

I SEMESTER

20MA104	Mathematics - I for Electrical Sciences (Common to ECE and BME)	L	T	P	C
		3	2	0	4
Nature of Course	Basic Sciences				
Pre requisites	Fundamentals of basic Mathematics				

Course Objectives

The course is intended to

1. Study the methodologies involved in solving problems related to fundamental principles of matrices and calculus.
2. Acquaint the student with mathematical tools needed in evaluating limits, derivatives and differentiation of one variable.
3. Learn the basic tools of calculus for the purpose of modeling the engineering problems mathematically and obtaining solutions.
4. Provide the concepts of evaluating multiple integrals and their usage.
5. Study the basics of vector calculus comprising of gradient, divergence, curl, line, surface, volume integrals and the classical theorems

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Apply the concept of orthogonal reduction to diagonals the given matrix	Apply
CO2	Understand the limit definition and rules of differentiation to differentiate functions.	Understand
CO3	Determine the circle of curvature, evaluate and envelope of the curves	Apply
CO4	Compute double and triple integrals	Understand
CO5	Apply the concepts of differentiation and integration to vectors	Apply

Course Contents**Unit – I Matrices****12**

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties(statement only) – Cayley-Hamilton theorem and its applications – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

Unit – II Limits, Continuity and Differentiability**12**

Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules – Rolle 's Theorem – Mean value theorem - Maxima and Minima of one variable.

Unit – III Differential Calculus**12**

Curvature – radius of curvature (Cartesian and Polar co-ordinates) – Centre of curvature – Circle of curvature – Involute and evolute – envelope.

Unit – IV Multiple Integrals**12**

Double integration- Cartesian and Polar co-ordinates – Change of order of integration – Area between two curves – Area of double integral – Triple integration

Unit – V Vector Calculus**12**

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's, Gauss divergence and Stokes ' theorem – Statement, Verification and Simple applications.

Total: 60 Periods

Text Books:

1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition 2016.
2. Veerarajan T," Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd Edition 2014.

Reference Books:

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics Semester II", Laxmi Publications, 6th Edition 2015.
2. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 3rd Edition 2012.

Web References

1. nptel.ac.in/courses/111/105/111105121
2. nptel.ac.in/courses/111/105/111105122

Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2										2		
CO2	3	3	2										3		
CO3	3	2	2										3		
CO4	3	3	2										2		
CO5	3	3	2										3		
	3	High				2	Medium					1	Low		

Formative assessment			
Bloom's Level	Assessment Component	Marks	Total marks
Remember	Online Quiz	5	15
Understand	Tutorial Class / Assignment	5	
	Attendance	5	

Summative Assessment				
Bloom's Category	Internal Assessment Examinations			Final Examination (60)
	IAE 1 (7.5)	IAE 2 (7.5)	IAE 3 (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyze				
Evaluate				
Create				

20BM101	BASICS OF ELECTRICAL AND BIOMEDICAL ENGINEERING	L	T	P	C
		3	0	0	3
Nature of Course		Engineering Sciences			
Pre requisites		Nil			

Course Objectives

The course is intended to

1. Understand the basic concepts of electric circuits and wiring.
2. Learn the principles of three phase circuits and magnetic circuits
3. Understand the operation of AC and DC machines.
4. Explore the knowledge on evolution and modern health care system in biomedical engineering
5. Study the properties of neurons and equivalent circuit model

Course Outcomes

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

CO.No.	Course Outcome	Bloom's Level
CO1	Explain the concepts related with electrical circuits and wiring	Understand
CO2	Explain the different three phase connections and the concepts of magnetic circuits	Apply
CO3	Interpret the operating principle of AC and DC machines	Understand
CO4	Identify the major role that advances in medical technology	Understand
CO5	Describe the process used for communication among neurons	Understand

Course Contents

UNIT – I BASIC CIRCUITS AND DOMESTIC WIRING 10

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 10

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 10

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 HISTORICAL PERSPECTIVE OF BIOMEDICAL ENGINEERING 9

The evolution and modern of health care system-Introduction to Biomedical Engineering-Recent advances in Biomedical engineering-Ethical issues, Definition-Ethical issues in emergency use and treatment use-The role of biomedical engineer in FDA process.

UNIT – V BIOELECTRIC PHENOMENA 6

Introduction-Neurons-Basic Biophysics tools-Equivalent circuit model for cell membrane-The Hodgkin-Huxley Model of Action Potential-model of whole neuron.

Total: 45 periods

Text books

1. Dr.Kothari D.P, Prof Nagrath I J,"Basic Electrical Engineering" , 3rd edition, Tata McGraw Hill, 2009.
- 2.John D. Enderle and Joseph D. Bronzino "Introduction to Biomedical Engineering", Elsevier International Projects Ltd., Boston, 3rd edition, 2012.
3. Muthusubramaniam R, Salivahanan S and Muraleedharan A.K, "Basic Electrical, Electronics and Computer Engineering", TMH 2007.

Reference books

1. Vijay kumar Garg,"Basic Electrical Engineering (A complete Solution)", Wiley, Reprint 2015.
2. Sen,P.C, "Principles of Electrical Machines and Power Electronics", Wiley, Reprint 2016
3. John D. Enderle and Susan M. Blanchard, "Introduction to Biomedical Engineering", Elsevier International Projects Ltd., Boston, 3rd edition, 2011

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3	1										2	1	
CO2	3	3	1										2	1	
CO3	3	3	1										2	1	
CO4	3	3	1					2				1	2	2	
CO5	3	3	1					2				1	2	2	
	3	High				2	Medium				1	Low			

Formative assessment			
Bloom's Level	Assessment Component	Marks	Total marks
Understand	Direct Measures: Quiz/Presentation/Tutorial	5	15
Understand	Indirect measures: Assignment/ Video presentation	5	
	Attendance	5	

Summative Assessment				
Bloom's Category	Continuous Assessment			Final Examination (Theory) (60)
	IAE 1 (7.5)	IAE 2 (7.5)	IAE 3 (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

20ENE01	COMMUNICATIVE ENGLISH (Common to all B.E. / B.Tech. Programmes)	L	T	P	C
		2	0	2	3
Nature of Course	Humanities and Social Science				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Improve lexical, grammatical and semantic competence.
2. Enhance communicative skills in real life situations.
3. Augment thinking in all forms of communication.
4. Equip with oral and written communication skills.
5. Gain employability skills.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Use effectively the lexical, grammatical and semantic knowledge	Remember
CO2	Communicate with clarity using intentional vocabulary in English	Apply
CO3	Articulate perfectly and express their opinions confidently using communicative strategies	Remember
CO4	Accomplish listening and reading skills for lifelong learning	Understand
CO5	Comprehend, interpret and present data	Understand

Course Contents**Unit - I Basic structure and Usage****6**

Parts of Speech -- Articles -- Tenses - Subject-Verb Agreement -- Different Grammatical forms of the same word - Listening to Speeches and Conversations from Communication software -- Listening to Announcements -- Listening and Gap Filling.

Unit - II Vocabulary and Language Development**6**

Intentional vocabulary used in and around Airport, Hospital, Hotel, Court -- Abbreviations and acronyms - One Word Substitution - Compound words -- Homophones and Homonyms -- Types of sentences - Ordering Jumbled Sentences Letter writing -- informal.

Unit - III Oral Communication Skills**6**

Improving fluency -- Articulation with pronunciation -- Voice modulation in Speaking -- One minute talk -Self Introduction and introducing ones friend -- Telephonic conversations -- Group Discussion -- Modal Auxiliaries -- discourse markers.

Unit - IV Comprehensive Listening and Reading**6**

Effective listening Strategies -- Listening to Interviews from Communication software -- Phrasal verbs -- Reading Comprehension -- "An Astrologer's Day" by R.K.Narayan and "Building a New State" by Dr. A.P.J. Abdul Kalam.

Unit - V Effective Writing**6**

Interpretation and presentation of data -- developing Hints -- general essays and paragraph writing -- Report Writing -- survey report and accident report - Instructions and Recommendations.

Total: 30 Periods

Laboratory Components

S.No	List of Exercises	CO Mapping	RBT
1	Role-play – One minute talk	3	Understand
2	Role-play – Telephonic conversations	3	Understand
3	Listening to speeches and lectures and gap filling	4	Understand
4	Group Discussion.	4	Understand
5	Articulation with pronunciation practice	3	Apply
6	Listening to Announcements – Listening and Gap Filling	4	Understand
7	Listening to Interviews & Native speakers' Conversations	4	Understand
8	Reading practice with articles in magazine and news papers.	4	Understand
9	Model – Job Interviews	4	Understand
10	Introspective report – Personal analysis	5	Understand
11	Telephone etiquette	3	Remember
12	Reading – Shorter texts and News Articles	4	Understand
13	Role Play – Getting and Giving Permission	3	Remember
14	Self Introduction(Formal)	3	Understand
15	Recommendations/Suggestions	3	Apply

Total: 30 Periods**Text Books**

1. Rizvi, Ashraf M., "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition, 2007.
2. Board of Editors, "Using English – A Coursebook for Undergraduate Engineers and Technologists", Orient BlackSwan Private Limited, Hyderabad, 2nd Edition, 2017.

Reference Books:

1. Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 10th Edition, 2007.
2. John Cunnison Catford, "A Practical Introduction to Phonetics", Clarendon Press, Jamaica, 2nd Edition, 2001.
3. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 3rd Edition, 2000.
4. S P Dhanavel "English and Soft Skills", Orient BlackSwan Private Limited, Hyderabad, 1st Edition, 2010.

Web reference:

https://www.googleadservices.com/pagead/aclk?sa=L&ai=DChcSEwIj4dCTucfsAhXE1pYKHch4ABMYABABGgJ0bA&ohost=www.google.com&cid=CAASEuRo76H-Vx9BpazOOBfXeJSKVQ&sig=AOD64_3O-HNEnUO4A5sc31MsUfaTBGG-dQ&q&adurl&ved=2ahUKEWjC3ceTucfsAhXBeisKHatIBewQ0Qx6BAGfEAE

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1							1			3	2	2	2		
CO2							1			3	2	2	2		
CO3							1			3	2	2	2		
CO4							1			3	2	2	2		
CO5							1			3	2	2	2		
	3	High				2	Medium				1	Low			

Summative assessment						
Bloom's Level	Continuous Assessment					Final Examination (Theory) [50 marks]
	Theory Marks				Practical	
	IAE-I [7.5]	IAE-II [7.5]	IAE -III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	20	20	20		40	40
Understand	20	20	20		40	40
Apply	10	10	10		20	20
Analyze						
Evaluate						
Create						

20PH102	Physics for Electrical Sciences (Common to ECE and BME)	L	T	P	C
		3	0	2	4
Nature of Course	Basic Sciences				
Pre requisites	Fundamentals of Basic Physics				

Course Objectives: The course is intended to

1. Impart knowledge of optics, especially laser and their applications in fiber optics.
2. Gain knowledge to learn thermal properties of materials and their applications.
3. Provide knowledge of properties of matter like elasticity and its applications.
4. Learn the electronic properties of materials like semiconductors and its applications.
5. Develop a clear understanding of optical devices like solar cell, LED etc.

Course Outcomes

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

CO.No.	Course Outcome	Bloom's Level
CO1	Compare the working of lasers and propagation of light through optical fibers and its applications.	Understand
CO2	Demonstrate the thermal conductivity of the good and bad conductors	Understand
CO3	Explain the knowledge about elasticity	Understand
CO4	Interpret the knowledge about semiconductor materials.	Understand
CO5	Illustrate the working of optoelectronic devices.	Understand

Course Contents:

UNIT I Laser and Fiber Optics

9

Lasers: population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibers (material, refractive index, mode) – optical fiber communication system – fiber optic endoscope.

UNIT II Thermal Physics

9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications : heat exchangers in refrigerators, ovens and solar water heaters.

UNIT III Properties of Matter

9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever – uniform and non-uniform bending - I-shaped girders - stress due to bending in beams.

UNIT IV Semiconductor Physics

9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration –Hall effect and its applications.

UNIT V Optical Properties of Materials

9

Classification of optical materials – carrier generation and recombination processes - photo current in a P- N diode: principle and working – solar cell and photo detectors: working principle – LED: principle and working – Organic LED: principle and working, advantages over LED – Laser diodes: principle, working and applications.

Total : 45 Periods

Laboratory Components

S.No	List of Experiments	CO Mapping	RBT
1	Determination of rigidity modulus – Torsion pendulum	CO3	Apply
2	Determination of Young's modulus by non-uniform bending method.	CO3	Apply
3	Determination of wavelength, and particle size using Laser	CO1	Apply
4	Determination of acceptance angle in an optical fiber	CO1	Apply
5	Determination of thermal conductivity of a bad conductor by Lee's Disc method	CO2	Apply
6	Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer	CO3	Apply
7	Determination of Coefficient of viscosity of liquid	CO3	Apply

Total: 30 Periods**TEXT BOOKS:**

1. Bhattacharya, D.K and Poonam, T, "Engineering Physics", 2nd edition, Oxford University Press, 2015.
2. M.N. Avadhanulu, M.N. & Kshirsagar PG. "A Text book of Engineering Physics", 10th edition, S.Chand and company, Ltd., New Delhi, 2014.
3. William D.Callister,Jr and David. G.Bethwisch, "Materials Science and Engineering", 9th edition, John Wiley & Sons, Inc, 2019.

REFERENCES:

1. Halliday, D, Resnick, R and Walker, J, "Principles of Physics", 10th edition, Wiley, 2014.
2. Serway, R.A. & Jewett, J.W, "Physics for Scientists and Engineers", 9th edition, Cengage Learning, 2019.
3. Raghavan, V. "Materials Science and Engineering, A First course", 5th edition, PHI Learning, 2015.

Web References:

1. <https://nptel.ac.in/courses/115/107/115107095/>
2. <https://www.coursera.org/lecture/fe-exam/stresses-in-beams-strains-in-pure-and-nonuniform-bending-6aMRx>
3. <https://nptel.ac.in/courses/115/105/115105099/#>
4. <https://www.youtube.com/watch?v=uv0LxMoalEQ>

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1												
CO2	3	1	1												
CO3	3	2	1												
CO4	3	1	1												
CO5	3		1												
	3	High				2	Medium				1	Low			

Summative assessment						
Bloom's Level	Continuous Assessment					Final Examination (Theory) [50 marks]
	Theory Marks				Practical	
	IAE-I [7.5]	IAE-II [7.5]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	30	30	30		-	30
Understand	62	62	62		40	62
Apply	8	8	8		60	8
Analyse	-	-	-		-	-
Evaluate	-	-	-		-	-
Create	-	-	-		-	-

20CS102	PROBLEM SOLVING USING PYTHON (Common to all Branches)	L	T	P	C
		3	0	2	4
Nature of Course	Engineering Sciences				
Pre requisites	Mathematical and Logical Knowledge				

Course Objectives

The course is intended

1. To think logically and write algorithm and draw flow charts for problems.
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures -- lists, tuples, dictionaries and files.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Develop algorithmic solutions to simple computational problems and read, write, execute by simple python programs.	Apply
CO2	Structure simple python programs for solving problems.	Understand
CO3	Administer the role of control statements and functions involving the idea of modularity.	Apply
CO4	Represent compound data using python strings and lists.	Apply
CO5	Read and write data from/to files in python Programs.	Understand

Course Contents:

Unit I Basics of Computers & Problem Solving 9

Computer Basics – Components-Computer organization - Computer Software- Types of software - Software Development steps -Need for logical analysis and thinking- Algorithms – Flowchart - Number system.

Unit II Introduction of Python Programming 9

Introduction-Python Interpreter-Interactive and script mode -Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, Input and Output Statements.

Unit III Control statements and Functions 9

Conditional (if), alternative (if-else), chained conditional (if-elif-else)-Iteration-while, for, break, continue, pass – Functions - Introduction, inbuilt functions, user defined functions, passing parameters, return values, recursion, Lambda functions.

Unit IV Strings and Lists 9

Strings-String slices, immutability, string methods and operations -Lists-creating lists, list operations, list methods, mutability, aliasing, cloning lists, list and strings, list and functions-list processing-list comprehension, searching and sorting.

Unit V Tuples, Dictionaries and Files 9

Tuples- Tuple assignment, lists and tuples, Tuple as return value- Dictionaries-operations and methods, Files and Exception-Text files, reading and writing files, format Operator, Exception handling.

TOTAL : 45 Periods

Laboratory Components

S.No	List of Experiments	CO Mapping	RBT
1	Write a algorithm & draw flowchart for simple computational problems	CO1	Understand
2	Write a program to perform different arithmetic operations on numbers in python.	CO2	Understand
3	Write a python program to implement the various control structures	CO3	Apply
4	Write a python program for computational problems using recursive function.	CO3	Apply
5	Demonstrate use of list for data validation.	CO4	Apply
6	Develop a python program to explore string functions	CO4	Analyze
7	Implement linear search and binary search.	CO4	Apply
8	Develop a python program to implement sorting methods	CO4	Analyze
9	Develop python programs to perform operations on dictionaries.	CO5	Analyze
10	Write a python program to read and write into a file	CO5	Apply

TOTAL: 30 Periods**Text Books:**

1. Reema Thareja, "Problem Solving and Programming with Python", Oxford University Press, 2018
2. Dr. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2017 Edition

Reference Books:

1. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012
2. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 2018.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013
4. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2	1										3	1		
CO2	3	2	1										3	1		
CO3	3	2	2										3	1		
CO4	3	2	2										3	1		
CO5	3	2	2										3	1		
	3	High				2	Medium				1	Low				

Summative assessment						
Bloom's Level	Continuous Assessment					Final Examination (Theory) [50 marks]
	Theory Marks				Practical	
	IAE-I [7.5]	IAE-II [7.5]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	10	10	10			20
Understand	20	20	20		30	50
Apply	20	20	20		50	30
Analyse	-	-	-		20	-
Evaluate	-	-	-		-	-
Create	-	-	-		-	-

20BM102	BIOMEDICAL ENGINEERING PRACTICES LAB (Common to ECE & BME Branches)	L	P	T	C
		3	0	0	3
Nature of Course	Engineering Science				
Pre requisites	NA				

Course Objectives

The course is intended to

1. Provide hands on experience on various Hospital wiring and its Control Circuit
2. Understand patient and electrical safety including calibration
3. Provide a comprehensive understanding of basic electronic components and equipment's
4. Study the basic circuits using Active and Passive Components
5. Understand the fundamental principles of logic gates

Course Outcomes

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

1. Construct basic Hospital electrical wirings for Intensive Care Units [ICU]
2. Test and Measure patient lead leakage including electrical quantities using Patient Safety Analyzers
3. Demonstrate sine, square and triangular waveforms with required frequency and amplitude using function generator
4. Identify the RLC Components and Logic gates
5. Design medical electronic circuits using Electronic Design tools

CYCLE-1

S.No.	Course Content	CO	Bloom's Level
1	Hospital Wiring using switches, fuse, indicator, lamp and energy meter with Control Circuits	CO 1	Understanding
2	Fluorescent lamp wiring	CO 1	Applying
3	Stair case wiring	CO 1	Applying
4	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit	CO 2	Understanding
5	Measurement of energy using single phase energy meter	CO 2	Understanding
6	Calibration and Testing of Biomedical Equipment's	CO 2	Applying

CYCLE-2

S.No.	Course Content	CO	Bloom's Level
1	Study of Electronic components and equipments – Resistor - Color coding. Measurement of AC signal parameter (peak-peak Voltage, RMS Voltage, frequency) using CRO	CO 4	Understanding
2	Study of logic gates AND, OR, EX-OR and NOT	CO 4	Understanding
3	Generation of Clock Signal	CO 3	Remembering
4	Soldering practice – Components Devices and Circuits – Using general purpose PCB	CO 5	Applying
5	Measurement of ripple factor of HWR & FWR	CO 3	Analyzing
6	Design Bio-amplifier for Noise elimination	CO 5	Applying

Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1		1	1							3	1	1
2	3	1	1		1	1							3	1	1
3	3	1	1		1	1							3	1	1
4	3	1	1		1	1							3	1	1
5	3	1	1		1	1							3	1	1
	3	High				2	Medium					1	Low		

Summative assessment based on Continuous and Final Examination		
Bloom's Level	Rubric based Continuous Assessment [50 marks]	Final Examination [50 marks]
Remember	10	10
Understand	50	50
Apply	30	30
Analyze	10	10
Evaluate	-	-
Create	-	-

20MC101	Induction Programme (Common to all Branches)	L	T	P	C
		2	0	0	0
Nature of Course	Mandatory, Non Credit				
Pre requisites	Completion of Schooling at Higher Secondary Level				

Course Objectives

The course is intended to

1. To nurture the character and behavior as a student.
2. To have broad understanding of society and relationships.
3. To impart interpersonal and soft skills.
4. To inspire the students in the field of engineering.
5. To provide exposure to industries.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO 1	Perform curricular and co-curricular activities excellently.	Knowledge
CO 2	Do the skill based training with excellence.	Understand
CO 3	Work as team for the given task	Apply
CO 4	Gain character and behaviour	Knowledge
CO 5	Demonstrate the acquired skills effectively	Apply

Course Contents

PHYSICAL ACTIVITY

Yoga, Sports

CREATIVE ARTS (students can select any one of their choice)

Painting, sculpture, pottery, music, craft making and so on

UNIVERSAL HUMAN VALUES

Enhancing soft skills

LITERARY AND PROFICIENCY MODULES

Reading, Writing, Speaking- Debate, Role play etc.,

Communication and computer skills

LECTURES BY EMINENT PEOPLE

Guest lecture by subject experts

VISIT TO LOCAL CITIES

Meditation centers / Industry

FAMILARIZATION TO DEPARTMENT / BRANCH INNOVATION

Lectures by Departments Head and senior faculty members

Total Hours: 45

Mapping of COs with POs and PSOs

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						2	1	2				3	2		
CO2						2	1	2				3	2		
CO3						2	1	2				3	2		
CO4						2	1	2				3	2		
CO5						2	1	2				3	2		
	3	High				2	Medium					1	Low		

Bloom's Level	Continuous Assessment (Non-Credit, Mandatory)				
	Test -I [20]	Test -II [20]	Test - III [20]	Assignment/ Activity [20]	Attendance [20]
Remember	10	10	10		
Understand	20	20	20	10	
Apply	20	20	20	10	
Analyse					
Evaluate					
Create					

20ENE02	Advanced Communicative English (Common to all B.E./ B.Tech Programmes)	L	T	P	C
		2	0	2	3
Nature of Course	Humanities and Social Sciences				
Pre requisites	Basics of Communicative English				

Course Objectives

The course is intended to

6. Demonstrate satisfactory control over complex structures and mechanics in English.
7. Develop fluency and accuracy in oral communication.
8. Communicate effectively and actively in social interactions.
9. Read English at inspectional level.
10. Face interviews with confidence.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Apply knowledge of English grammar for effective communication	Remember
CO2	Make use of common English phrases and vocabulary strength.	Understand
CO3	Build self-confidence and enhance professionalism	Apply
CO4	Implement listening, reading and writing skills in real - life situations	Apply
CO5	Speak fluently in English with proper pronunciation, intonation, tone and accent.	Understand

Course Contents

Unit – I Grammar and usage

6

Active voice and passive voice – Prefixes and suffixes – Connotation – Clauses - If conditionals – Idioms & Phrases - Right forms of verbs – Modal Auxiliaries - Spotting errors.

Unit - II Lexical competence

6

Technical Vocabulary - Expressions – Frequency – Cause and effect - Words often Miss-spelled – Syntax and structure - Homophones and Homonyms- Verbal analogy - Idioms and Phrases.

Unit - III Conversational etiquette

6

Processes description – Tone and accent in speech – Role-play (Job-Interview) – Presentation skills – Mechanics of presentation - Telephone etiquette – Group Discussion strategy - Formal & Informal subjective and objective introduction – Body Language – Mock Interview.

Unit – IV Listening reading and writing

6

Listen to Scientific / Technical talks and gap filling – Listening to TED/INK Talks – Reading – “Water: The Elixir of Life” by Sir. C.V.Raman. “Progress” by St. John Ervine - Instructions and Recommendations – Letter writing formal – Job application- Report writing – Introspective report – Creative writing – Essays and Paragraphs.

Unit – V Phonetics

6

Production and classification of speech sound – International Phonetic Alphabet and transcriptions – Phonological rules – way and Place of articulation – Vowels, consonants and diphthongs. Specific characteristics feature of vowel sounds.

Total: 30 Periods

Laboratory Components

S.No	List of Exercises	CO Mapping	RBT
1	Role-play – Processes Description	2	Remember
2	Listening to TED/INK Talks and gap filling	4	Understand
3	Group Discussion	3	Understand
4	Articulation with pronunciation practice	3	Apply
5	Reading – Longer texts and Technical Articles (Skimming & Scanning).	4	Apply
6	Presentation skills – Mechanics of presentation	5	Understand
7	Individual presentation on given topics	5	Remember
8	Telephone etiquette	5	Understand
9	Instructions and Recommendations	5	Remember
10	Writing – General Essays.	4	Apply
11	Report writing technique- write up	4	Remember
12	Introspective report – Personal analysis	4	Understand
13	Model Job Interviews	3	Understand
14	Job Interviews(Role play)	3	Apply
15	Body Language	3	Understand

Total: 30 Periods**Text Books**

- Rizvi, Ashraf.M, “Effective Technical Communication”, Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition, 2007.
- Hewings. M, “Advanced English Grammar”, 3rd Edition, Cambridge University Press, Chennai, 5th Edition, 2000.
- Board of Editors, “Using English – A Coursebook for Undergraduate Engineers and Technologists”, Orient BlackSwan Private Limited, Hyderabad, 2nd Edition, 2017.

Reference Books:

- Raman M & Sangeetha Sharma, “Technical Communication”, Oxford University Press, USA, 10th Edition, 2007.
- John Cunnison Catford, “A Practical Introduction to Phonetics”, Clarendon Press, Jamaica, 2nd Edition, 2001.
- Norman Whitby, Business Benchmark – “Pre-Intermediate to Intermediate, Students Book”, Cambridge University Press, 1st Edition, 2006.
- Dhanavel S. P., “English and Soft Skills”, 1st Edition, Orient BlackSwan Private Limited, Hyderabad, 1st Edition, 2010.

Web reference:

- https://www.coursera.org/lecture/tesol-speaking/video-2-listening-strategies-for-learners-3AeBL?utm_source=mobile&utm_medium=page_share&utm_content=vlp&utm_campaign=top_button
- blob:<https://www.youtube.com/73f7256d-d302-4563-bed5-9e84c94a26ac>

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										3	1	2	2		
CO2										3	1	2	2		
CO3										3	1	2	2		
CO4										3	1	2	2		
CO5										3	1	2	2		
	3	High				2	Medium				1	Low			

Summative assessment						
Bloom's Level	Continuous Assessment					Final Examination (Theory) [50 marks]
	Theory Marks				Practical	
	IAE-I [7.5]	IAE-II [7.5]	IAE -III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	20	20	20		40	40
Understand	20	20	20		40	40
Apply	10	10	10		20	20
Analyse						
Evaluate						
Create						

II SEMESTER

20MA204	Mathematics - II for Electrical Sciences (Common to ECE and BME)	L	T	P	C
		3	2	0	4
Nature of Course	Basic Sciences				
Pre requisites	Fundamentals of Basic Mathematics				

Course Objectives

The course is intended to

1. Learn rigorous and analytic approach to analyze the conformal mapping.
2. Study the knowledge of evaluating contour integrals using residue theorem.
3. Explain the concept of Laplace transforms and its applications to various problems related to Engineering.
4. Acquaint the student with Fourier transform techniques used in wide variety of situations
5. Study the knowledge of specific mathematical tools and techniques such as Z-transforms and solutions of difference equations

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Compute an analytic function, when its real or imaginary part is known	Understand
CO2	Identify the Singularities and its corresponding Residues for the given function	Apply
CO3	Compare Laplace transform, Inverse Laplace transform and solve the linear differential equations by Laplace transform techniques.	Apply
CO4	Solve Engineering problems using Fourier transform techniques	Apply
CO5	Solve difference equations using Z-transforms that arise in discrete time systems	Apply

Course Content**Unit - I Complex Differentiation and Conformal Mapping 12**

Functions of a complex variable – Analytic functions – Statement of Cauchy – Riemann equation – Harmonic functions – Harmonic conjugate – Construction of analytic functions – Conformal mapping : $w=z +c$, cz , $1/z$ and Bilinear transformation.

Unit - II Complex Integration and Calculus of Residues 12

Cauchy's Integral theorem (statement only) – Cauchy's integral formula – Liouville's theorem - Maximum Modulus Principle - Taylor's series and Laurent's series – Classification of singularities – Cauchy's residue theorem – Contour integration.

Unit - III Laplace Transforms 12

Laplace transforms – Transform of elementary functions – Properties – Transform of periodic functions. Definition of Inverse Laplace transforms – Statement and applications of Convolution theorem – Initial and Final theorems – Solution of linear ODE of second order with constant coefficient by Laplace transforms.

Unit - IV Fourier Transforms 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity - Application to boundary value problems.

Unit - V Z - Transforms 12

Z-Transform, Elementary Properties, Inverse Z-Transform, Convolution Method- Partial fraction method, Solution of Difference Equations using Z-Transform.

Total: 60 Periods

Text Books:

1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition 2016.
2. Veerarajan T, "Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd Edition, 2014.

Reference Books:

1. Bali N.P and Dr. Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications(P)Ltd, 8th Edition, 2015.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons(Asia) Limited, 10th Edition, 2018.

Web References:

1. nptel.ac.in/courses/111/105/111105134
2. nptel.ac.in/courses/111/102/111102129

Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1										2		
CO2	3	2	1										2		
CO3	2	3	2										3		
CO4	3	3	3										2		
CO5	3	2	3										2		
	3	High				2	Medium				1	Low			

Formative assessment			
Bloom's Level	Assessment Component	Marks	Total marks
Remember	Online Quiz	5	15
Understand	Tutorial Class / Assignment	5	
	Attendance	5	

Summative Assessment				
Bloom's Category	Continuous Assessment Tests			Final Examination (60)
	IAE-1 (7.5)	IAE-2 (7.5)	IAE-3 (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse				
Evaluate				
Create				

20BM201	BIOCHEMISTRY	L	T	P	C
		3	0	0	3
Nature of Course	Engineering Sciences				
Pre requisites	NIL				

Course Objectives:

The course is intended to

1. To learn the fundamentals of bio chemical reactions and bio molecules.
2. To study structural and functional properties of carbohydrates.
3. To understanding of the core principles and structure of proteins, lipids and nucleic acids.
4. To emphasize the role of these biomolecules by providing basic information on specific metabolic diseases and disorders of these biomolecules.
5. Acquire knowledge and understanding of metabolic functions and synthesis.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Explain the Chemical bonds and its application	Understand
CO2	Classify the Metabolic activity of Carbohydrates	Understand
CO3	Understand the basics of Protein Metabolism	Understand
CO4	Compare fatty acid metabolism and nucleic acid metabolism	Understand
CO5	Classify the bio energetic and high energy compounds	Understand

Course Contents:**UNIT I Introduction to Biochemistry****9**

Introduction of organic chemistry-Chemical Bonds–role of carbon–type of functional group-chemical nature of water-pH-Buffers–Biological Buffer-Carbohydrates-Lipids–Proteins–transamination–deamination–decarboxylation.

UNIT II Metabolism of Carbohydrates**9**

Introduction to Metabolism-Glycolysis–Citric acid cycle–Gluconeogenesis-Glycogen metabolism–Glycogenesis–Glycogenolysis-Biochemical aspects of Diabetes Mellitus.

UNIT III Protein Metabolism**9**

Introduction-Metabolism of amino acids-Transamination-Deamination-Metabolism of ammonia-Urea cycle-Biosynthesis of amino acids-Disorders of tyrosine (phenylalanine) metabolism

UNIT IV Fatty Acid Metabolism and Nucleic Acid Metabolism**9**

Introduction-Fatty acid oxidation-Ketone bodies & Ketogenesis-Biosynthesis of Fatty acids-Eicosanoids–Cholesterol Biosynthesis–Lipoproteins–Disorders of Lipid metabolism-Nucleic acids Biosynthesis of Purine and Pyrimidines-Degradation of purine nucleotides and pyrimidine Nucleotides-Disorders of Purine and pyrimidine metabolism.

UNIT V Oxidative Phosphorylation**9**

Introduction-Bioenergetics, High energy compounds, Biological oxidation Electron transport chain, Oxidative phosphorylation, Chemiosmotic theory–Shuttle pathway Glycerol phosphate Shuttle, Malate aspartate Shuttle – Shunt pathways.

TOTAL PERIODS:45

TEXT BOOK

- 1.JL,Jain,Nitin,SunjayJain.,“*Fundamentals of Biochemistry*”,S.ChandGroup, 7thedition, 2016.
2. U.Satyanarayana. and U.Chakrapani.,“*Biochemistry*”, BooksAndAllied(p)Ltd.,5thedition, 2019

REFERENCES

- 1.DavidL.Nelson,AlbertLesterLehninger,MichaelM.Cox.,“*Lehninger principles of Biochemistry*”, 5th Edition,illustrated,W.H.Freeman,2008.
2. JeremyM.Berg,JohnL.Tymoczko,LubertStryer.,“*Biochemistry*”,W.H.Freeman,7thEdition,2012.

Web References:

- 1.https://nptel.ac.in/content/storage2/courses/126104004/LectureNotes/Week-1_06Carbohydrate.pdf
- 2.<https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod10.pdf>

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	1	1			2	2		1	2			1	1	
CO2	3	1	1			2	2		1	2			1	1	
CO3	3	1	1			2	2		1	2			1	1	
CO4	3	1	1			2	2		1	2			1	1	
CO5	3	1	1			2	2		1	2			1	1	
	3	High				2	Medium				1	Low			

Formative assessment			
Bloom's Level	Assessment Component	Marks	Total marks
Remember	Online Quiz	5	15
Understand	Tutorial Class / Assignment	5	
	Attendance	5	

Summative Assessment				
Bloom's Category	Continuous Assessment			Final Examination (Theory) (60)
	IAE-1 (7.5)	IAE-2 (7.5)	IAE-3 (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse				
Evaluate				
Create				

20CH202	CHEMISTRY FOR ELECTRICAL SCIENCES (Common to ECE and BME)	L	T	P	C
		3	0	2	4
Nature of Course	Basic Sciences				
Prerequisites	Nil				

Course Objectives:

The course is intended to

1. Impart knowledge and understanding about the constituents present in water and the need for purification of water.
2. Understand the fundamentals of batteries.
3. Provide knowledge about materials like metals, refractories and cement.
4. Develop the understanding and applications of basic concepts of electrochemistry.
5. Understand the causes and control measures of corrosion.

Course Outcomes

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

CO.No	Course Outcome	Bloom's Level
CO1	Develop innovative and eco-friendly method for water purification to meet the growing industrial demand	Apply
CO2	Understand the basic principles and mechanism of working of batteries and fuel cells	Understand
CO3	Discuss about various types of alloys and engineering materials	Understand
CO4	Use the principles of electro chemical cells, EMF, electroplating and electrolysis	Apply
CO5	Demonstrate the importance of protection of metals from corrosion	Apply

Course Contents**Unit-I Water Analysis and Water Treatment 9**

Water analysis: Sources of water, Hard water and soft water, Hardness of water, acidity, alkalinity, pH value, amount of free CO₂, fluoride content and chloride content. Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD). Water treatment: Definition, Zeolite process, Conditioning methods: internal conditioning (Phosphate, Calgon) and external conditioning (Demineralisation), Desalination, Reverse osmosis (RO).

Unit-II Energy Storage Devices 9

Batteries: Definition, characteristics and classification, Primary battery: Alkaline battery, Secondary battery: lead acid battery, nickel cadmium battery, lithium battery and lithium ion battery, Fuel cells: construction and working of phosphoric acid fuel cell.

Unit-III Alloys and Engineering Materials 9

Alloys: classification and types, Ferrous alloys (Nichrome and stainless steel only), Non-ferrous alloys (brass and bronze), Heat treatment of steel, Refractories: characteristics, classification – manufacture, Cement: manufacture and setting.

Unit-IV Electrochemistry 9

Electrode potential, Nernst equation and problems, Reference electrodes, Standard hydrogen electrode, Calomel electrode, Ion selective electrode (glass electrode), Determination of pH by glass electrode, Electrochemical series, Electrochemical cell, Galvanic cell: measurement of EMF, Electrolytic cell.

Unit-V Corrosion and its Control 9

Corrosion: Classification, Types: Chemical corrosion and electrochemical corrosion, mechanism. Corrosion control: Corrosion inhibitors, cathodic protection (sacrificial anodic protection, impressed current cathodic protection), Protective coating and Paint. Electroplating (Au).

TOTAL PERIODS: 45

Laboratory Component

S.No	Name of the Experiment	CO Mapping	RBT
1	Determination of hardness of water	CO1	Apply
2	Determination of chloride content in water sample	CO1	Apply
3	Conductometric titration of strong acid versus strong base	CO2	Understand
4	Determination of strength of HCl by pH metry	CO2	Understand
5	Estimation of copper in brass by EDTA method	CO3	Apply
6	Determination of CaO in cement	CO3	Apply
7	Estimation of strength of iron by potentiometric titration	CO4	Apply
8	Determination alkalinity of water sample and making a comparative study of corrosion rate	CO5	Apply

Text Books

- O.G.Palanna, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, 1st Edition, New Delhi, 2017.
- P.C.Jain and Monicka Jain, "Engineering Chemistry", Dhanapat Rai Publishing Company Pvt. Ltd, 2nd Edition, 2017.

Reference Books

- B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, 2nd Edition, New Delhi 2009.
- R.Sivakumar and N.Sivakumar, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1st Edition, 2009.
- Dr.Sivanesanand Nandagopal, "Engineering Chemistry-I" V.K.Pub.Pvt.Ltd, 2nd Edition, 2011.

Additional Resources

- <https://nptel.ac.in/downloads/122101001>
- <https://nptel.ac.in/courses/103103033/module9/lecture1.pdf>
- <https://nptel.ac.in/courses/102103044/3>
- <https://www.sciencedirect.com/topics/chemistry/phosphoric-acid-fuel-cells>

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2									1				
CO2	3	2									1				
CO3	3	2									1				
CO4	3	2									1				
CO5	3	1									1				
	3	High				2	Medium				1	Low			

Summative Assessment						
	Continuous Assessment					Final
	Theory				Rubric based CIA [20]	
	IAE-I [7.5]	IAE-II [7.5]	IAE-III[10]	Attendance [5]		
Remember	30	20	10		20	
Understand	10	20	30		20	
Apply	10	10	10		10	
Analyze						
Evaluate						
Create						

20ME203	Engineering Graphics	L	T	P	C
		1	0	4	3
Nature of Course	Engineering Sciences				
Pre requisites	Nil				

Course Objectives:

The course is intended to

1. Understand technical drawings in various fields of engineering
2. Imagine and visualize the geometric details of engineering objects.
3. Translate the geometric information of engineering objects into engineering drawings.
4. Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.
5. Visualize and draw isometric and perspective views

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO 1	Develop the conic sections, special curves, and draw orthographic views from pictorial views.	Apply
CO 2	Apply the principles of orthographic projections of points in all quadrants, lines and planes in first quadrant.	Apply
CO 3	Construct the projections of simple solids like prisms, pyramids, cylinder and cone.	Apply
CO 4	Build the sectional views of solids like cube, prisms, pyramids, cylinders & cones and development of its lateral surfaces.	Apply
CO 5	Organize and draw isometric and perspective sections of simple solids.	Apply

Course Contents**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 Hand Sketching**(3+12)**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – 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**(3+12)**

Orthographic projection- principles-Principal 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. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT –III Projection of Solids**(3+12)**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT- IV Projection of Sectioned Solids and Development of Surface (3+12)

Sectioning of above 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 (3+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.

TOTAL: (15+60) Periods

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2011
2. Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2012.

REFERENCE BOOKS

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Parthasarathy N S and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

Web References

1. [http://nptel.ac.in/courses/112103019/Engineering drawing](http://nptel.ac.in/courses/112103019/Engineering%20drawing)
2. <http://pioneer.netserv.chula.ac.th/~kjiapon/self-practice.html>

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.

Special points applicable only to Final Examinations of 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. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2										1	2		
CO2	3	2										1	2		
CO3	3	2										1	2		
CO4	3	3										1	2		
CO5	3	2										1	2		
	3	High				2	Medium				1	Low			

Summative assessment						
Bloom's Level	Continuous Assessment					Final Examination (Theory) [50 marks]
	Theory				Practical	
	IAE-I [7.5]	IAE-II [7.5]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	10	10	10		20	20
Understand	20	20	20		40	40
Apply	20	20	20		40	40
Analyse						
Evaluate						
Create						

20BM202	BIOCHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2
Nature of Course	Engineering Sciences				
Pre requisites					

Course Objectives

The course is intended to

1. Estimation and Quantification of bio molecules
2. Separation of macromolecules
3. Estimation and interpretation of biochemical parameter.

Course Outcomes

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

CO.No.	Course Outcome	Bloom's Level
CO 1	Get knowledge on the PH and buffer solution preparation.	Understand
CO 2	Have adequate knowledge on qualitative analysis of bio molecules.	Analysis
CO 3	Gain knowledge on the estimation of biomolecules.	Analysis
CO 4	Acquire knowledge on collections of blood .	Understand
CO 5	Get sufficient knowledge on the concept of SDS electrophoresis.	Understand

CYCLE-1

S.No.	Course Content	Bloom's Level
1	Standardization of pH meter, preparation of buffers, emulsions	Understand
2	General tests for carbohydrates, proteins and lipids.	Understand
3	Identification of Blood Collection Tubes and Phlebotomy equipments	Analysis
4	Preparation of serum and plasma from blood.	Analysis
5	Estimation of blood glucose-Benedict's method	Analysis
6	Estimation of Hemoglobin	Understand

CYCLE-2

S.No.	Course Content	Bloom's Level
1	Estimation of creatinine.	Understand
2	Estimation of urea	Analysis
3	Estimation of Uric acid	Analysis
4	Estimation of cholesterol	Analysis
5	Assay of SGOT/SGPT.	Analysis
6	Separation of proteins by SDS electrophoresis (Demo)	Analysis

Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
1				2	2	2	2	2	2			2	3	1		
2				2	2	2	2	2	2			2	3	1		
3				2	2	2	2	2	2			2	3	1		
4				2	2	2	2	2	2			2	2	1		
5				2	2	2	2	2	2			2	2	1		
	3	High				2	Medium					1	Low			

Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [50 marks]	Final Examination [50 marks]
Remember	-	-
Understand	20	20
Apply	-	-
Analyze	30	30
Evaluate	-	-
Create	-	-

20MC202	INTERPERSONAL SKILLS	L	T	P	C
		2	0	2	0
Nature of Course	Mandatory, Non Credit				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Use interpersonal communication skills to influence and build good relationships.
2. Identify and pursue personal learning goals.
3. Obtain feedback skills in service of evolving learning goals.
4. Learn about group dynamics, behaviors and feelings
5. Enhance the communication process in both formal and informal contexts

Course Outcomes

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

CO.No	Course Outcome	Bloom's Level
CO1	Practice interpersonal communication skills to influence and build good relationships	Understand
CO2	Identify and pursue personal learning goals.	Understand
CO3	Give evident feedback	Understand
CO4	Reveal group dynamics and amiable behavior	Understand
CO5	Emphasis the communication process	Understand

Course Contents:**Unit I: Fundamentals of Interpersonal Communication****6**

Facts of communication and Interpersonal communication – culture and gender – Communication and Self disclosure – Presentation of Interpersonal perception - Learning goals – Feeling and feedback.

Unit II: Interpersonal communication in action**6**

Nature of language – language and culture – usage and abuse of language –Positive communication -Non verbal communication - Listening strategies – Barriers of listening.

Unit III: Emotional Intelligence**6**

Influence of emotional experience and expressions – Accepting the responsibilities and changes - Negotiation tactics - Dealing with criticism and appreciation - Collaborative Problem Solving - Resilience Building.

Unit IV: Transactions**6**

Different types of transactions - Building Positive Relationship - Managing Conflict – Connecting across Difference – Factors hampering Interpersonal interactions – Assertiveness in communication.

Unit V: Essential Interpersonal Competencies**6**

Behaviour – Understanding limiting behaviour - Interpersonal and small group behavior – Critical and lateral thinking- Win – Win attitude – Positive thinking – Stress management – Assertive feedback - Personal Evaluation of Interpersonal Relationship Skills

Total 30 Periods

Activity Component

S.No	Name of the Exercises	CO Mapping	RBT
1	Self-Introduction	1	Remember
2	Presentation of Individual perception	2	Understand
3	Role play - Non-verbal communication - Body language	4	Apply
4	Role play - Interpersonal interactions & Assertive feedback	3	Remember
5	Group Discussion	4	Apply
6	Role play - Situational conversation (On spot)	5	Understand

Text Books

1. Bozeman, Jeanine C and Argile Smith, "Interpersonal Relationship Skills for Ministers" Gretna, LA: Pelican Publishing Company, 1st Edition, 2004.
2. Floyd, Kory, "Interpersonal Communication", 2d. Boston: McGraw-Hill, 2nd Edition, 2011.

Reference Books:

1. Augsburger, David, "Caring Enough to Confront How to Understand and Express Your Deepest Feelings Towards Others", updated ed. Ventura, CA: Regal Books, 2nd Edition 2009.
2. Vohs, Kathleen D., and Eli J., Finkel, eds, "Self and Relationships: Connecting Intrapersonal and Interpersonal Processes", New York: Guilford Press, 1st Edition, 2006.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										3	2	1	2		
CO2										3	2	1	2		
CO3										3	2	1	2		
CO4										3	2	1	2		
CO5										3	2	1	2		
	3	High				2	Medium				1	Low			

Bloom's Level	Summative Assessment (Internal Mode)	
	Assessment 1 (50 Marks)	Assessment 2 (50 Marks)
Remember	20	20
Understand	10	10
Apply	20	20
Analyze		
Evaluate		
Create		

20ENE02	Advanced Communicative English (Common to all B.E./ B.Tech Programmes)	L	T	P	C
		2	0	2	3
Nature of Course	Humanities and Social Sciences				
Pre requisites	Basics of Communicative English				

Course Objectives

The course is intended to

1. Demonstrate satisfactory control over complex structures and mechanics in English.
2. Develop fluency and accuracy in oral communication.
3. Communicate effectively and actively in social interactions.
4. Read English at inspectional level.
5. Face interviews with confidence.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Apply knowledge of English grammar for effective communication	Remember
CO2	Make use of common English phrases and vocabulary strength.	Understand
CO3	Build self-confidence and enhance professionalism	Apply
CO4	Implement listening, reading and writing skills in real - life situations	Apply
CO5	Speak fluently in English with proper pronunciation, intonation, tone and accent.	Understand

Course Contents

Unit – I Grammar and usage

6

Active voice and passive voice – Prefixes and suffixes – Connotation – Clauses - If conditionals – Idioms & Phrases - Right forms of verbs – Modal Auxiliaries - Spotting errors.

Unit - II Lexical competence

6

Technical Vocabulary - Expressions – Frequency – Cause and effect - Words often Miss-spelled – Syntax and structure - Homophones and Homonyms- Verbal analogy - Idioms and Phrases.

Unit - III Conversational etiquette

6

Processes description – Tone and accent in speech – Role-play (Job-Interview) – Presentation skills – Mechanics of presentation - Telephone etiquette – Group Discussion strategy - Formal & Informal subjective and objective introduction – Body Language – Mock Interview.

Unit – IV Listening reading and writing

6

Listen to Scientific / Technical talks and gap filling – Listening to TED/INK Talks – Reading – “Water: The Elixir of Life” by Sir. C.V.Raman. “Progress” by St. John Ervine - Instructions and Recommendations – Letter writing formal – Job application- Report writing – Introspective report – Creative writing – Essays and Paragraphs.

Unit – V Phonetics

6

Production and classification of speech sound – International Phonetic Alphabet and transcriptions – Phonological rules – way and Place of articulation – Vowels, consonants and diphthongs. Specific characteristics feature of vowel sounds.

Total: 30 Periods

Laboratory Components

S.No	List of Exercises	CO Mapping	RBT
1	Role-play – Processes Description	2	Remember
2	Listening to TED/INK Talks and gap filling	4	Understand
3	Group Discussion	3	Understand
4	Articulation with pronunciation practice	3	Apply
5	Reading – Longer texts and Technical Articles (Skimming & Scanning).	4	Apply
6	Presentation skills – Mechanics of presentation	5	Understand
7	Individual presentation on given topics	5	Remember
8	Telephone etiquette	5	Understand
9	Instructions and Recommendations	5	Remember
10	Writing – General Essays.	4	Apply
11	Report writing technique- write up	4	Remember
12	Introspective report – Personal analysis	4	Understand
13	Model Job Interviews	3	Understand
14	Job Interviews(Role play)	3	Apply
15	Body Language	3	Understand

Total: 30 Periods**Text Books**

- Rizvi, Ashraf.M, “Effective Technical Communication”, Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition, 2007.
- Hewings. M, “Advanced English Grammar”, 3rd Edition, Cambridge University Press, Chennai, 5th Edition, 2000.
- Board of Editors, “Using English – A Coursebook for Undergraduate Engineers and Technologists”, Orient BlackSwan Private Limited, Hyderabad, 2nd Edition, 2017.

Reference Books:

- Raman M & Sangeetha Sharma, “Technical Communication”, Oxford University Press, USA, 10th Edition, 2007.
- John Cunnison Catford, “A Practical Introduction to Phonetics”, Clarendon Press, Jamaica, 2nd Edition, 2001.
- Norman Whitby, Business Benchmark – “Pre-Intermediate to Intermediate, Students Book”, Cambridge University Press, 1st Edition, 2006.
- Dhanavel S. P., “English and Soft Skills”, 1st Edition, Orient BlackSwan Private Limited, Hyderabad, 1st Edition, 2010.

Web reference:

- https://www.coursera.org/lecture/tesol-speaking/video-2-listening-strategies-for-learners-3AeBL?utm_source=mobile&utm_medium=page_share&utm_content=vlp&utm_campaign=top_button
- blob:<https://www.youtube.com/73f7256d-d302-4563-bed5-9e84c94a26ac>

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										3	1	2	2		
CO2										3	1	2	2		
CO3										3	1	2	2		
CO4										3	1	2	2		
CO5										3	1	2	2		
	3	High				2	Medium				1	Low			

Summative assessment						
Bloom's Level	Continuous Assessment					Final Examination (Theory) [50 marks]
	Theory Marks				Practical	
	IAE-I [7.5]	IAE-II [7.5]	IAE -III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	20	20	20		40	40
Understand	20	20	20		40	40
Apply	10	10	10		20	20
Analyse						
Evaluate						
Create						

20ENE03	HINDI	L	T	P	C
		2	0	2	3
Nature of Course	Humanities and Social Sciences				
Pre requisites	Basic Perceptive of Language				

Course Objectives

The course is intended for learners.

1. To help students acquire the basics of Hindi
2. To teach them how to converse in Hindi on simple day-to-day situations
3. To help students acquire the ability to understand a simple technical text in Hindi

Course Outcomes

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

CO.No.	Course Outcome	Bloom's Level
CO.1	Construct simple sentences and use vocabulary required for day-to-day conversation	Remember
CO.2	Distinguish and understand the basic sounds of Hindi language.	Remember
CO.3	Appear for Hindi examinations conducted by Dakshin Bharat Hindi Prachar Sabha.	Remember

Course Contents:**UNIT I: Introduction**

6

Hindi Alphabet: Introduction - Vowels - Consonants - Plosives - Fricatives - Nasal sounds - vowel Signs- Chandra Bindu & Visarg -Table of Alphabet -Vocabulary.

UNIT II: Reading

6

Nouns: Genders (Masculine & Feminine Nouns long vowels and short vowels - -Masculine & Feminine - Reading Exercises

UNIT III: Grammar

6

Pronouns and Tenses: Categories of Pronouns - Personal Pronouns - Second person you & honorific) - Definite & Indefinite pronouns - Relative pronouns - Present tense - Past tense - Future tense - Assertive & Negative Sentences – Interrogative Sentences.

UNITI V : Vocabulary

6

Classified Vocabulary: Parts of body - Relatives - Spices - Eatables - Fruit & Vegetables - Clothes - Directions - Seasons - Professions

UNIT V: Speaking

6

Speaking: Model Sentences and Rhymes - Speaking practice for various occasions.

Total: 30 Periods

Reference:

1. Hindi Prachar Vahini-1 by Dakshin Bharat Hindi Prachar Sabha Chennai
2. B.R.Kishore, Self Hindi Teacher for Non-Hindi Speaking People, VeeKumar Publications(P)Ltd., NewDelhi,2009
3. Videos, Stories, Rhymes and Songs.

20ENE04	FRENCH	L	T	P	C
		2	0	2	0
Nature of Course	Humanities and Social Sciences				
Pre requisites	Basic Perceptive of Language				

Course Objectives

The course is intended for learners.

1. To prepare the students for DELFA1 Examination
2. To teach them to converse fluently in French in day-to-day scenarios

Course Outcomes

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

CO.No.	Course Outcome	Bloom's Level
CO1	To help students acquire familiarity in the French alphabet & basic vocabulary	Remember
CO2	listen and identify individual sounds of French	Remember
CO3	Use basic sounds and words while speaking	Remember
CO4	Read and understand short passages on familiar topics	Understand
CO5	Understand and use basic grammar and appropriate vocabulary in completing language tasks	Understand

Course Contents:**UNIT I : Entrer En Contact****6**

La langue française, alphabets, les numéros, les jours, les mois.
Grammaire Les verbes s'appeler, être, avoir, les articles définis, indéfinis
Communication - Saluer, s'informer sur quelqu'un, demander de se présenter
Lexique - Les alphabets, les nationalités, âge, les pays, les couleurs, les jours de la semaine, les mois de l'année, les professions

UNIT II : Partager Son Lieu De Vie**6**

Le français et leur habitat, des habitations in solites Grammaire- Verbes - Conjugaison :
Present (Avoir / être / ER, IR, RE : Régulier/Irregulier) – Adjectifs de lieu
Communication - Chercher un logement, d'écrire son voisin, s'informer sur un logement
Lexique - L'habitat, les pièces, l'équipement, la description physique

UNIT III: Vivre Au Quotidien**6**

Grammaire - Articles contractés, verbes vouloir, pouvoir, devoir, adjectif interrogative, future proche
Communication- Exprimer ses goûts, parler de ses loisirs, justifier un choix, exprimer une envie
Lexique - le temps libre et les loisirs, les saisons, les activités quotidiennes, le temps (le matin, le soir, la nuit)

UNIT IV: Comprendre Son Environnement Ouvrir La Culture**6**

Grammaire - Verbes- Finir, Sortir, les adjectifs démonstratifs, le passé composé, l'imparfait
Communication - Proposer à quelqu'un de faire quelque chose, raconter une sortie au cinéma
Lexique - Les sorties, la famille, art, les vêtements et les accessoires

UNIT V: Gouter ALa Campagne**6**

Grammaire La forme negative, les verbes acheter, manger, payer, articles partitifs, le pronom de quantite Communication Accepter et refuse une invitation, donner des instructions, commander au restaurant Lexique Les services et les commerces, les aliments, les ustensiles, argent.

Total: 30 Periods

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										2					
CO2										2					
CO3										3					
CO4										3					
CO5										2					
	3	High				2	Medium					1	Low		