



ACE ENGINEERING COLLEGE

Ankushapur, Ghatkesar – 501 301

(Autonomous)

B.TECH. FOUR YEAR DEGREE COURSE ELECTRICAL AND ELECTRONICS ENGINEERING COURSE STRUCTURE ACE R20

I Year			Course Title	I Semester			Credits
S.No.	Course type	Course Code		Periods per week			
				L	T	P	
1	BSC	MA101BS	Mathematics-I	3	1	0	4
2	BSC	CH102BS	Engineering Chemistry	3	1	0	4
3	ESC	EE103ES	Basic Electrical Engineering	3	0	0	3
4	ESC	ME105ES	Engineering Workshop	1	0	3	2.5
5	HSMC	EN105HS	English	2	0	0	2
6	BSC	CH106BS	Engineering Chemistry Lab	0	0	3	1.5
7	HSMC	EN107HS	English Language and Communication Skills Lab	0	0	2	1
8	ESC	EE108ES	Basic Electrical Engineering Lab	0	0	2	1
9	MC	MC109	Python Programming	1	0	2	0
10	MC	MC110	Aptitude & Reasoning	3	0	0	0
11			Induction Programme				
Total				16	2	12	19

I Year			Course Title	II Semester			Credits
S.No.	Course type	Course Code		Periods per week			
				L	T	P	
1	BSC	MA201BS	Mathematics – II	3	1	0	4
2	BSC	PH202BS	Applied Physics	3	1	0	4
3	ESC	CS203ES	Programming for Problem Solving	3	1	0	4
4	ESC	ME204ES	Engineering Graphics	1	0	4	3
5	BSC	PH205BS	Applied Physics Lab	0	0	3	1.5
6	ESC	CS206ES	Programming for Problem Solving Lab	0	0	3	1.5
7	MC	MC207ES	Environmental Science	3	0	0	0
8	MC	MC208	Business English	2	0	0	0
Total				15	3	10	18

Note: *MC = Satisfactory/Unsatisfactory

MA101BS: MATHEMATICS – I

B.Tech. I Year I Semester									
Course Code	Category	Hours/Week			Credits	Maximum Marks			
MA101BS	BSC	L	T	P	C	CIA	SEE	Total	
		3	1	-	4	30	70	100	
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60				
Prerequisite: Mathematical Knowledge of 12 th / Intermediate level									
<p>Course Objectives: To learn</p> <ol style="list-style-type: none"> 1. Types of matrices and their properties. 2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations. 3. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form. 4. Concept of Sequence. 5. Concept of nature of the series. 6. Geometrical approach to the mean value theorems and their application to the mathematical problems 7. Evaluation of surface areas and volumes of revolutions of curves. 8. Evaluation of improper integrals using Beta and Gamma functions. 9. Partial differentiation, concept of total derivative 10. Finding maxima and minima of function of two and three variables. 									
<p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ol style="list-style-type: none"> 1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations 2. Find the Eigen values and Eigen vectors 3. Reduce the quadratic form to canonical form using orthogonal transformations. 4. Analyse the nature of sequence and series. 5. Solve the applications on the mean value theorems. 6. Evaluate the improper integrals using Beta and Gamma functions 7. Find the extreme values of functions of two variables with/ without constraints. 									
UNIT: I	Matrices					No. of Classes: 12			
Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.									
UNIT: II	Eigen values and Eigen vectors					No. of Classes: 12			
Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation: Eigen values and 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	Sequences & Series	No. of Classes: 12
Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.		
UNIT: IV	Calculus	No. of Classes: 12
Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.		
UNIT: V	Multivariable calculus (Partial Differentiation and applications)	No .of Classes: 12
Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.		
Text Books: 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.		
Reference Books: 1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008. 2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010. 3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.		
Web References: 1) SWAYAM Online Courses https://storage.googleapis.com/uniquecourses/online.html 2) Directory of Open Access Journals https://doaj.org/ 3) Springer Open Journals https://www.springeropen.com/journals 4) UG/PG MOOCs http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php		
E-Text Books: 1) National Digital Library: https://ndl.iitkgp.ac.in/ 2) NCERT Text Books http://ncert.nic.in/textbook/textbook.htm 3) Directory of Open Access Books https://www.doabooks.org/		

H102BS/CH202BS: ENGINEERING CHEMISTRY

B.Tech. I Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CH102BS/CH202BS	Basic Sciences	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			
Prerequisite: Nil								
Course Objectives: <ul style="list-style-type: none"> To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them. To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry. To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways. To acquire the knowledge of preparation, properties and applications of engineering materials. 								
Course Outcomes: The basic concepts included in this course will help the student to gain: <ul style="list-style-type: none"> The knowledge of atomic, molecular and electronic changes, band theory related to conductivity. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments. The knowledge of configurational and conformational analysis of molecules and reaction mechanisms. The knowledge of preparation ,properties and applications of engineering materials. 								
Unit - 1	MOLECULAR STRUCTURE AND THEORIES OF BONDING							
Atomic and Molecular orbitals, Linear Combination of Atomic orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N ₂ ,O ₂ and F ₂ molecules. II- molecular orbitals of butadiene and benzene. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.								
Unit - 2	WATER AND ITS TREATMENT							
Water and its treatment: Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.								

Unit - 3	ELECTROCHEMISTRY AND CORROSION
<p>Electro Chemistry: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).</p> <p>Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion Corrosion control methods - Cathodic protection–Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. . Factors affecting rate of corrosion.</p>	
Unit - 4	STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES
<p>Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n-butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and Anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation Reactions : Oxidation of alcohols using KMnO₄ and chromic acid. Reduction reactions : Reduction of carbonyl compounds using LiAlH₄, NaBH₄ . Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.</p>	
Unit - 5	MATERIAL SCIENCE(POLYMERS,CERAMICS AND COMPOSITE MATERIALS) & SPECTROSCOPY
<p>POLYMERS: Introduction, classification, Types of polymerization, Thermoplastics and thermosetting polymers, synthesis and applications of poly vinyl chloride, Bakelite, nylon 6,6</p> <p>COMPOSITE MATERIALS: Composites - Constitution, classification, Particle reinforced composites, Fiber-reinforced composites, Metal-matrix composites, Carbon-carbon composites Structural composites, Advantages and applications.</p> <p>CERAMICS : Different types of ceramic crystal structures, Clay products, Advanced ceramics, Ceramic ball bearings, Cements.</p> <p>SPECTROSCOPY: Introduction to spectroscopy, IR spectra and its applications</p>	

Text Books:

1. A TEXT BOOK OF ENGINEERING CHEMISTRY BY DR S.S DHARA& DR. K. MUKKANTI.(S.Chand Publications)
2. A TEXT BOOK OF ENGINEERING CHEMISTRY BY DR BHARATHI KUMARI YALAMANCHALI.(VGS Techno Series)

Reference Books:

1. Physical Chemistry, by P.W. Atkins
2. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
3. University Chemistry, by B.M. Mahan, Pearson IV Edition.

Web References:

1. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S.Krishnan.
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P)Ltd., New Delhi.

E-Text Books:

- 1.[ebook] Central library IIT Indore (www.library.iiti.ac.in)
- 2.[ebook]Chemistry by Royal Society of Chemistry (<https://www.rsc.org/ebooks>)

EE103ES/ EE203ES: BASIC ELECTRICAL ENGINEERING

B. Tech. I Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EE103ES/ EE203ES	ESC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Content Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisite: Fundamentals of Physics								
Course Objectives: <ol style="list-style-type: none"> 1. To introduce the concepts of electrical circuits and its components 2. To understand AC single phase circuits and concept of power factor. 3. To realize the operation of Transformers. 4. To recognize the working of three phase Induction Motor. 								
Course Outcomes: Students are able <ol style="list-style-type: none"> 1. To resolve electrical circuits using network laws and theorems. 2. To able operate resonance in series RLC circuits. 3. To identify losses and calculate the efficiency of Transformer. 4. To realize Torque-Speed Characteristics of Three phase Induction Motor. 5. To analyze importance of Earthing and Energy Consumption. 								
UNIT: I	D.C. Circuits				No. of Classes: 09			
Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Star-Delta Transformations.								
UNIT: II	A.C. Circuits				No. of Classes: 09			
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series RL-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections. (Elementary Treatment Only)								

Module: III	Transformers	No. of Classes: 09
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. (Elementary Treatment Only)		
UNIT: IV	Electrical Machines	No. of Classes: 09
D.C. Machines: Construction, Principle and Types of D.C Machines. Speed control of separately excited dc motor.		
Induction Motors: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic		
Synchronous Generators: Construction and working of synchronous generators. (Elementary Treatment Only)		
UNIT: V	Electrical Installations	No. of Classes: 09
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup. (Elementary Treatment Only)		
Text Books:		
<ol style="list-style-type: none"> 1. D.P Kothari and I.J Nagrath, Basic Electrical Engineering 3rd Edition , Tata Mc Graw Hill Education Private Limited , 2009. 2. Sahdev S.K, Basic Electrical Engineering Pearson India Education Service Pvt. Ltd, 2015 		
Reference Books:		
<ol style="list-style-type: none"> 1. D.P.Kothari & I.J. Nagrath Theory and Problems of Basic Electrical Engineering by PHI.2009. 2. V.K Mehta , Principles of Electrical Engineering , S. Chand Publications.2008. 3. C.L. Wadhwa, Basic Electrical Engineering, New Age International Pvt Ltd Publishers, 2007 4. Abhijit Chakrabarti, Sudipta Debnath, Soumitra Kumar Mandal, Basic Electrical and Electronics Engineering-II, 2016 		
Web Reference:		
<ol style="list-style-type: none"> 1. https://swayam.gov.in/fundamentals of electrical engineering. 2. https://www.sciencedirect.com/book/9780750646376/electrical-engineers-reference-book 3. https://www.pdfdrive.com/basic-electrical-engineering-books.html 		

ME105ES/ME205ES: ENGINEERING WORKSHOP

B.Tech. I Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
ME105ES/ME205ES	ESC	L	T	P	C	CIA	SEE	Total
		1	-	3	2.5	30	70	100
Contact Classes: 15	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 60			
Prerequisite: Nil								
Course Objectives: <ol style="list-style-type: none"> 1. To Study of different hand operated power tools, uses and their demonstration. 2. To gain a good basic working knowledge required for the production of various engineering products. 3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field. 4. To develop a right attitude, team working, precision and safety at work place. 5. It explains the construction, function, use and application of different working tools, equipment and machines. 6. To study commonly used carpentry joints. 7. To have practical exposure to various welding and joining processes. 8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances. 								
List of Experiments: <ol style="list-style-type: none"> 1. TRADES FOREXERCISES: At least two exercises from each trade: <ol style="list-style-type: none"> I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint) II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit) III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel) IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern) V. Welding Practice – (Arc Welding & Gas Welding) VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light) VII. Black Smithy – (Round to Square, Fan Hook and S-Hook) 2. TRADES FOR DEMONSTRATION & EXPOSURE: <p>Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working</p>								

List of Equipments required

1. Benches
2. Sheet Metal Pieces for Conducting Experiment
3. Oil Fired and Coal Fired
4. Anvil
5. Swage Block
6. Sledge Hammer
7. Tong and other Black Smithy Tools
8. Wiring Board
9. Wiring Tools
10. Wiring Cables
11. Foundry Tools
12. Carpentry Vises
13. Cope and drag with Sweeps
14. Different Pattern
15. Core Boxes
16. Arc Welding machine
17. Tig welding Machine
18. Welding Tools
19. Power Hacksaw, Drilling Machine
20. Pipe Wise
21. Plumbing tools
22. Lathe Machine with all Accessories
23. Carpentry Tools
24. Water Plasma Cutting Machine
25. Wood Turning Lathe
26. Wood Pieces to Conduct Experiment
27. Bench Wises
28. Fitting Tools
29. Metal Pieces for Conducting Experiment
30. Tin Smithy Tools

EN205HS/EN105HS: ENGLISH

B.Tech. I Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EN205HS	HSMC	L	T	P	C	CIA	SEE	Total
		2	0	0	2	30	70	100
Contact Classes: 32	Tutorial Classes: -	Practical Classes: Nil			Total Classes: 32			
Prerequisite: Knowledge of functional English, basics in grammar, understanding of LSRW skills								
<p>Course Overview:</p> <p>In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.</p> <p>In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.</p> <p>Course Objectives:</p> <p>The course will help to</p> <ul style="list-style-type: none"> • Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills. • Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus. <p>Develop study skills and communication skills in formal and informal situations.</p>								

Course Outcomes:

Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

**Module:
I**

The Raman Effect

No.of Classes: 08

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Parts of Speech

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**Module:
II**

Ancient Architecture in India

No.of Classes: 06

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

**Module:
III**

Blue Jeans

No.of Classes: 05

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives- Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

Module: IV	What Should You Be Eating	No.of Classes: 07
<p>Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oral and Written Communication. Reading: Comprehension- Intensive Reading and Extensive Reading Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing</p>		
Module: V	How a Chinese Billionaire Built Her Fortune	No.of Classes: 06
<p>Vocabulary: Technical Vocabulary and their usage Grammar: Common Errors in English Reading: Reading Comprehension-Exercises for Practice Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.</p>		
<p>Text Book: 1.Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.</p>		
<p>Reference Books: Swan, M. (2016). Practical English Usage. Oxford University Press. 2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press. 3. Wood, F.T. (2007).Remedial English Grammar. Macmillan. 4. Zinsser, William. (2001). On Writing Well. Harper Resource Book. 5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press. 6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.</p>		
<p>Web References: 1. www.cambridgeenglishonline.org 2. www.eslcafe.com 3. bbc.co.uk/worldservice/learningenglish</p>		
<p>E-Text Books: 1. The secret to perfecting your grammar - Bloomsbury International</p>		

CH106BS/CH206BS: ENGINEERING CHEMISTRY LAB

B.Tech. I Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CH106BS	BASIC SCIENCE	L	T	P	C	CIA	SEE	Total
		-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisite: Nil								
<p>Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:</p> <ul style="list-style-type: none"> • Estimation of hardness and chloride content in water to check its suitability for drinking purpose. • To determine the rate constant of reactions from concentrations as a function of time. • The measurement of physical properties like adsorption and viscosity. • To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique. 								
<p>List of Experiments:</p> <ol style="list-style-type: none"> 1. Determination of total hardness of water by complexometric method using EDTA 2. Determination of chloride content of water by Argentometry 3. Estimation of an HCl by Conductometric titrations 4. Estimation of Acetic acid by Conductometric titrations 5. Estimation of HCl by Potentiometric titrations 6. Estimation of Fe²⁺ by Potentiometry using KMnO₄ 7. Synthesis of Aspirin and Paracetamol 8. Determination of acid value of coconut oil 9. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal 10. Determination of viscosity of ground nut oil by using Ostwald's viscometer. 11. Determination of partition coefficient of acetic acid between n-butanol and water. 12. Determination of surface tension of a give liquid using stalagmometer. <p>Thin layer chromatography calculation of R_f values. eg ortho and para nitrophenols. 14. Determination of rate constant of acid catalysed hydrolysis of methylacetate</p>								
<p>List of Equipment/Software (with Specifications or Range) Required:</p> <ol style="list-style-type: none"> 1. CONDUCTIVITYMETER 2. POTENTIOMETER. 3. WATER DISTILLATION SET 4. WATER BATH 5. TLC CHAMBER 6. UV CHAMBER 7. SHAKER BATH 								

EN207HS/EN107HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. I Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EN207HS	HSMC	L	T	P	C	CIA	SEE	Total
0	0	2	1	30	70	100		
Contact Classes: 32	Tutorial Classes: 0	Practical Classes: 32			Total Classes: 32			
Prerequisites: Knowledge of functional English, basics in grammar, understanding of LSRW skills								
Course Objectives:								
<ul style="list-style-type: none"> To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking To improve the fluency of students in spoken English and neutralize their mother tongue influence To train students to use language appropriately for public speaking and interviews 								
Learning Outcomes: Students will be able to attain								
<ul style="list-style-type: none"> Better understanding of nuances of English language through audio- visual experience and group activities Neutralization of accent for intelligibility Speaking skills with clarity and confidence which in turn enhances their employability skills 								

SYLLABUS

English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. Computer Assisted Language Learning (CALL) Lab
- b. Interactive Communication Skills (ICS) Lab

Listening Skills

Objectives

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role play – Individual/Group activities

Module: I	Exercise-I	No.of Classes: 08
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CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings –

Taking Leave – Introducing Oneself and Others.

Module: II	Exercise-II	No.of Classes: 06
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CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –MakingRequests and Seeking Permissions - Telephone Etiquette.

Module: III	Exercise-III	No.of Classes: 05
<p>CALL Lab: Understand: Intonation-Errors in Pronunciation-the Interference of Mother Tongue (MTI). Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.</p> <p>ICS Lab: Understand: How to make Formal Presentations. Practice: Formal Presentations.</p>		
Module: IV	Exercise-IV	No.of Classes: 07
<p>CALL Lab: Understand: Listening for General Details. Practice: Listening Comprehension Tests.</p> <p>ICS Lab: Understand: Public Speaking – Exposure to Structured Talks. Practice: Making a Short Speech – Extempore.</p>		
Module: V	Exercise- V	No.of Classes: 06
<p>CALL Lab: Understand: Listening for Specific Details. Practice: Listening Comprehension Tests.</p> <p>ICS Lab: Understand: Interview Skills. Practice: Mock Interviews.</p>		
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Swan, M. (2016). Practical English Usage. Oxford University Press. 2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press. 3. Wood, F.T. (2007).Remedial English Grammar. Macmillan. 4. Zinsser, William. (2001). On Writing Well. Harper Resource Book. 5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press. 6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press. 		
<p>Web References:</p> <ol style="list-style-type: none"> 1. elt.oup.com/learning resources 2. www.cambridgeenglishonline.org 3. www.eslcafe.com 4. bbc.co.uk/worldservice/learningenglish 5. www.manythings.org 		
<p>E-Text Books:</p> <ol style="list-style-type: none"> 1. The secret to perfecting your grammar - Bloomsbury International 		

EE108ES/ EE203ES: BASIC ELECTRICAL ENGINEERING LAB

B.Tech. I Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EE108ES/ EE203ES	ESC	L	T	P	C	CIA	SEE	Total
		0	0	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisite: BASIC ELECTRICAL ENGINEERING								
Course Objectives: <ol style="list-style-type: none"> 1. To introduce the concepts of electrical circuits and its components 2. To understand AC single phase circuits and concept of power factor. 3. To realize the operation of Transformers. 4. To recognize the working of three phase Induction Motor. 								
Course Outcomes: <ol style="list-style-type: none"> 1. To resolve electrical circuits using network laws and theorems. 2. To able operate resonance in series RLC circuits. 3. To identify losses and calculate the efficiency of Transformer. 4. To realize Torque-Speed Characteristics of Three phase Induction Motor. 5. To analyze importance of Earthing and Energy Consumption. 								
List of Experiments: <ol style="list-style-type: none"> 1. Verification of Ohms Law 2. Verification of KVL and KCL 3. Resonance in series RLC circuit 4. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits 5. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer 6. Load Test on Single Phase Transformer to Calculate Efficiency 7. Load Test on Single Phase Transformer to calculate Regulation 8. Measurement of Active and Reactive Power in a balanced Three-phase circuit 9. Performance Characteristics of a DC Motors 10. Torque-Speed Characteristics of a DC Motors 11. Performance Characteristics of a Three-phase Induction Motor 12. Torque-Speed Characteristics of a Three-phase Induction Motor 								

List of Equipment/Software(with Specifications or Range) Required:

1. Ohms Law kit
2. KVL and KCL kit
3. Resonance in series RLC circuit kit
4. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits panel
5. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer panel
6. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation) panel
7. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) panel
8. Measurement of Active and Reactive Power in a balanced Three-phase circuit panel
9. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor panel
10. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor panel
11. Performance Characteristics of a Three-phase Induction Motor panel
12. Torque-Speed Characteristics of a Three-phase Induction Motor panel
13. No-Load Characteristics of a Three-phase Alternator panel

MC109/MC209: PYTHON PROGRAMMING

B.TECH I YEAR II SEMESTER								
COURSE CODE	CATEGORY	HOURS/WEEK			CREDITS	MAXIMUM MARKS		
MC109/MC209	MC	L	T	P	C	CIA	SEE	TOTAL
		2	0	1	0	30	70	100
CONTACT CLASSES:30	TUTORIAL CLASSES: Nil	PRACTICAL CLASSES:15			TOTAL CLASSES :45			
PREREQUISITES: A course on “Python Programming”.								
COURSE OBJECTIVE:								
At the end of the course students should be able to:								
<ol style="list-style-type: none"> 1. To learn how to use lists, tuples, and dictionaries in Python programs. 2. To learn how to write loops and decision statements in Python. 3. To learn how to read and write files in Python. 4. To learn how to use exception handling in Python applications for error handling. 								
COURSE OUTCOME:								
At the end of the course students will be able to:								
<ol style="list-style-type: none"> 1. Explain basic principles of Python programming language. 2. Create, run and manipulate Python Programs using core data structures like Lists, Tuple, Set and 3. Dictionaries. 4. Understand and summarize different File handling operations. 5. Handle exceptions in programming. 								
Unit -1	Algorithms, building blocks of algorithms					NO OF CLASSES:9		
Algorithms, building blocks of algorithms (statements, state, control flow), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms. Python Basics, Features of Python, Python Applications, Installing and running Python with Different IDEs, Comments in Python, Memory Management in Python, Garbage Collection in Python, Python I/O : Printing to the Screen, Reading Keyboard Input.								
Unit -2	Operators in Python and Control Statements					NO OF CLASSES:9		
Operators in Python: Arithmetic, Relational and Comparison Operators, Python Assignment Operators, Logical Operators and Bitwise Operators, Membership Operators, Identity Operators, Operator Precedence and Associativity, Evaluating Expressions. Control Statements: A Word on Indentation, The if Statement, The if ... else Statement, The if ... elif ... else Statement, The while Loop, The for Loop, Infinite Loops, Nested Loops, Loop manipulation using pass, continue, break and else Statement.								
Unit -3	Variables and Data Types in Python					NO OF CLASSES:9		
Variables and Data Types in Python: How Python Sees Variables, Constants, Identifiers and Reserved words in Python, Naming Conventions in Python. Declaring and using Numeric data types: int, float, complex and boolean , Sequences: Using String data type, Lists and Tuples, Methods and Useful Built-in Functions, Dictionaries and Set Types								
Unit -4	Python Programming using functions, modules and packages					NO OF CLASSES:9		
Python Programming using functions, modules and packages: Organizing python codes using functions, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, Pass by Object Reference, Local and Global Variables, Scope and Lifetime of variables, Nested Functions, Recursive Functions, Powerful Lamda function.								

Unit -5	Python File Input-Output and Python Exception Handling	NO OF CLASSES:9
<p>Python File Input-Output: Opening and closing file, Various types of file modes, reading and writing to files. Python Exception Handling: Avoiding code break using exception handling , Various keywords to handle exception, try .. except .. else ... finally, Raising Exceptions, Assertions, Python Custom Exceptions. Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.</p>		
TEXT BOOKS:		
<ol style="list-style-type: none"> 1. Learning with Python3: How to Think Like a Computer Scientist, 3rd Edition – Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers 2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, Shroff/O'Reilly Publishers. 		
REFERENCE BOOKS:		
<ol style="list-style-type: none"> 1. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr. 2. Exploring Python, Timothy A. Budd, Mc Graw Hill Education 3. John V Guttag, —Introduction to Computation and Programming Using Python``, Revised and expanded Edition, MIT Press 4. PYTHON PROGRAMMING, Ashok Kamthane and Amit Ashok kamthane 		
E TEXT BOOKS:		
<ol style="list-style-type: none"> 1. https://www.davekuhlman.org/python_book_01.pdf 2. https://www.pdfdrive.com/python-programming-for-the-absolute-beginner-d34494394.html 3. http://index-of.es/Python/Exploring%20Python.pdf 		

MC210/MC110: APTITUDE AND REASONING

B.Tech. I Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
MC210/MC110	MC	L	T	P	C	CIA	SEE	Total
		3	-	-	0	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisite: Nil								
<p>Course Objectives: This is a foundation course and aims at enhancing employability skills in students. Students will be introduced to higher order thinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning. Students will be trained to work systematically with speed and accuracy while problem solving. The major areas covered in this course include</p> <ol style="list-style-type: none"> 1. Arithmetic Ability 2. Numerical Ability 3. Quantitative Aptitude 4. Verbal Reasoning 5. Logical reasoning 6. Visual Reasoning 								
<p>Course Outcomes: Upon the completion of the course, students are expected to</p> <ol style="list-style-type: none"> 1. Solve questions on the above mentioned areas using short cuts and smart methods 2. Understand the fundamentals concepts of Aptitude skills 3. Perform calculations with Speed & Accuracy 4. To improve Logical thinking. 5. To improve Application Knowledge 								
Unit-1	ARITHMETIC ABILITY FOUNDATION					No.of Classes: 09		
<p>ARITHMETIC ABILITY FOUNDATION: Square root, Cube roots, Speed Maths using Vedic Maths, Surds & Indices, Logarithms Number Systems - Types of numbers, Divisibility tests, LCM and HCF, Unit digit, Number of zeroes, Factorial, No. of factors, Remainder concepts, Successive Divisors</p>								
Unit-2	COMMERCIAL ARITHMETIC & ARITHMETIC ABILITY ADVANCED					No.of Classes: 09		
<p>COMMERCIAL ARITHMETIC: Percentages, Profit and Loss, Discount, Simple Interest & Compound Interest ARITHMETIC ABILITY ADVANCED: Time, Speed & Distance- Basics, Average Speed, Problems on Trains, Relative Speed, Boats & Streams, Races & Games, Circular Motion Time and work, Work & Wages, Chain Rule, Pipes and Cisterns</p>								
Unit-3	BIODIVERSITY AND BIOTIC RESOURCES					No.of Classes: 09		
<p>ALGEBRA: Linear Equations, Quadratic Equations and In-equations, Averages, Ratio, Proportion & Variations, Ages, Partnership LOGICAL REASONING: Statements & Conclusions, Statements & Course of Actions, Statements & Assumptions, Cause & Effect, Coded Inequalities, Syllogism, Input Output</p>								
Unit-4	MODERN APTITUDE					No.of Classes: 09		
<p>MODERN APTITUDE - I: Permutations & Combinations, Circular Permutation, Probability, Area and Volumes. MODERN APTITUDE - II: Data Sufficiency, Data Interpretation – Line graph, Pie Charts, Bar graph</p>								
Unit-5	VERBAL REASONING & VISUAL REASONING					No.of Classes: 09		
<p>VERBAL REASONING: Blood relations, Directions, Coding & Decoding, Number Ranking, Venn Diagrams, Alphanumeric Symbol Test, Mathematical operations.</p>								

Series, Analogy, Classification, Analytical Reasoning - Information Ordering – Arrangements

VISUAL REASONING: Series, Analogy, Classification, Mirror & Water Images, Spotting out the Embedded figure, Pattern Incompletion, Paper Folding & Cutting, Analytical Figures, Cubes & Dice

Text Books:

1. Quantitative Aptitude for Competitive Examinations – Dr. R.S Aggarwal, S. Chand Publisher, English Medium, Revised & Enlarged Edition.
2. A Modern Approach to Verbal Reasoning (Fully Solved) – Dr R.S Aggarwal, S. Chand Publisher, English Medium.
3. Environmental Studies by R. Rajagopalan, Oxford University Press.

Reference Books:

1. How to Prepare for Quantitative Aptitude for the CAT – Arun Sharma, Publisher: Mcgraw Hill TP, 8th Edition, English Medium.
2. A Modern Approach to Verbal & Non-Verbal Reasoning – Dr. R.S Aggarwal, S. Chand Publisher, English Medium, Revised Edition.
3. Quantitative Aptitude for All Competitive Examinations – Abhijit Guha, Publisher: Mcgraw Hill, 3rd Edition, English Medium.
4. Quantitative Aptitude - For Competitive Examinations – Rao U. M. Karanam, Publisher: Scitech Publications (India) Pvt. Ltd, ISBN: 9788183714631, English Medium.
5. Course in Mental Ability and Quantitative Aptitude - For Competitive Examinations – Edgar Thorpe, Publisher: Tata McGraw - Hill Education, 2nd Edition, English Medium.

MA201BS: MATHEMATICS – II
(ADVANCED CALCULUS & ELEMENTARY COMBINATORICS) (Common to
CE, EEE, ME, ECE, CSE, IT, AI, AI&ML, DSE)

B.Tech. I Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
MA201BS	BSC	3	1	-	4	30	70	100
		Contact Classes: 45			Tutorial Classes: 15		Practical Classes: Nil	
Prerequisite: Mathematical Knowledge of 12 th / Intermediate level								
Course Objectives: To learn <ul style="list-style-type: none"> • Methods of solving the differential equations of first and higher order. • Evaluation of multiple integrals and their applications • The physical quantities involved in engineering field related to vector valued functions • The basic properties of vector valued functions and their applications to line, surface and volume integrals • Concept of Recurrence Relations and generating functions 								
Course Outcomes: After learning the contents of this paper the student must be able to <ul style="list-style-type: none"> • Identify whether the given differential equation of first order is exact or not • Solve higher differential equation and apply the concept of differential equation to real world problems • Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped • Evaluate the line, surface and volume integrals and converting them from one to another • Apply the concepts of advanced counting techniques 								
Unit: I		First Order ODE				No. of Classes: 09(L), 03(T)		
Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.								
Unit: II		Ordinary Differential Equations of Higher Order				No. of Classes: 09(L), 03(T)		
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $x V(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.								
Unit: III		Multivariable Calculus (Integration)				No. of Classes: 09(L), 03(T)		
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).								

Unit: IV	Vector calculus	No.of Classes: 09(L), 03(T)
Gradient, Divergence, Curl, Line integral, conservative fields, Green's theorem, surface area of solids of revolution, surface area, surface integral, Triple integrals and Gauss Divergence theorem, Stokes' theorem (without proofs)		
Unit: V	Counting (Recurrence Relations & Elementary Combinatorics)	No.of Classes: 09(L), 03(T)
Basic counting, Pigeonhole principle, Permutations and Combinations, Binomial Coefficients, Application of Recurrence Relations, Solution of Recurrence Relations, Generating functions, Inclusion – Exclusion and applications		
Text Books:		
<ol style="list-style-type: none"> 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010 2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw Hill. 		
Reference Books:		
<ol style="list-style-type: none"> 1. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984. 2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002. 3. Higher Engineering Mathematics by B V Ramana, Tata McGraw-Hill 4. Discrete Mathematics for Computer Scientists and Mathematicians by Joe R. Mott, Abraham Kandel, Theodore P. Baker, Prentice-Hall of India Pvt.Ltd. 		
Web References:		
<ol style="list-style-type: none"> 1) SWAYAM Online Courses https://storage.googleapis.com/uniquecourses/online.html 2) Directory of Open Access Journals https://doaj.org/ 3) Springer Open Journals https://www.springeropen.com/journals 4) UG/PG MOOCs http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php 		
E-Text Books:		
<ol style="list-style-type: none"> 1) National Digital Library: https://ndl.iitkgp.ac.in/ 2) NCERT Text Books http://ncert.nic.in/textbook/textbook.htm 3) Directory of Open Access Books https://www.doabooks.org/ 		

**PH102BS /
PH202BS: APPLIED PHYSICS
(For All Circuit Branches)**

APPLIED PHYSICS								
R 20-B. TECH- I YEAR								
I SEMESTER: ECE, CSE (IoT), CSE (AI/ML) II SEMESTER: CSE, IT, EEE, CSE(DS)								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
PH102 /202BS	BS	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	4	30	70	100
CONTACT CLASSES:45	TUTORIAL CLASSES:15	PRACTICAL CLASSES: NIL				TOTAL CLASSES :60		
PREREQUISITES: Intermediate level Physics and Mathematics								
COURSE OBJECTIVES								
To make the student								
<ol style="list-style-type: none"> 1. Understand the basic concepts of Quantum Physics 2. Understand basics of semiconductors and operation of devices PN Diode, Zener Diode, BJT. 3. Understand basics of direct band gap semiconductors and operation of Opto-Electronic devices. 4. Gain knowledge on different ways of production of lasers and the basics of fiber optics 5. Apply the knowledge to understand the nature of different dielectric and magnetic materials and electromagnetic theory to solve problems in them 								
COURSE OUTCOMES:								
After completion of this course the student will be able to								
<ol style="list-style-type: none"> 1. Explain the wave-particle duality of both radiation and matter 2. Explain the different types of semi-conductors and the operation & characteristics of PN Diode, Zener diode and BJT 3. Describe the operation & characteristics of Opto- Electronic devices 4. Illustrate the features of a laser beam and its applications and explain fiber optic communication 5. Classify various dielectric and magnetic materials and explain the basics of electromagnetic theory 								
UNIT 1:	QUANTUM MECHANICS						No. of Classes: 12	
Introduction to quantum physics, de-Broglie's hypothesis, Wave-particle duality, Davisson-Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box, Bloch's Theorem- Electron motion in a periodic potential- Kronig-Penney Model-Effective Mass- Origin of Energy Bands in solids-Classification of materials into conductors, semiconductors and insulators.								
UNIT 2:	SEMICONDUCTOR PHYSICS						No. of Classes: 15	
Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.								
UNIT 3:	OPTOELECTRONICS						No. of Classes: 10	
Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.								
UNIT 4:	LASERS AND FIBER OPTICS						No. of Classes: 12	
Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO ₂) laser, He-Ne laser, Applications of laser. Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibers, Losses associated with optical fibers, Applications of optical fibers								
UNIT 5:	ELECTROMAGNETISM & MAGNETIC PROPERTIES OF MATERIALS						No. of Classes: 11	
Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Dielectricity, Permittivity and Dielectric constant, Hysteresis and Solenoid, Inductance								

Text Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning
2. Integrated Electronics by J. Millman and C. Halkias, TMH

Reference Books:

1. Richard Robinett, "Quantum Mechanics" 2nd ed. -Oxford.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, MGH (1995).
3. Halliday and Resnick, Physics - Wiley.
4. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

Web References:

1. web.mit.edu/6.732
2. <https://learnabout-electronics.org/semiconductors>
3. www.Aip.org/history/Heisenberg/p08.html
4. <https://www.youtube.com/watch?v=wpAA3qeOYiI>
5. <https://www.youtube.com/watch?v=OyC02DWq3mI>
6. <https://www.youtube.com/watch?v=KFCgeI4j-Ig>
7. <http://www.infocobuild.com/education/audio-video-courses/materials-science/optoelectronic-materials-and-devices-iit-kanpur.html#:~:text=Instructors%3A%20Prof.-,Deepak%20Gupta%20and%20Prof.,in%20optoelectronics%20and%20semiconductor%20devices.>
8. <https://circuitglobe.com/light-emitting-diode-led.html>
9. <https://solarlove.org/how-solar-cells-work-components-operation-of-solar-cells/>

E-Text Books:

1. <https://www.e-booksdirectory.com/details.php?ebook=11931>
2. <https://www.e-booksdirectory.com/details.php?ebook=5855>
3. <https://www.e-booksdirectory.com/details.php?ebook=5302>

CS103ES/CS203ES: PROGRAMMING FOR PROBLEM SOLVING

B. Tech I Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
CS103ES/CS203ES	ESC	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

Prerequisite: Basic knowledge of Computer

Course Objectives:

- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.
- To learn modular programming approach in programming
- To understand and learn the concept of derived data types.

Course Outcomes:

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into module (functions) and to develop modular reusable code.
- To use derived data type to write advances C programs.

Unit-1	COMPUTER FUNDAMENTALS AND INTRODUCTION TO C LANGUAGE	No. of Classes: 15
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Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm flowchart/Pseudo code with examples, Program design and structured programming **Introduction to**

Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,

The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, else, else, switch-case, ternary operator, goto, Iteration with for, while, dowhile loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Unit-2	Derived Data Types	No. of Classes: 14
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Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays **Strings** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcpy, strncpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) **Enumeration data type**

Unit-3	Files	No. of Classes: 09
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Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef **Files:** Text and binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Unit-4	Functions	No. of Classes: 10
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Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

Unit-5	Applications of Arrays & Analysis of algorithms	No. of Classes: 12
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Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion, Selection, **Quick and Merge** sort algorithms)

Reference Books:

1. 'C Programming: A Modern Approach (2nd Edition)' by K. N. King
2. Let us c by Yawanth Kanetkar
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
5. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
6. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
7. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

Web References:

1. <https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md#c>
2. https://publications.gbdirect.co.uk//c_book/

Text Books:

1. <https://books.goalkicker.com/CBook/>
 2. <http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20C%20Programming%20Language.pdf>
 3. <https://www.stormingrobots.com/prod/tutorial/pdf/kingBook-ch1to10.pdf>
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ME104ES/ME204ES: ENGINEERING GRAPHICS

B.Tech I year I semester

Course Code	Category	Hours/Week			Credits	Max Marks		
		L	T	P	C	CIA	SEE	Total
ME104ES/ME204ES	ESC	1	0	4	3	30	70	100
Contact Classes: 15	Tutorial Classes: 0	Practical Classes: 60			Total Classes: 75			

Prerequisite: None

Course Objectives: To provide basic concepts in engineering drawing.

- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course Outcomes: At the end of the course, the student will be able to:

- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT-1	Introduction to Engineering Drawing	No. of classes: 15
Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal		

UNIT-2	Orthographic Projections	No. of classes :15
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes		

UNIT-3	Projections of Regular Solids	No. of classes :15
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere		

UNIT-4	Development of Surfaces of Right Regular Solids	No. of classes :15
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder		

UNIT-5	Isometric Projections	No. of classes :15
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions		

Introduction to CAD: (For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

Text Books :

1. Engineering Drawing N.D. Bhatt /Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

Reference Books :

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGrawHill
2. Engineering Drawing/ M. B. Shah, B.C. Rane /Pearson.
3. Computer Aided Engineering Drawing – K BalaVeera Reddy et al – CBS Publishers

Web References :

1. <https://ndl.iitkgp.ac.in/>

E-text Books :

PH 105BS/PH205BS: APPLIED PHYSICS LAB

R 20- B.Tech. I Year I/II Semester

Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
PH 105BS/ PH205BS	BSC	-	-	3	1.5	30	70	100
		Contact Classes: Nil				Tutorial Classes: Nil		
		Practical Classes: 45			Total Classes:45			

Prerequisites: none

Course Objectives:

To make the student

1. To gain knowledge by applying the experimental methods to correlate with the theoretical concepts
2. To learn the usage of various electrical, magnetic and optical tools for measuring related parameters
3. To Apply the analytical techniques and graphical analysis to the experimental data
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group

Course Outcomes:

At the end of this course, the student will be able to

1. Operate different sets of measuring tools and techniques
2. Compute relevant physical quantities from the observed measurements and interpret through graphical methods in experiments using LCR, RC, LED, Solar Cell, Laser Diode circuit boards
3. Compare the experimental results with their theoretical counterparts
4. Demonstrate basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

List of Experiments:

- 1) **Charging, discharging and time constant of an R-C circuit**
 - 2) **L-C-R circuit – Resonance & Q-factor**
 - 3) **Magnetic field along the axis of current carrying coil – Stewart and Gees method**
 - 4) **Study the characteristics of a LED**
 - 5) **Study the characteristics of a LASER diode**
 - 6) **Bending losses of fibres & Evaluation of numerical aperture of a given fibre**
 - 7) **Energy gap of a material of p-n junction**
 - 8) **Hall Effect- Determination of Hall Coefficient**
 - 9) **Solar Cell-I-V Characteristics and Fill Factor**
 - 10) **Photoelectric Effect- Determination of Planck's Constant**
- (Any eight experiments to be mandatorily performed by the student)**

List of Equipment Required:

- Function Generators
- Battery Eliminators
- Ammeters
- Rheostats
- LCR Circuit Boards
- L-C Circuit Boards
- Laser Characteristics-Circuit Boards
- LED characteristics Boards
- Energy Gap Kits
- Optical Fiber Kits
- Hall Effect circuit Boards
- Photoelectric effect circuit Boards

CS106ES/CS206ES: PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. I Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS106ES/CS206ES	ESC	0	0	3	1.5	30	70	100
Contact Classes: 0	Tutorial Classes: 0	Practical Classes:45			Total Classes:45			

Prerequisite: Basic Knowledge of Computer

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

For all the Programs writing Algorithm and drawing Flow chart is Mandatory.

List of Experiments:

Basic programs

1. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.
3. Write a program to convert temperature from Fahrenheit to Celsius and vice versa.
4. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut + \frac{1}{2}at^2$ where u and a are the initial velocity in m/sec ($= 0$) and acceleration in m/sec^2 ($= 9.8 m/s^2$)).
5. Write a C program to find simple and compound interest.
6. Write a C program to find Gross salary of an Employee.

Decision Making statements

1. Write a program for finding the max and min from the three numbers using if-else.
2. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
3. Write program that declares Class awarded for a given percentage of marks, where mark $< 40\%$ = Failed, 40% to $< 60\%$ = Second class, 60% to $< 70\%$ = First class, $\geq 70\%$ = Distinction. Read percentage from standard input.
4. Write a C program to find the roots of a Quadratic equation.
5. Write a C program to find grade of a student using else if ladder.
6. C program to read weekday number and print weekday name using switch.

Loop:

1. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

```
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
```

2. Write a C program to print the following patterns:

```
1      *      1      1      *****
1 2    **     2 3    2 2    ***
1 2 3  ***    4 5 6    3 3 3  **
                          4 4 4 4  *
```

<ol style="list-style-type: none"> a. 1 2 3 4 5 6 8 9 10 	<ol style="list-style-type: none"> b. 1 01 101 0101 10101 	<ol style="list-style-type: none"> c. 1 22 333 4444 55555
--	--	--

d. *

*

Find the sum of the series

- a. $1^2+2^2+3^2+4^2+\dots+N^2$ b. $1/2 - 2/3 + 3/4 - 4/5 + 5/6\dots n$
c. $1-X^2/2!+X^4/4!-\dots$ d. $1-x/2 +x^2/4-x^3/6 \dots\dots\dots$

oop with Decision making Statements:

- Write a program that shows the binary equivalent of a given positive number between 0 to 255.
- Write a program that finds if a given number is a prime number
- Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression $1+x+x^2+x^3+\dots+x^n$. For example: if n is 3 and x is 5, then the program computes $1+5+25+125$.
- Write a C program to print all Perfect numbers between 1 to n.
- Write a C program to print all Armstrong numbers from 1 to N.

Function

- Write a C program to calculate factorial of a given number using function & recursion.
- Write a C Program for call by value & call by reference.
- Write a C program to calculate GCD of two number using function & recursion.
- Write a C program to calculate LCM of two number using function & recursion.
- Write a C program to find x^n using recursion.
- Write a C program to find minimum and maximum value from given two values using a macro.
- Write a C program to demonstrate the storage classes.
- Write a C program to demonstrate pre processor commands.

Arrays

- Write a C program to find the minimum, maximum and average in an array of integers.
- Write a C program to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
- Write a C program that uses functions to perform the following:
 - i. Addition of Two Matrices
 - ii. Multiplication of Two Matrices
- Write a C program to merge two arrays into a single array.
- Write a C program to implement Stack using array.
- Write a C program to implement Queue using array.

Sorting and Searching:

- Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
- Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
- Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- Write a C program that sorts the given array of integers using selection sort in descending order
- Write a C program that sorts the given array of integers using insertion sort in ascending order
- Write a C program that sorts the given array of integers using merge sort and quick sort in ascending order

Pointers & Dynamic Memory Allocation

- Write a C program to transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
- Write a program for reading elements using pointer into array and display the values using array.
- Write a program for display values reverse order from array using pointer.
- Write a program through pointer variable to sum of n elements from array.

Strings:

- Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent

Write a C program to count the lines, words and characters in a given text.

Write a C program that sorts a given array of names

structures

Define a structure for Student with Sno, Sname, marks of three subjects, avg. Write a C program to read 4 students information and display grade of the student.

Define a structure called books with book name, author, price, pages, and edition. Write a C program to read and display a book information using pointer.

Define a structure for complex number. Write functions on complex numbers (addition, subtraction, multiplication, division, complex conjugate) and implement them in a menu driven style.

files:

Write a C program to display the contents of a file to standard output device.

Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back.

Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Write a C program to display first n characters of a file in reverse order.

List of Equipment/Software (with Specifications or Range) Required:

A Computer System with Ubuntu operating system and GCC Compiler

References

Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice

Hall of India

R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)

Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.

Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

MC107ES/ MC207ES: ENVIRONMENTAL SCIENCE

B.Tech. I Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC107ES/ MC207ES	MC	3	-	-	0	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			

Prerequisite: Nil

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT: I	Ecosystems	No. of Classes: 09
Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.		

UNIT: II	Natural Resources & Energy resources	No. of Classes: 09
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.		

UNIT: III	Biodiversity And Biotic Resources	No. of Classes: 09
Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visits. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.		

UNIT: IV	Environmental Pollution and Control Technologies	No. of Classes: 09
Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management.		

Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT: V	Environmental Policy, Legislation & EIA	No. of Classes: 09
Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).		

Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life cycle assessment (LCA), Low carbon life style.

Text Books:

- Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- Environmental Studies by R. Rajagopalan, Oxford University Press.

Web References:

- .Fundamental concepts in Environmental Studies by Dr.D.DMishra
 - .Basis of Environmental Science by Micheal Allaby
-

Text Books:

- .[ebook] A Text Book of environmental studies by Shashi Chawla - Meripustak.com
 - . [ebook] A Text Book of environmental studies by Dr.D.K.Asthana <https://books.google.co.in>
-

MC108/MC208: BUSINESS ENGLISH

B.Tech. I Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
MC108/208	MC	L	T	P	C	CIA	SEE	Total
		2	0	0		0	30	70
Contact Classes: 30	Tutorial Classes: -	Practical Classes: Nil			Total Classes: 30			

Prerequisite: Knowledge of functional English, basics in grammar, understanding of LSRW skills

Course Objectives:

The course aims to illustrate the significance of communication in professional life and emphasize the need for continuous learning in the context of globalization.

Course Outcomes:

Students should be able to

- 1. Use English Language effectively in spoken and written forms.
- 2. Comprehend the given texts and respond appropriately in formal and informal situations.
- 3. Communicate confidently in various contexts and different cultures.
- 4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills to perform effectively in personal and professional contexts.

Module: I

COMMUNICATION

No. of Classes: 07

Reading: Goal of Reading, General Strategies for Reading Comprehension, Previewing, Predicting, Identifying the main Idea, Questioning, Making Inferences, Visualizing

Listening: A conversation on phone, Listening to a travel anecdote

Writing: Filling in an application form, Writing emails

Speaking: Breaking the Ice, JAM sessions

Vocabulary: Word Formation : Homophones, Homonyms, Homographs

Module: II

DEVELOPMENT AND TRAINING

No. of Classes: 06

Reading: Reading between the Lines, Reading and answering a quiz

Listening: Listening to an Interview on Radio, A conversation between colleagues

Writing: Letters- responding to an invitation, letter of enquiry, letter of apology

Speaking: Role Play: How to make decisions, Giving the summary of an article, Descriptions

Vocabulary: Synonyms and Antonyms, One-word substitutes

Module: III

CORPORATE CULTURE

No. of Classes: 05

Reading: Reading beyond the lines, An article on the power of customers' opinions online

Listening: Working in Teams, Talking about Meetings

Writing: A memo asking for suggestions, Minutes of the meetings

Speaking: Discussion- How to make work place more ecofriendly?

Vocabulary: Technical or business vocabulary, emails and website terms

Module: IV

BEING PERSUASIVE

No. of Classes: 06

Reading: Reading for Negative Facts, The art of agreeing and disagreeing

Listening: What makes people persuasive, People negotiating a sale at a trade fair

Writing: A survey report, Completing a business report

Speaking: Things that are important when making a presentation, short presentations

Vocabulary: Cohesive Devices or Linkers, Collocations

Reference Books:

- 1. New International Business English Updated Edition Workbook, Cambridge University Press.
- 2. Swan, M. (2016). Practical English Usage. Oxford University Press.
- 3. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
- 4. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
- 5. Zinsner, William. (2001). On Writing Well. Harper Resource Book.
- 6. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
- 7. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Web References:

- 9. elt.oup.com/learningresources
- 10. www.cambridgeenglishonline.org
- 11. www.eslcafe.com
- 12. bbc.co.uk/worldservice/learningenglish
- 13. www.manythings.org

Text Books:

- 3. The secret to perfecting your grammar - Bloomsbury International
-