

**VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM**  
(Deemed to be University)

**AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, CHENNAI**  
&  
**VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, SALEM**

**FACULTY OF ENGINEERING AND TECHNOLOGY**

**STRUCTURED CHOICE BASED CREDIT SYSTEM**

**BOARD : BIOTECHNOLOGY**  
**REGULATION : 2017**  
**PROGRAM : B.Tech., – BIOTECHNOLOGY (FULL TIME - REGULAR)**

**CURRICULUM AND SYLLABUS**

SEMESTER – I								
S.NO	COURSE CODE	COURSE TITLE	OFFERING DEPARTMENT	CATEGORY	L	T	P	C
<b>THEORY</b>								
1		TECHNICAL ENGLISH	ENGLISH	FC(HSS)	3	0	0	3
2		MATHEMATICS FOR BIO-ENGINEERING	MATHEMATICS	FC(BS)	2	2	0	3
3		PHYSICAL SCIENCES	PHYSICS & CHEMISTRY	FC(BS)	4	0	0	4
4		ESSENTIALS OF COMPUTING (Theory + Practice)	CSE	FC(ES)	2	0	2	3
5		FUNDAMENTALS OF BIOTECHNOLOGY	BTE	FC(ES)	3	0	0	3
<b>PRACTICAL</b>								
6		ENGLISH LANGUAGE LAB	ENGLISH	FC(HSS)	0	0	4	2
7		PHYSICAL SCIENCES LAB	PHYSICS & CHEMISTRY	FC(BS)	0	0	4	2
8		YOGA & MEDITATION	PHYSICAL EDUCATION	FC(HSS)	0	0	4	2
<b>TOTAL</b>					<b>14</b>	<b>2</b>	<b>14</b>	<b>22</b>
L – LECTURE HOUR		T – TUTORIAL HOUR		P – PRACTICAL HOUR		C – CREDIT		
HSS	HUMANITIES AND SOCIAL SCIENCES	CC	CORE COURSES					
BS	BASIC SCIENCES	EC	ELECTIVE COURSES					
ES	ENGINEERING SCIENCES	EEC	EMPLOYABILITY ENHANCEMENT COURSES + EXTRA CURRICULAR COURSES + CO - CURRICULAR COURSES					
PII	PROJECT + INTERNSHIP + INDUSTRY ELECTIVES							

COURSE CODE	SEMESTER – I				
	NAME OF THE COURSE : <b>TECHNICAL ENGLISH</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	TOTAL HOURS : <b>45</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	PREREQUISITE : <b>NIL</b>				
<b>PURPOSE:</b>					
Strengthens the basic LSRW (Listening, Speaking, Reading and Writing) skills. Comprehension of English Language and Grammar.					
<b>INSTRUCTIONAL OBJECTIVES:</b>					
1.	To enable students to develop LSRW skills in English. (Listening, Speaking, Reading and Writing).				
2.	To make them to become effective communicators in English.				
3.	To ensure that learners use Electronic media materials for developing language skills.				
4.	To aid the students with employability skills.				
5.	To motivate students to continuously use English Language.				
<b>UNIT – I</b>					
Self introduction – Simulations using E Materials – Whatsapp, Face book, Hiker, Twitter – Effective Communication with Minimum Words – Interpretation of Images and Films – Identify the different Parts of Speech – Word formation with Prefixes and suffixes – Common Errors in English – Scientific Vocabulary (definition and meaning) – Listening Skills – Passive and Active listening, Listening to Native Speakers – Characteristics of a good listener.					<b>9</b>
<b>UNIT – II</b>					
Articles – Phonetics (Vowels, Consonants and Diphthongs) – Pronunciation Guidelines – Listening to Indian speakers from different regions, intrusion of mother tongue – Homophones – Homonyms – Note taking and Note making - Difference between Spoken and Written English – Use of appropriate language – Listening and Responding to Video Lectures (Green India, environment, social talks) – Extempore.					<b>9</b>
<b>UNIT – III</b>					
Tense forms – Verbal and Non verbal Communication – Describing objects – Process Description – Speaking Practice – Paragraph Writing on any given topic (My favourite place, games / Hobbies / School life, etc.) – Types of paragraphs – Telephone Etiquettes – Telephonic conversation with dialogue.					<b>9</b>
<b>UNIT – IV</b>					
Impersonal Passive Voice – Conditional Sentences – Technical and Non technical Report Writing (Attend a technical seminar and submit a report) – News Letters and Editing – Skimming – Scanning – How to Improve Reading Speed – Designing Invitations and Poster Preparation.					<b>9</b>
<b>UNIT – V</b>					
Sentence Pattern (SVOCA) – Statement of Comparison – Transcoding (Flow Chart, Bar Chart and Pie Chart) – Informal letters – Resume Writing – Difference between Bio data, Resume and Curriculum Vitae.					<b>9</b>
<b>TEXT BOOK:</b>					
1. “English for Engineers”, Department of English, VMKV Engineering College, Salem and AVIT, Chennai, Anuradha publishers, 2017.					

**REFERENCES:**

1. "English for Effective Communication", Department of English, VMKV & AVIT, SCM Publishers, 2009.
2. "Practical English Usage", Michael Swan (III<sup>rd</sup> Edition), Oxford University Press.
3. "Grammar Builder – I, II, III", Cambridge University Press.
4. Pickett and Laster, "Technical English: Writing, Reading and Speaking", New York: Harper and Row Publications, 2002.

**COURSE CODE :****NAME OF THE COURSE : TECHNICAL ENGLISH**

<b>COURSE DESIGNED BY</b>		<b>DEPARTMENT OF ENGLISH</b>										
		a	b	c	d	e	f	g	h	i	j	k
1	Student Outcomes		√		√		√	√		√	√	
2	Mapping of instructional objectives with student outcome		3,4		1,3		2,3,5	1,2,3,4,5		4,5	2	
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
		√										

COURSE CODE	SEMESTER - I				
	Name of the Course: <b>MATHEMATICS FOR BIO-ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	TOTAL HOURS : <b>60</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>
	PREREQUISITE : <b>NIL</b>				
<b>PURPOSE:</b>					
To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.					
<b>INSTRUCTIONAL OBJECTIVES :</b>					
1.	To improve their ability in solving geometrical applications of differential calculus problems.				
2.	To use the appropriate and relevant, fundamental of applied mathematical knowledge.				
3.	To have knowledge in integral calculus.				
4.	To correlate two or more than two variables, one needs simple, multiple and partial correlations and suitable interpretation.				
5.	To Produce a coherent, well supported argument that shows critical thinking, analysis and decision making.				
<b>UNIT – I    DIFFERENTIAL CALCULUS</b>					
					<b>12</b>
Ordinary Differentiation – Basic Concepts – Slope – Maxima, Minima of a function of a single variable – Second order derivatives – Partial Differentiation– maxima and minima of a function of two variables.					
<b>UNIT – II    INTEGRATION</b>					
					<b>12</b>
Concept of integration-Integration of Rational and Trigonometric functions – Using Partial Fractions – Substitutions – Integration by parts.					
<b>UNIT – III    ORDINARY DIFFERENTIAL EQUATIONS</b>					
					<b>12</b>
Formation of differential equations – Solution of first order equation – Variable separable and solution of Linear differential equation of the form – Linear Second Order ordinary differential equation with constant coefficients ( $e^{ax}$ , $\cos ax$ , $\sin ax$ ).					
<b>UNIT – IV    STATISTICS</b>					
					<b>12</b>
Measure of central value – Average – Type of average – Arithmetic; Mean, Median, Mode –Measures of Dispersion – Measure of Skewness and Kurtosis – measure of Skewness based on Moments.					
<b>UNIT – V    CORRELATION AND REGRESSION ANALYSIS</b>					
					<b>12</b>
Correlation analysis – methods of correlation. Regression analysis – Regression equation – Multiple and partial correlation – Notations – Equation of regression plane (Three variables) – Multiple correlation coefficients – Partial Correlation coefficients.					
<b>TEXTBOOKS:</b>					
1. Grewal, B.S., “Higher Engineering Mathematics”, 42 <sup>nd</sup> Edition, Khanna Publishers, Delhi (2012).					
2. S.P. Gupta, “Statistical Methods”, 34 <sup>th</sup> Edition, Sultan Chand & Sons Publishers (2006).					

**REFERENCES:**

1. Kreyszig, E., “Advanced Engineering Mathematics”, 8th Edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore (2012).
2. W.Ewans & G.Grant, “Statistical Methods in Bio informatics – An Introduction”, (2005).

**COURSE CODE:****NAME OF THE COURSE: MATHEMATICS FOR BIO-ENGINEERING**

<b>COURSE DESIGNED BY</b>		<b>DEPARTMENT OF MATHEMATICS</b>										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
		√			√	√						
2	Mapping of instructional objectives with student outcome	1,2			5	3,4						
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
			√									

COURSE CODE	SEMESTER – I							
	NAME OF THE COURSE : <b>PHYSICAL SCIENCES</b> <b>PART A – ENGINEERING PHYSICS</b>				L	T	P	C
	TOTAL HOURS : <b>30</b>				2	0	0	2
	PREREQUISITE : <b>NIL</b>							
<b>PURPOSE:</b>								
The fundamental knowledge in physics will improve the scientific thinking of students.								
<b>INSTRUCTIONAL OBJECTIVES:</b>								
1.	To understand the significance of laser and its applications in technology.							
2.	To understand the basic principles of fibre optics and applications.							
3.	To understand various techniques used in Non-destructive testing.							
<b>UNIT – I LASERS</b>								
Laser characteristics - Stimulated Emission – Population Inversion – Einstein coefficients – Lasing action – Types of Laser – Nd:YAG laser, CO <sub>2</sub> laser, GaAs laser – Applications of Laser – Holography – construction and reconstruction of a hologram.							<b>10</b>	
<b>UNIT – II FIBRE OPTICS</b>								
Principle and propagation of light in optical fibres – numerical aperture and acceptance angle – types of optical fibres (material, refractive index, mode) – Applications: Fibre optic communication system – fibre optic displacement sensor and pressure sensor.							<b>10</b>	
<b>UNIT – III NON-DESTRUCTIVE TESTING</b>								
Introduction – Types of NDT – Liquid penetrant method – characteristics of penetrant and developer – ultrasonic flaw detector – X-ray Radiography: displacement method – X-ray Fluoroscopy.							<b>10</b>	
<b>TEXT BOOK:</b>								
1. “Engineering Physics”, Department of Physics, VMKVEC, Salem and AVIT, Chennai, Anuradha publishers 2017.								
<b>REFERENCES:</b>								
1. Beiser, Arthur, “Concepts of Modern Physics”, 5 <sup>th</sup> Edition. McGraw-Hill, 2009.								
2. Halliday.D, Resnick.R, Walker.J, “Fundamentals of Physics”, Wiley & sons, 2013.								
3. Gaur R. K. and Gupta S. L., “Engineering Physics”, Dhanpat Rai publishers, New Delhi, 2001.								
4. Avanadhanulu.M.N., Arun Murthy.T.V.S, “Engineering Physics”, Volume-I, S.Chand, 2014.								
5. Rajendran. V, “Engineering Physics”, Tata McGraw Hill Publication and Co., New Delhi, 2009.								
6. Baldev Raj et al. “Practical Non-Destructive Testing”, Narosa Publications, 2017.								

<b>COURSE CODE :</b>												
<b>NAME OF THE COURSE : PHYSICAL SCIENCES</b>												
<b>PART A – ENGINEERING PHYSICS</b>												
<b>COURSE DESIGNED BY</b>		<b>DEPARTMENT OF PHYSICS</b>										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
		√	√	√	√	√		√	√		√	√
2	Mapping of instructional objectives with student outcome	1	3	2	1	3		3	2		1	3
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
			√									

COURSE CODE	SEMESTER – I				
	NAME OF THE COURSE : <b>PHYSICAL SCIENCES</b> <b>PART B - ENGINEERING CHEMISTRY</b>	L	T	P	C
	TOTAL HOURS : <b>30</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
	PREREQUISITE : <b>NIL</b>				
<b>PURPOSE:</b>					
Enhancement of knowledge with the basic concepts of Chemistry and its application in Engineering and Technology.					
<b>INSTRUCTIONAL OBJECTIVES:</b>					
1.	To impart basic knowledge in Chemistry so that the student will understand the engineering concept and they can face the competitive examinations effectively.				
2.	To inculcate the knowledge of techniques, skills and modern engineering.				
3.	To lay foundation for practical applications of chemistry in engineering aspects.				
<b>UNIT – I</b>					
<b>ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS</b>					<b>10</b>
Electrode potential – Nernst equation – Electrodes (SHE, Calomel and Glass) – cells – EMF measurement. Primary battery (Daniel and dry cell) – secondary battery (lead Acid storage battery and Nickel – Cadmium battery) – Fuel cell (H <sub>2</sub> -O <sub>2</sub> fuel cell).					
<b>UNIT – II</b>					
<b>WATER TECHNOLOGY AND CORROSION</b>					<b>10</b>
Sources of water – impurities – Hardness and its determination (problems to be avoided) – boiler troubles – water softening (Zeolite & Demineralisation) – Domestic water treatment – Desalination (Electrodialysis & Reverse Osmosis). Corrosion – Types – principles – corrosion control methods - Sacrificial anode and Impressed current method) – Electroplating and Electroless plating.					
<b>UNIT – III</b>					
<b>FUELS AND CHEMISTRY OF ADVANCED MATERIALS</b>					<b>10</b>
Classification of Fuels (Solid, Liquid, Gaseous, Nuclear and Bio fuels) – Calorific Value of a fuel – Non Petroleum Fuels – Non conventional sources of Energy – combustion. Basics and Applications:- Organic electronic material, shape memory alloys, polymers (PVC, Teflon, Bakelite) – fibers (optical fibre), composites (FRP, MMC & PMC), Nanomaterials.					
<b>TEXT BOOK:</b>					
1. “Engineering Chemistry”, Department of Chemistry, VMKVEC, Salem, Anuradha Publishers, 2017.					
<b>REFERENCES:</b>					
1. “A text book of Engineering Chemistry”, S.S. Dara, S.Chand & company Ltd., New Delhi. 2. “Engineering Chemistry”, Jain & Jain, 15 <sup>th</sup> Edition Dhanpatrai Publishing Company (P) Ltd., New Delhi. 3. “A text book of Engineering Chemistry”, Shashi Chawla, Edition 2012, Dhanpatrai & Co., New Delhi. 4. “Engineering Chemistry”, Dr. A. Ravikrishnan, Sri Krishna Publications, Chennai.					

<b>COURSE CODE :</b>												
<b>NAME OF THE COURSE : PHYSICAL SCIENCES</b>												
<b>PART B - ENGINEERING CHEMISTRY</b>												
<b>COURSE DESIGNED BY</b>		<b>DEPARTMENT OF CHEMISTRY</b>										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
		√	√	√	√	√	√	√	√	√	√	√
2	Mapping of instructional objectives with student outcome	1	3	2	1	1	1	1	3	1	3	2
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
			√									

COURSE CODE	SEMESTER – I						
	NAME OF THE COURSE : <b>ESSENTIALS OF COMPUTING</b> (Theory + Practice)			L	T	P	C
	TOTAL HOURS : <b>60</b>			2	0	2	3
	PREREQUISITE : <b>NIL</b>						
<b>PURPOSE:</b>							
To study the basics of Computer, Hardware, Software Applications, Algorithms and Problem solving methodologies.							
<b>INSTRUCTIONAL OBJECTIVES:</b>							
1.	To provide basic knowledge on hardware and software components of computers.						
2.	To introduce and demonstrate various software applications.						
3.	To introduce Problem solving methodologies.						
4.	To learn about Algorithms.						
5.	To Analyze and implement Algorithms.						
<b>UNIT – I</b>							
<b>BASICS OF COMPUTER AND INFORMATION TECHNOLOGY</b>					<b>12</b>		
Computer – Generations, Types of Computers, Block diagram of a computer – Components of a computer system – Hardware and software definitions – Categories of software – Booting – Installing and Uninstalling a Software – Software piracy – Software terminologies – Applications of Computer – Role of Information Technology – History of Internet – Internet Services.							
<b>UNIT – II</b>							
<b>SOFTWARE APPLICATIONS</b>					<b>12</b>		
Office Automation: Application Packages – Word processing (MS Word) – Spread sheet (MS Excel) – Presentation (MS PowerPoint).							
<b>UNIT – III</b>							
<b>PROBLEM SOLVING METHODOLOGIES</b>					<b>12</b>		
Problems Solving Techniques - Program Development Cycle – Algorithm Development – Flow chart generation – Programming Constructs (Sequential, Decision-Making, Iteration) – Types and generation of programming languages.							
<b>UNIT – IV</b>							
<b>INTRODUCTION TO ALGORITHMS</b>					<b>12</b>		
Implementation of Algorithms- program verification – The efficiency of algorithms – The analysis of algorithms.							
<b>UNIT – V</b>							
<b>IMPLEMENTATION OF ALGORITHMS</b>					<b>12</b>		
Fundamental Algorithms: Introduction – Exchanging the values of two variables – Counting – Summation of a set of Numbers – factorial computation – Generation of the Fibonacci sequence – Reversing the digits of an integer.							
<b>TEXT BOOKS:</b>							
1. “Essentials of Computer Science and Engineering”, Department of Computer Sciences, VMKVEC, Salem, Anuradha Publishers, 2017.							
2. Dromey.R.G, “How to Solve it by Computer”, Prentice-Hall of India, 1996.							

**REFERENCES :**

1. Aho.A.V., Hopcroft.J.E and Ullman.J.D, “The Design and Analysis of Computer Algorithms”, Pearson Education, 2004.
2. Knuth,D.E., “The Art of computer programming Vol 1:Fundamental Algorithms”, 3<sup>rd</sup> Edition, Addison Wesley, 1997.
3. Knuth,D.E., “Mathematical Analysis of algorithms”, Proceedings IFIP congress, 1971.

**COURSE CODE :**

**NAME OF THE COURSE : ESSENTIALS OF COMPUTING**  
**(Theory + Practice)**

<b>COURSE DESIGNED BY</b>		<b>DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING</b>										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
		√		√		√						√
2	Mapping of instructional objectives with student outcome	1-5		2-4		3,4						2,4
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
				√								

COURSE CODE	SEMESTER – I				
	NAME OF THE COURSE: <b>FUNDAMENTALS OF BIOTECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	TOTAL HOURS: <b>45</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	PREREQUISITE: <b>NIL</b>				
<b>PURPOSE:</b>					
To offer a focused study on the important aspects of Biotechnology.					
<b>INSTRUCTIONAL OBJECTIVES :</b>					
To understand the basic concepts of the following					
1.	Food Biotechnology.				
2.	Agricultural Biotechnology.				
3.	Animal Biotechnology.				
4.	Medical Biotechnology.				
5.	Environmental Biotechnology.				
<b>UNIT – I</b>	<b>FOOD BIOTECHNOLOGY</b>				<b>9</b>
Scope and importance of Food Biotechnology, Arctic Apples, Golden Rice, Flavr – Savr Tomato, Bt- potatoes, Virus resistant Squash, Fermented Food, Single Cell Protein – Spirulina.					
<b>UNIT – II</b>	<b>AGRICULTURAL BIOTECHNOLOGY</b>				<b>9</b>
Basics of plant tissue culture – callus induction, organogenesis, embryogenesis – embryo rescue, somatic embryogenesis, somaclonal variation, artificial seeds, secondary metabolites and their uses, Protoplast technology – hybrids and Cybrids, Biofertilizer, Biological Pest Control.					
<b>UNIT – III</b>	<b>ANIMAL BIOTECHNOLOGY</b>				<b>9</b>
Transgenic animals – Knock out mice, chimeric mice, Baculoviruses and transgenic silkworm, Hybridoma Technique for Monoclonal antibodies, Pharmaceuticals from animal systems, Animal bioreactors to produce therapeutic proteins, Karyotyping, FISH – Fluorescent in situ hybridization.					
<b>UNIT – IV</b>	<b>MEDICINAL BIOTECHNOLOGY</b>				<b>9</b>
Industrial Enzyme production: $\alpha$ -amylase, cellulase, protease and lipase, Recombinant protein production: Insulin and interferon, Antibiotic production: Penicillin- Synthetic and Semisynthetic and Bacitracin (Novartis and Genetech), GeneTheraphy, Clinical Diagnosis using electronic devices (PCR, ELISA, Glucometer, RIA, Biosensor).					
<b>UNIT – V</b>	<b>ENVIRONMENTAL BIOTECHNOLOGY</b>				<b>9</b>
Molecular approaches towards bioremediation, Biosensors for detection of environmental pollutants, Ecofriendly & sustainable Environmental Technologies, Renewable energy technologies.					
<b>TEXT BOOKS:</b>					
1. Gupta, P.K., “Elements of Biotechnology”, Rastogi Publications, 2 <sup>nd</sup> Edition, 2010.					
2. Satyanarayana.U., “Biotechnology”, Books and Allied Pvt Ltd., 2005.					

**REFERENCES:**

1. John E. Smith., "Biotechnology", Cambridge Press. 3<sup>rd</sup> Edition, 2005.
2. Glazer A and Nikaido H., "Microbial Biotechnology - Fundamentals of Applied Microbiology", Cambridge University Press, 2<sup>nd</sup> Edition, 2007.
3. Jogdand S.N., "Environmental Biotechnology", Himalaya Publishing House, 2003.
4. Kumar H.D., "Modern Concepts and Biotechnology", Vikas Publishing House Pvt. Ltd, 1998.
5. R.C. Dubey., "Textbook of Biotechnology", S. Chand Publishing., 2001.

**COURSE CODE:****NAME OF THE COURSE : FUNDAMENTALS OF BIOTECHNOLOGY**

<b>COURSE DESIGNED BY</b>		<b>DEPARTMENT OF BIOTECHNOLOGY</b>										
		a	b	c	d	e	f	g	h	i	j	k
1	Student Outcomes	√	√						√			√
2	Mapping of instructional objectives with student outcome	1-5	1-5						1-5			1-5
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
				√								

COURSE CODE	SEMESTER – I								
	NAME OF THE COURSE : ENGLISH LANGUAGE LAB					L	T	P	C
	TOTAL HOURS : 60					0	0	4	2
	PREREQUISITE : NIL								

**PURPOSE:**

1. Better performance in Group Discussion and Interview.
2. More placement opportunities.
3. Better job opportunities in corporate companies.

**INSTRUCTIONAL OBJECTIVES:**

1.	To understand communication nuisances in the corporate sector.
2.	To understand the role of mother tongue in second language learning and to avoid interference of mother tongue.
3.	To communicate effectively through different activities.
4.	To understand and apply the telephone etiquette.
5.	Case study to understand the practical aspects of communication.

**EXERCISE:**

1. Ice Breaker, Grouping, Listening – (Hearing and listening – Active Listening – Passive Listening – Listening to a song and understanding – fill in the blanks) Telephone Conversation).
2. Influence of mother tongue, videos, understanding nuances of English language (video) puzzle to solve, Activity.
3. Why is English important, Communication skills, TED (video) Communication in different scenario – a case study, ingredients of success, Activity – chart, speak the design, feedback on progress, Group wise, Individual.
4. Telephone Etiquette, Dining Etiquette, Meeting Etiquette.
5. Case study of Etiquette in different scenario.

**COURSE CODE :**

**NAME OF THE COURSE : ENGLISH LANGUAGE LAB**

COURSE DESIGNED BY		DEPARTMENT OF ENGLISH										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
			√		√		√	√		√	√	
2	Mapping of instructional objectives with student outcome		1-5		1-5		1-5	1-5		1-5	1-5	
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
		√										

COURSE CODE	SEMESTER – I				
	NAME OF THE COURSE : <b>PHYSICAL SCIENCES LAB PART A - REAL AND VIRTUAL LAB IN PHYSICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	TOTAL HOURS : <b>30</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
	PREREQUISITE : <b>NIL</b>				

**PURPOSE:**

1. Students will have the knowledge of taking measurements precisely.
2. Through the hand-on experience gained by the students in virtual laboratory, students will be able to self-learn any experiment in the future course of study.

**INSTRUCTIONAL OBJECTIVES:**

- |    |  |
|----|--|
| 1. | To understand the Physics Experiments through online virtual demonstration followed by real hands-on experience. |
| 2. | To gain the knowledge of taking precise readings from equipments.  |

**LIST OF EXPERIMENTS:**

1. Young's modulus of a bar – Non-uniform bending.
2. Rigidity modulus of a wire – Torsional Pendulum.
3. Viscosity of a liquid – Poiseuille's method.
4. Velocity of ultrasonic waves in liquids – Ultrasonic Interferometer.
5. Particle size determination using Laser.
6. Wavelength of spectral lines – grating – Spectrometer.
7. Thickness of a wire – Air wedge Method.
8. Thermal conductivity of a bad conductor – Lee's disc.
9. Band gap determination of a thermistor – Post Office Box.
10. Specific resistance of a wire – Potentiometer.

**COURSE CODE :**

**NAME OF THE COURSE : PHYSICAL SCIENCES LAB  
PART A - REAL AND VIRTUAL LAB IN PHYSICS**

SIGNED BY		DEPARTMENT OF PHYSICS										
		a	b	c	d	e	f	g	h	i	j	k
1	Student Outcomes		√	√		√	√					√
2	Mapping of instructional objectives with student outcome		1	1		1	2		2			2
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
			√									

COURSE CODE	SEMESTER – I				
	NAME OF THE COURSE : <b>PHYSICAL SCIENCES LAB</b> <b>PART B - REAL AND VIRTUAL LAB IN CHEMISTRY</b>	L	T	P	C
	TOTAL HOURS : <b>30</b>	0	0	2	1
	PREREQUISITE : <b>NIL</b>				

**PURPOSE:**

1. Familiarize the basic concepts of Chemistry and its application in Engineering & Technology.
2. Through the hand-on experience gained by the students in virtual laboratory, students will be able to self-learn any experiment in the future course of study.

**INSTRUCTIONAL OBJECTIVES:**

1.	To impart basic skills in Chemistry so that the student will understand the engineering concept.
2.	To inculcate the knowledge of handling equipments.
3.	To lay foundation for practical applications of chemistry in engineering aspects.
4.	To create awareness of global issues.

**LIST OF EXPERIMENTS:**

1. Determination of Hardness by EDTA method.
2. Estimation of Hydrochloric acid by conductometric method.
3. Acid base titration by pH method.
4. Estimation of ferrous ion by Potentiometric method.
5. Determination of Dissolved oxygen by Winkler's method.
6. Estimation of Sodium by Flame photometer.
7. Estimation of copper from Copper Ore Solution.
8. Estimation of iron by spectrophotometer.

**COURSE CODE :**

**NAME OF THE COURSE : PHYSICAL SCIENCES LAB**

**PART B - REAL AND VIRTUAL LAB IN CHEMISTRY**

COURSE DESIGNED BY		DEPARTMENT OF CHEMISTRY										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
		√	√	√	√			√	√		√	√
2	Mapping of instructional objectives with student outcome	1	2	3	2			1	4		4	3
3	Category	HSS	BS	ES	CC	EC	EEC	PII				
			√									

<b>CATEGORY :</b>			
HSS	HUMANITIES AND SOCIAL SCIENCES	CC	CORE COURSES
BS	BASIC SCIENCES	EC	ELECTIVE COURSES
ES	ENGINEERING SCIENCES	EEC	EMPLOYABILITY ENHANCEMENT COURSES + EXTRA CURRICULAR COURSES + CO - CURRICULAR COURSES
PII	PROJECT + INTERNSHIP + INDUSTRY ELECTIVES		

<b>STUDENT OUTCOMES :</b>	
<b>a.</b>	An ability to apply knowledge of Mathematics, Science and Engineering.
<b>b.</b>	An ability to design and conduct experiments, as well as to analyze and interpret data.
<b>c.</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as Economic, Environmental, Social, Political, Ethical, Health and Safety, Manufacturability and Sustainability.
<b>d.</b>	An ability to function on Multi Disciplinary Teams.
<b>e.</b>	An ability to identify, formulate and solve Engineering Problems.
<b>f.</b>	An understanding of professional and Ethical Responsibility.
<b>g.</b>	An ability to Communicate Effectively.
<b>h.</b>	The broad education necessary to understand the impact of Engineering Solutions in Global, Economic, Environmental and Social Context.
<b>i.</b>	A recognition of the need for, and an ability to engage in Life-Long Learning.
<b>j.</b>	A knowledge of contemporary issues.
<b>k.</b>	An ability to use the Techniques, Skills and Modern Engineering Tools necessary for Engineering Practice.