA5158	ENGINEERING MATHEMATI CS – I	L	T	P	C
	(Common to all branches of B.E. / B.Tech. Programmes in I Semester)	**3**	**1**	**0**	**4**

OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a Real Matrix – Characteristic Equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem – Diagonalization of Matrices – Reduction of a Quadratic Form to Canonical Form by Orthogonal Transformation – Nature of Quadratic Forms.

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UNIT II DIFFERENTIAL CALCULUS 12

Limit of Function – One Sided Limit – Limit Laws – Continuity – Left and Right Continuity – Types of Discontinuities – Intermediate Value Theorem – Derivatives of a Function – Differentiation Rules – Chain Rule – Implicit Differentiation – Logarithmic Differentiation – Maxima and Minima – Mean Value Theorem – (Optional: Polar Coordinate System – Differentiation in Polar Coordinates).

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

Partial Derivatives – Homogeneous Functions and Euler's Theorem – Total Derivative – Differentiation of Implicit Functions – Change of Variables – Jacobians – Partial Differentiation of Implicit Functions – Taylor's Series for Functions of Two Variables – Errors and Approximations – Maxima and Minima of Functions of Two Variables – Lagrange's Method of Undetermined Multipliers.

UNIT IV INTEGRAL CALCULUS 12

Definite and Indefinite Integrals – Substitution Rule – Techniques of Integration – Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions, Integration of Rational Functions by Partial Fraction, Integration of Irrational Functions – Improper Integrals.

UNIT V MULTIPLE INTEGRALS 12

Double Integrals – Change of Order of Integration – Double Integrals in Polar Coordinates – Area Enclosed by Plane Curves – Triple Integrals – Volume of Solids – Change of Variables in Double and Triple Integrals.

TOTAL : 60 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Use the matrix algebra methods for solving practical problems.
2. Apply differential calculus tools in solving various application problems.
3. Able to use differential calculus ideas on several variable functions.
4. Apply different methods of integration in solving practical problems.
5. Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXTBOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Forty Fourth Edition, New Delhi, 2017.
2. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, Sixth Edition, New Delhi,2013.
3. Joel Hass, Christopher Heil and Maurice D.Weir, "Thomas' Calculus", Pearson, Fourteenth Edition, New Delhi, 2018.
4. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

REFERENCES:

1. Bali N., Goyal M., Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), Seventh Edition, New Delhi, 2009.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, Tenth Edition, New Delhi, 2015.
3. Greenberg M.D., “Advanced Engineering Mathematics”, Pearson Education, Second Edition, Fifth Reprint, Delhi, 2009.
4. Jain R.K., Iyengar S.R.K., “Advanced Engineering Mathematics”,Narosa Publications, Fifth Edition, New Delhi, 2017.
5. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, Seventh Edition, New Delhi , 2012.
6. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd., Eleventh Reprint, New Delhi, 2010.

PH5151	ENGINEERING PHYSICS	L	T	P	C
	(Common to all branches of B.E / B.Tech programmes)	3	0	0	3

OBJECTIVE

- To make the students in understanding the importance of mechanics.
- To equip the students on the knowledge of electromagnetic waves.
- To introduce the basics of oscillations, optics and lasers.
- To enable the students in understanding the importance of quantum physics.
- To elucidate the application of quantum mechanics towards the formation of energy bands in crystalline materials.

UNIT I MECHANICS **9**

Moment of Inertia (M.I) - Radius of Gyration - Theorems of M .I – M.I of Circular Disc, Solid Cylinder , Hollow Cylinder , Solid Sphere and Hollow Sphere – K.E of a Rotating Body – M.I of a Diatomic Molecule – Rotational Energy State of a Rigid Diatomic Molecule – Centre of Mass – Conservation of Linear Momentum – Relation Between Torque and Angular momentum – Torsional pendulum.

UNIT II ELECTROMAGNETIC WAVES **9**

Gauss’s Law – Faraday’s Law – Ampere’s Law – The Maxwell’s Equations – Wave Equation; Plane Electromagnetic Waves in Vacuum, Conditions on the Wave Field – Properties of Electromagnetic Waves: Speed, Amplitude, Phase, Orientation and Waves in Matter – Polarization – Producing Electromagnetic Waves – Energy and Momentum in EM Waves: Intensity, Waves From Localized Sources, Momentum and Radiation Pressure – Cell-Phone Reception. Reflection and Transmission of Electromagnetic Waves from a Non-Conducting Medium – Vacuum Interface for Normal Incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS **9**

Simple Harmonic Motion – Resonance – Waves on a String – Standing Waves – Traveling Waves – Energy Transfer of a Wave – Sound Waves – Doppler Effect – Reflection and Refraction of Light Waves – Total Internal Reflection – Interference – Interferometers – Air Wedge Experiment. Theory of Laser

– Characteristics – Spontaneous and Stimulated Emission – Einstein's Coefficients – Population Inversion – Nd-YAG Laser, CO_2 Laser, Semiconductor Laser – Applications.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and Light Waves – Electrons And Matter Waves – The Schrodinger Equation (Time Dependent and Time Independent Forms) – Meaning of Wave Function – Normalization - Particle in a Infinite Potential Well – Normalization, Probabilities and the Correspondence Principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The Harmonic Oscillator – Barrier Penetration and Quantum Tunneling – Tunneling Microscope – Resonant Diode – Finite Potential Wells – Particle in a Three Dimensional Box – Bloch's Theorem for Particles in a Periodic Potential, Kronig-Penney Model and Origin of Energy Bands.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Understanding the importance of mechanics.
2. Express the knowledge of electromagnetic waves.
3. Know the basics of oscillations, optics and lasers.
4. Understanding the importance of quantum physics.
5. Apply quantum mechanical principles towards the formation of energy bands in crystalline materials.

TEXT BOOKS

1. D.Kleppner, R.Kolenkow., "An Introduction to Mechanics", McGraw Hill Education, 2017.
2. D.Halliday, R.Resnick, J.Walker, "Principles of Physics". John Wiley & Sons, 2015.
3. N.Garcia, A.Damask, S.Schwarz, "Physics for Computer Science Students", Springer- Verlag, 2012.

REFERENCES:

1. R.Wolfson, "Essential University Physics", Volume 1 & 2, Pearson, 2016.
2. D.J.Griffiths, "Introduction to Electrodynamics. Pearson Education", 2015.
3. K.Thyagarajan, A.Ghatak, "Lasers: Fundamentals and Applications", Springer, 2012.

CY5151 ENGINEERING CHEMISTRY L T P C

(COMMON TO ALL BRANCHES) 3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of polymers, their properties and some of the important applications.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of the laws of photochemistry, photoprocesses and instrumentation & applications of spectroscopic techniques.
- To familiarize the operating principles and applications of energy conversion, its processes and storage devices.

- To inculcate sound understanding of water quality parameters and water treatment techniques.

UNIT I POLYMER CHEMISTRY 9

Introduction: Functionality – Degree of Polymerization. Classification of Polymers- Natural and Synthetic, Thermoplastic and Thermosetting. Types and Mechanism of Polymerization: Addition (Free Radical, Cationic, Anionic And Living); Condensation and Copolymerization. Properties of Polymers: Tg, Tacticity, Molecular Weight – Weight Average, Number Average and Polydispersity Index. Techniques of Polymerization: Bulk, Emulsion, Solution and Suspension. Structure, Properties and Uses Of: PE, PVC, PC, PTFE, PP, Nylon 6, Nylon 66, Bakelite, Epoxy; Conducting Polymers – Polyaniline and Polypyrrole.

UNIT II NANOCHEMISTRY 9

Basics – Distinction Between Molecules, Nanomaterials and Bulk Materials; Size-Dependent Properties. Types – Nanoparticle, Nanocluster, Nanorod, Nanowire and Nanotube. Preparation of Nanomaterials: Sol-Gel, Solvothermal, Laser Ablation, Chemical Vapour Deposition, Electrochemical Deposition and Electro Spinning. Characterization – Scanning Electron Microscope and Transmission Electron Microscope – Principle and Instrumentation (Block Diagram). Properties (Optical, Electrical, Mechanical and Magnetic) and Applications of Nanomaterials – Medicine, Agriculture, Electronics and Catalysis.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of Photochemistry – Grotthuss-Draper Law, Stark-Einstein Law and Lambert-Beer Law (Derivation and Problems). Photo Physical Processes – Jablonski Diagram. Chemiluminescence, Photo-Sensitization and Photoquenching – Mechanism and Examples. Spectroscopy: Electromagnetic Spectrum – Absorption of Radiation – Electronic, Vibrational and Rotational Transitions. Width and Intensities of Spectral Lines. Atomic Absorption Spectroscopy, UV-Vis and IR Spectroscopy – Principles, Instrumentation (Block Diagram) and Applications.

UNIT IV ENERGY CONVERSIONS AND STORAGE 9

Nuclear Fission – Controlled Nuclear Fission – Nuclear Fusion – Differences Between Nuclear Fission and Fusion – Nuclear Chain Reactions – Nuclear Energy – Light Water Nuclear Power Plant – Fast Breeder Reactor. Solar Energy Conversion – Solar Cells. Wind Energy. Batteries – Types of Batteries – Primary Battery (Dry Cell), Secondary Battery (Lead Acid, Nickel-Cadmium and Lithium-Ion-Battery). Fuel Cells – H_2-O_2 and Microbial Fuel Cell. Explosives – Classification, Examples: TNT, RDX, Dynamite; Rocket Fuels and Propellants – Definition and Uses.

UNIT V WATER TECHNOLOGY 9

Water – Sources And Impurities – Water Quality Parameters: Colour, Odour, pH, Hardness, Alkalinity, TDS, COD and BOD. Boiler Feed Water – Requirement – Troubles (Scale & Sludge, Caustic Embrittlement, Boiler Corrosion and Priming & Foaming. Internal Conditioning – Phosphate, Calgon and Carbonate Treatment. External Conditioning – Zeolite (Permutit) And Ion Exchange Demineralization. Municipal Water Treatment Process – Primary (Screening, Sedimentation and Coagulation), Secondary (Activated Sludge Process And Trickling Filter Process) And Tertiary (Ozonolysis, UV Treatment, Chlorination, Reverse Osmosis).

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TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Rrecognize and apply basic knowledge on different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.
2. Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
3. Identify and apply suitable spectroscopic technique for material analysis and study different forms of photochemical reactions.
4. Recognize different forms of energy resources and apply them for suitable applications in energy sectors.
5. Demonstrate the knowledge of water and their quality in using at different industries.

TEXT BOOKS:

1. Jain P. C., Monica Jain., "Engineering Chemistry", Sixteenth Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. S.S.Dara, "A text book of Engineering Chemistry", Chand Publications, 2014.

REFERENCES:

1. Schdeva M V, "Basics of Nano Chemistry", Anmol Publications Pvt Ltd
2. B.Sivasankar, "Instrumental Methods of Analysis", Oxford University Press. 2012.
3. Friedrich Emich, "Engineering Chemistry", Scientific International Ltd.
4. V RGowariker, N V Viswanathan, Jayadev Sreedhar, "Polymer Science", New AGE International Publishers, 2009.

GE5153 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To know the basics of algorithmic problem solving.
- To develop Python programs with conditionals and loops.
- To define Python functions and use function calls.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I INTRODUCTION TO COMPUTING AND PROBLEM SOLVING 9

Fundamentals of Computing – Computing Devices – Identification of Computational Problems – Pseudocodes and Flowcharts – Instructions – Algorithms – Building Blocks of Algorithms – Introduction to Python Programming – Python Interpreter and Interactive Mode – Variables and Identifiers – Arithmetic Operators– Values and Types – Statements.

Suggested Activities:

- Developing Pseudocodes and flowcharts for real life activities such as railway ticket booking using IRCTC, admission process to undergraduate course, academic schedules during a semester etc.
- Developing algorithms for basic mathematical expressions using arithmetic operations.
- Installing Python.
- Simple programs on print statements, arithmetic operations.

Suggested Evaluation Methods:

- Assignments on pseudocodes and flowcharts.
- Tutorials on Python programs.

UNIT II CONDITIONALS AND FUNCTIONS 9

Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement – Function Call and Returning Values – Parameter Passing – Local and Global Scope – Recursive Functions.

Suggested Activities:

- Simple Python program implementation using Operators, Conditionals, Iterative Constructs and Functions.
- Implementation of a simple calculator.
- Developing simple applications like calendar, phone directory, to-do lists etc.
- Flow charts for GCD, Exponent Functions, Fibonacci Series using conditionals and iterative statements.
- External learning - Recursion vs. Iteration.

Suggested Evaluation Methods:

- Tutorials on the above activities.
- Group discussion on external learning.

UNIT III SIMPLE DATA STRUCTURES IN PYTHON 10

Introduction to Data Structures – List – Adding Items to a List – Finding and Updating an Item – Nested Lists – Cloning Lists – Looping Through a List – Sorting a List – List Concatenation – List Slices – List Methods – List Loop – Mutability – Aliasing – Tuples: Creation, Accessing, Updating, Deleting Elements in a Tuple, Tuple Assignment, Tuple as Return Value, Nested Tuples, Basic Tuple Operations – Sets.

Suggested Activities:

- Implementing python program using lists, tuples, sets for the following scenario:
  - Simple sorting techniques
  - Student Examination Report
  - Billing Scheme during shopping.
- External learning - List vs. Tuple vs. Set – Implementing any application using all the three data structures.

Suggested Evaluation Methods:

- Tutorials on the above activities.
- Group Discussion on external learning component.

UNIT IV STRINGS, DICTIONARIES, MODULES 10

Strings: Introduction, Indexing, Traversing, Concatenating, Appending, Multiplying, Formatting, Slicing, Comparing, Iterating – Basic Built-In String Functions – Dictionary: Creating, Accessing, Adding Items, Modifying, Deleting, Sorting, Looping, Nested Dictionaries Built-in Dictionary Function – Finding Key and Value in a Dictionary – Modules – Module Loading and Execution – Packages – Python Standard Libraries.

Suggested Activities:

- Implementing Python program by importing Time module, Math package etc.
- Creation of any package (student's choice) and importing into the application.

Suggested Evaluation Methods:

- Tutorials on the above activities.

UNIT V FILE HANDLING AND EXCEPTION HANDLING 7

Introduction to Files – File Path – Opening and Closing Files – Reading and Writing Files – File Position – Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions.

Suggested Activities:

- Developing modules using Python to handle files and apply various operations on files.
- Usage of exceptions, multiple except blocks - for applications that use delimiters like age, range of numerals etc.
- Implementing Python program to open a non-existent file using exceptions.

Suggested Evaluation Methods:

- Tutorials on the above activities.
- Case Studies.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press, 2017.

2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second Edition, Shroff/O‘Reilly Publishers, 2016. (http://greenteapress.com/wp/thinkpython/).

REFERENCES:

1. Guido van Rossum, Fred L. Drake Jr., “An Introduction to Python – Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.
2. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and Expanded Edition, MIT Press , 2013
3. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley India Edition, 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, Cengage Learning, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓		✓		✓							✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

BS5161 **BASIC SCIENCES LABORATORY** **L T P C**

(Common to all branches of B.E. / B.Tech Programmes) **0 0 4 2**

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves and band gap determination.

LIST OF EXPERIMENTS:

1. Torsional pendulum – Determination of rigidity modulus of wire and moment of inertia of disc.
2. Non-uniform bending – Determination of young’s modulus.
3. Uniform bending – Determination of young’s modulus.
4. Lee’s disc Determination of thermal conductivity of a bad conductor.

5. Potentiometer – Determination of thermo e.m.f of a thermocouple.
6. Laser- Determination of the wave length of the laser using grating.
7. Air wedge – Determination of thickness of a thin sheet/wire.
8. Optical fibre – Determination of Numerical Aperture and acceptance angle.
9. Compact disc – Determination of width of the groove using laser..
10. Acoustic grating – Determination of velocity of ultrasonic waves in liquids.
11. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
12. Post office box – Determination of Band gap of a semiconductor.
13. Spectrometer – Determination of wavelength using gating.
14. Photoelectric effect.
15. Michelson Interferometer.
16. Estimation of laser parameters.
17. Melde's string experiment.

TOTAL: 30 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Determine various moduli of elasticity and also various thermal and optical properties of materials.

2. Determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

BASIC SCIENCE LABORATORY

CHEMISTRY LABORATORY: (Minimum of 8 experiments to be conducted)

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.

- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

- To demonstrate the analysis of metals and polymers by spectroscopy and viscometry methods.

LIST OF EXPERIMENTS:

1. Estimation of HCl using Na2CO3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler‟s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.

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7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of polyvinylalcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Phase change in a solid.

TOTAL: 30 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
2. Determine the amount of metal ions through volumetric and spectroscopic techniques.
3. Determine the molecular weight of polymers by viscometric method.
4. Quantitatively analyse the impurities in solution by electroanalytical techniques.
5. Design and analyse the kinetics of reactions and corrosion of metals.

TEXT BOOKS:

1. Laboratory Manual- Department of Chemistry, CEGC, Anna University (2014).
2. Vogel‟s Textbook of Quantitative Chemical Analysis (Eighth Edition, 2014).

GE5161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To articulate where computing strategies support in providing Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
2. Python programming using simple statements and expressions.
3. Scientific problems using Conditionals and Iterative loops.

4. Implementing real-time/technical applications using Lists, Tuples.
5. Implementing real-time/technical applications using Sets, Dictionaries.
6. Implementing programs using Functions.
7. Implementing programs using Strings.
8. Implementing programs using written modules and Python Standard Libraries.
9. Implementing real-time/technical applications using File handling.
10. Implementing real-time/technical applications using Exception handling.
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL: 60 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python data structures.
CO6: Apply Python features in developing software applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓		✓		✓							✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

HS5251 PROFESSIONAL COMMUNICATION

L	T	P	C
4	0	0	4

OBJECTIVES

- To improve the relevant language skills necessary for professional communication.
- To develop linguistic and strategic competence in workplace context.
- To enhance language proficiency and thereby the employability of budding engineers and technologists.

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UNIT I TECHNICAL COMMUNICATION 12

Listening: Listening to Telephone Conversations (Intent of the Speaker and Note Taking Exercises) – Speaking: Role Play Exercises Based on Workplace Contexts, Introducing Oneself – Reading: Reading the Interview of an Achiever and Completing Exercises (Skimming, Scanning and Predicting) – Writing: Writing a Short Biography of an Achiever Based on Given Hints – Grammar: Asking and Answering Questions, Punctuation in Writing, Prepositional Phrases – Vocabulary Development: Use of Adjectives.

UNIT II SUMMARY WRITING 12

Listening: Listening to Talks/Lectures Both General and Technical and Summarizing the Main Points – Speaking: Participating in Debates – Reading: Reading Technical Essays/ Articles and Answering Comprehension Questions – Writing: Summary Writing – Grammar: Participle Forms, Relative Clauses – Vocabulary Development: Use of Compound Words, Abbreviations and Acronyms.

UNIT III PROCESS DESCRIPTION 12

Listening: Listening to a Process Description and Drawing a Flowchart – Speaking: Participating in Group Discussions, Giving Instructions – Reading: Reading Instruction Manuals – Writing: Writing Process Descriptions – Writing Instructions – Grammar: Use of Imperatives, Active and Passive Voice, Sequence Words – Vocabulary Development: Technical Jargon.

UNIT IV REPORT WRITING 12

Listening: Listening to a Presentation and Completing Gap-Filling Exercises – Speaking: Making Formal Presentations – Reading: Reading and Interpreting Charts/Tables and Diagrams – Writing: Interpreting Charts/Tables and Diagrams, Writing a Report – Grammar: Direct into Indirect Speech, Use of Phrases – Vocabulary Development: Reporting Words.

UNIT V WRITING JOB APPLICATIONS 12

Listening: Listening to a Job Interview and Completing Gap-Filling Exercises – Speaking: Mock Interview, Telephone Interviews – Reading: Reading a Job Interview, SOP, Company Profile and Completing Comprehension Exercises – Writing: Job Applications and Resumes And Sops-Grammar: Present Perfect and Continuous Tenses- Vocabulary Development: Technical Vocabulary.

TOTAL : 60 PERIODS

LEARNING OUTCOMES

On completion of the course, the students will be able to:

1. Read and comprehend technical texts effortlessly.
2. Write reports of a technical kind.
3. Speak with confidence in interviews and thereby gain employability

TEXTBOOK

1. Revised Edition of ‘English for Engineers and Technologists’ Volume 1 published by Orient Black Swan Limited 2019.

ASSESSMENT PATTERN

- Assessments will assess all the four skills through both pen and paper and computer based tests.
- Assessments can be pen and paper based, quizzes.

MA5252 ENGINEERING MATHEMATICS – II L T P C

(Common to all branches of B.E. / B.Tech. Programmes in II Semester) 3 1 0 4

OBJECTIVES:

- To acquaint the students with the concepts of vector calculus which naturally arises in many engineering problems.
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
- To acquaint the students with Differential Equations which are significantly used in Engineering problems.
- To make the students appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I VECTOR CALCULUS 12

Gradient and Directional Derivative – Divergence and Curl – Irrotational and Solenoidal Vector Fields – Line Integral Over A Plane Curve – Surface Integral – Area of a Curved Surface – Volume Integral – Green's Theorem, Stoke's Theorem and Gauss Divergence Theorem – Verification and Application In Evaluating Line, Surface and Volume Integrals.

UNIT II ANALYTIC FUNCTION 12

Analytic Functions – Necessary and Sufficient Conditions for Analyticity – Properties – Harmonic Conjugates – Construction of Analytic Function - Conformal Mapping – Mapping by Functions – Bilinear Transformation $w = c + z,\ az,\ 1/z,\ z^2$.

UNIT III COMPLEX INTEGRATION 12

Line Integral - Cauchy's Integral Theorem – Cauchy's Integral Formula – Taylor's and Laurent's Series – Singularities – Residues – Residue Theorem – Application of Residue Theorem for Evaluation of Real Integrals – Use of Circular Contour and Semicircular Contour With No Pole on Real Axis.

UNIT IV DIFFERENTIAL EQUATIONS 12

Method of Variation of Parameters – Method of Undetermined Coefficients – Homogenous Equations of Euler's and Legendre's Type – System of Simultaneous Linear Differential Equations with Constant Coefficients.

UNIT V LAPLACE TRANSFORMS 12

Existence Conditions – Transforms of Elementary Functions – Transform of Unit Step Function and Unit Impulse Function – Basic Properties – Shifting Theorems – Transforms of Derivatives and Integrals – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Transform of Periodic Functions – Application to Solution of Linear Ordinary Differential Equations With Constant Coefficients.

TOTAL : 60 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

1. Calculate grad, div and curl and use Gauss, Stokes and Greens theorems to simplify calculations of integrals.
2. Construct analytic functions and use their conformal mapping property in application problems.
3. Evaluate real and complex integrals using the Cauchy's integral formula and residue theorem.
4. Apply various methods of solving differential equation which arise in many application problems.
5. Apply Laplace transform methods for solving linear differential equations.

TEXTBOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, Tenth Edition, New Delhi, 2015.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Forty fourth Edition, New Delhi, 2017.

REFERENCES:

1. Bali N., Goyal M., Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), Seventh Edition, New Delhi, 2009.
2. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, Fourth Edition, New Delhi, 2011.
3. Jain R.K., Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, Fifth Edition, New Delhi, 2017.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, Seventh Edition, New Delhi, 2012.
5. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., Eleventh Reprint, New Delhi, 2010.

AZ5201 OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES L T P C
3 0 0 3

OBJECTIVES:

- To understand the Object Oriented Programming(OOP) language concepts.
- To learn and implement different data structures using OOP concepts.
- To learn and use hierarchical data structures and its operations
- To learn the usage of graphs in real world problems
- To familiarize the techniques of Sorting, Searching and Hashing.

UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS 8

C++ - Data abstraction – encapsulation - Class – objects – Constructors - Static members - constant members - member functions – pointers - string handling - copy constructor - polymorphism – Function overloading - operators overloading Dynamic Memory Allocation.

Suggested Activities:

- Flipped Classroom - Features of OOP, Pointers.
- External learning - Dynamic memory allocation operators and its usage.
- Exploration of examples on static functions and usage of 'this' pointer.
- Exploration of the usage of reference variables, pointer to reference and reference to a pointer.
- Application development using Friend functions and function overloading.

Suggested Evaluation Methods:

- Assignments on the usage of dynamic memory allocation operators, Friend functions and reference variables.
- Quizzes on pointers and usage of pointers.
- Demonstration of the application development.

UNIT II OBJECT ORIENTED PROGRAMMING - ADVANCED FEATURES 8

Inheritance – Exception handling – Generic Programming - Templates - class templates- Virtual function - abstract class - STL : Containers, Algorithms, iterators.

Suggested Activities:

- Flipped Classroom on basics of exception handling.
- External learning - STL Containers and Iterators.
- Practical - Solve a given problem (such as Vector Manipulation, List Updation) by choosing appropriate functions from STL.
- Exploration on the usage of Virtual Functions and Abstract Classes.
- Application development using exception handling.

Suggested Evaluation Methods:

- Assignments on problem solving using STL.
- Quizzes on exception handling, abstract classes.
- Demonstration for application development.

UNIT III LINEAR DATA STRUCTURES – LIST, STACK, QUEUE 8

Array based & Linked list based implementation – Doubly & Circular Linked List - Applications of lists – Polynomial manipulation – Stack ADT – Queue ADT – Circular queue – Applications.

Suggested Activities:

- Flipped classroom on priority queue
- Converting an algorithm from recursive to non-recursive using stack.
- Demonstrating stack for Towers of Hanoi application
- Developing any application using all the linear data structures.

Suggested Evaluation Methods:

- Tutorials on applications of linear data structures.
- Checking output of programs implemented

UNIT IV NON LINEAR DATA STRUCTURES – TREES AND GRAPH 12

Tree - Definitions - Binary and Binary search trees - Implementation – Tree Traversals – Insertion – Deletion - Balanced Tree: AVL tree – m-way tree- B tree – Heaps - Applications.- Graphs – Definitions – Representation of Graphs – Topological Sort - Graph Traversals – Shortest Paths - Minimum Spanning Tree.

Suggested Activities:

- Flipped classroom on binary search trees and graph traversal application
- External learning - Fibonacci heap
- Exploration of application of trees where trees can be applied for real time problems.
- Exploration of other single source shortest path problems.
- Practical - Design and Implementation of a suitable tree/heap structure for solving a given real time problem such as implementation of syntax trees in compilers

Suggested Evaluation Methods:

- Assignments on Fibonacci Heaps, Real time problem solving using Trees and graph. .
- Quizzes on BST, Binary Heap, Graph.
- Demonstration of practical learning component.

UNIT V SORTING, SEARCHING AND HASHING TECHNIQUES 9

Sorting algorithms: Insertion sort – shell sort –quick sort – heap sort- Merge sort -Searching: linear search – Binary search – Hashing: Hash functions – Separate chaining – open addressing – Rehashing – Extendible hashing.

Suggested Activities:

- Flipped classroom on selection sort.
- External learning - External sorting implementation.
- Implementation of all sorting techniques.
- Demonstration of searching techniques under best and worst case inputs.

S**uggested Evaluation Methods**:

- Tutorials on External sorting.
- Checking output of programs implemented.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of the course the student should be able to

- Implement advanced data structures through ADTs using OOP.
- Select and use appropriate linear/non–linear data structure for solving a given problem.
- Apply suitable hierarchical data structures to solve practical problems.
- Apply the graph data structures for a real world problem.
- Appropriately use sort, search, hash techniques for a given application.

TEXT BOOKS:

1. Herbert Schildt, “C++ The Complete Reference”, Fourth Edition, McGraw Hill Education, 2003.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Fourth Edition, Pearson Education, 2013.

REFERENCES:

1. Paul Deitel, Harvey Deitel, “C++ How to Program”, Tenth Edition, Pearson Education, 2017.
2. Michael T, Goodrich, Roberto Tamassia, David Mount, ““Data Structures and Algorithms in C++”, Seventh Edition, Wiley Publishers, 2004.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, 2006.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Third Edition, Prentice-Hall, 2011.

EE5251 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To understand the basic concepts of electric circuits, magnetic circuits and wiring.
- To understand the operation of AC and DC machines.
- To understand the working principle of electronic devices and circuits.

UNIT I BASIC CIRCUITS AND DOMESTIC WIRING 9

Electrical Circuit Elements (R, L and C)-Dependent And Independent Sources – Ohm’s Law-Kirchhoff’s Laws – Mesh Current and Node Voltage Methods (Analysis with only Independent Source) – Phasors – RMS-Average Values – Sinusoidal Steady State Response of Simple RLC Circuits. Types of Wiring – Domestic Wiring – Specification of Wires – Earthing-Methods – Protective Devices.

UNIT II THREE PHASE CIRCUITS AND MAGNETIC CIRCUITS 9

Three Phase Supply – Star Connection – Delta Connection – Balanced and Unbalanced Loads- Power in Three-Phase Systems – Comparison of Star and Delta Connections – Advantages-Magnetic Circuits-Definitions – MMF, Flux, Reluctance, Magnetic Field Intensity, Flux Density, Fringing, Self and Mutual Inductances-Simple Problems.

UNIT III ELECTRICAL MACHINES 9

Working Principle of DC Generator, Motor-EMF And Torque Equation-Types – Shunt, Series and Compound-Applications. Working Principle of Transformer-EMF Equation – Operating Principles of Three Phase and Single Phase Induction Motor – Applications. Working Principles of Alternator – EMF Equation – Operating Principles of Synchronous Motor, Stepper Motor-Applications.

UNIT IV BASICS OF ELECTRONICS 9

Intrinsic Semiconductors, Extrinsic Semiconductors – P-type and N-type, P-N Junction, VI Characteristics of PN Junction diode, Zener Effect, Zener Diode, Zener Diode Characteristics-Rectifier Circuits – Wave Shaping.

UNIT V CURRENT CONTROLLED AND VOLTAGE CONTROLLED DEVICES 9

Working Principle and Characteristics – BJT, SCR, JFET, MOSFET.

TOTAL: 45 PERIODS

OUTCOMES:

CO1: To be able to understand the concepts related with electrical circuits and wiring.
CO2: To be able to study the different three phase connections and the concepts of magnetic circuits.
CO3: Capable of understanding the operating principle of AC and DC machines.
CO4: To be able to understand the working principle of electronic devices such as diode and zener diode.
CO5: To be able to understand the characteristics and working of current controlled and voltage controlled devices.

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education, 2014
2. Del Toro, “Electrical Engineering Fundamentals”, Second edition, Pearson Education, New Delhi,1989.
3. John Bird, “Electrical Circuit theory and technology”, Routledge, Fifth edition, 2013.

REFERENCES:

1. Thomas L. Floyd, ‘Electronic Devices’, 10th Edition, Pearson Education, 2018.
2. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th edition, 2017
3. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, McGraw Hill, 2010.
4. Muhammad H.Rashid, “Spice for Circuits and electronics”, 4th ed., Cengage India,2019.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓	✓	✓	✓						✓	
CO3	✓	✓	✓	✓	✓						✓	✓
CO4	✓	✓	✓	✓	✓						✓	✓
CO5	✓		✓	✓	✓						✓	✓

GE5151 **ENGINEERING GRAPHICS** **L T P C**
1 0 4 3

COURSE OBJECTIVES:

- To draw free hand sketches of basic geometrical shapes and multiple views of objects.
- To draw orthographic projections of lines and planes.
- To draw orthographic projections of solids.
- To draw the development of surfaces of objects.
- To draw isometric and perspective views of simple solids.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) **1**

Importance of Graphics in Engineering Applications – Use of Drafting Instruments – BIS Conventions and Specifications – Size, Layout and Folding of Drawing Sheets – Lettering and Dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING **14**

Basic Geometrical Constructions, Curves Used in Engineering Practices – Conics – Construction of Ellipse, Parabola and Hyperbola by Different Methods – Construction of Cycloid – Construction of Involutes of Square and Circle – Drawing of Tangents and Normal to the Above Curves. Visualization Concepts and Free Hand Sketching: Visualization Principles – Representation of Three – Dimensional Objects – Layout of Views- Free Hand Sketching of Multiple Views From Pictorial Views of Objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **15**

Orthographic Projection – Principles – Principle Planes – First Angle Projection – Projection of Points. Projection of Straight Lines (Only First Angle Projections) Inclined to Both the Principal Planes – Determination of True Lengths and True Inclinations by Rotating Line Method and Trapezoidal Method and Traces Projection of Planes (Polygonal and Circular Surfaces) Inclined to Both the Principal Planes by Rotating Object Method.

UNIT III PROJECTION OF SOLIDS **15**

Projection of Simple Solids like Prisms, Pyramids, Cylinder, Cone and Truncated Solids When the Axis is Inclined to Both the Principal Planes by Rotating Object Method and Auxiliary Plane Method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **15**

Sectioning of Solids in Simple Vertical Position When the Cutting Plane is Inclined to the One of the Principal Planes and Perpendicular to the other – Obtaining True Shape of Section. Development of Lateral Surfaces of Simple and Sectioned Solids – Prisms, Pyramids Cylinders and Cones. Development of Lateral Surfaces Of Solids With Cut-Outs and Holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS **12**

Principles of Isometric Projection – Isometric Scale – Isometric Projections of Simple Solids And Truncated Solids – Prisms, Pyramids, Cylinders, Cones – Combination of Two Solid Objects in Simple Vertical Positions and Miscellaneous Problems. Perspective Projection of Simple Solids – Prisms Pyramids and Cylinders by Visual Ray Method And Vanishing Point Method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) **3**

Introduction to Drafting Packages and Demonstration of Their Use.

TOTAL (L: 15 + P: 60):75 PERIODS

COURSE OUTCOMES:

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

1. Draw free hand sketching of basic geometrical shapes and multiple views of objects.
2. Draw orthographic projections of lines and planes
3. Draw orthographic projections of solids
4. Draw development of the surfaces of objects
5. Draw isometric and perspective views of simple solids.

TEXT BOOKS:

1. Bhatt, N. D.,Panchal V M and Pramod R. Ingle, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014.
2. Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015

REFERENCES:

1. Agrawal, B. and Agrawal C.M., “Engineering Drawing”, Tata McGraw, N.Delhi, 2008.
2. Gopalakrishna, K. R., “Engineering Drawing”, Subhas Stores, Bangalore, 2007.
3. Natarajan, K. V., “A text book of Engineering Graphics”, 28thEd., Dhanalakshmi Publishers, Chennai, 2015.
4. Shah, M. B., and Rana, B. C., “Engineering Drawing”, Pearson, 2ndEd., 2009.
5. Venugopal, K. and Prabhu Raja, V., “Engineering Graphics”, New Age,2008.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

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Special Points Applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only.
4. The students will be permitted to use appropriate scale to fit solution within A3 size. The examination will be conducted in appropriate sessions on the same day.

AZ5211 DATA STRUCTURES LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To understand the concepts of Object Oriented Programming.
- To use standard template library in the implementation of standard data structures.
- To learn the data structures using Object Oriented Programming (OOP) language.
- To explore linear and non-linear structures using OOP concepts.
- To understand various sorting, searching algorithms using OOP concepts.

LIST OF EXPERIMENTS: Implement the following exercises using C++:

1. Practice of C++ Programming on real world/technical applications using statements, expressions, decision making constructs, Iterative and branching constructs, structures, arrays, functions, pointers.
2. Implementation of Stack and queue using Arrays and Linked List.
3. Implementation of Binary Search Tree, AVL.
4. Implementation of Insertion sort, Quick Sort, Merge Sort.
5. Implementation of an Application (such as Library Management System) using Classes, Objects, Constructors, Destructors and String Handling.
6. Implementation of Programs using Function Overloading and Operator Overloading.
7. Implementation of an Application such as Student Information System using Inheritance, Virtual Functions and Abstract Classes.
8. Implementation of a Heap tree using Templates.
9. Implementation of Graph Traversals Algorithms: Breadth-First Search, Depth-First Search.
10. Implementation of List, Stack and Queue Data Structures using STL Concepts.
11. Mini Project

TOTAL:60 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

- Implement the basic and advanced concepts of object-oriented programming.
- Solve the given problem using object oriented concepts.
- Implement linear and non-linear data structures through ADTs using OOP.
- Analyze and apply the sorting, searching and hashing techniques for a real world problem.

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- Design and develop real time applications by applying suitable data structures and associated operations.

EE5261 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY L T P C
0 0 4 2

OBJECTIVES

- To impart hands on experience in verification of circuit laws and measurement of circuit parameters
- To train the students in performing various tests on electrical motors.
- To give practical exposure to the usage of CRO, power sources & function generators

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's Law.
2. Steady state response of AC and DC circuits (Mesh, Node Analysis)
3. Frequency response of RLC circuits.
4. Measurement power in three phase circuits by two-watt meter method.
5. Regulation of single phase transformer.
6. Performance characteristics of DC shunt generator.
7. Performance characteristics of single phase induction motor.
8. Characteristics of PN diode and Zener diode.
9. Characteristics of Zener diode.
10. Half wave and full wave Rectifiers
11. Application of Zener diode as shunt regulator.
12. Characteristics of BJT and JFET

TOTAL: 60 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Become familiar with the basic circuit components and know how to connect them to make a real electrical circuit.
2. Perform speed characteristic of different electrical machines.
3. Use logic gates and Flip flops.