COURSE STRUCTURE(R19)
AND
DETAILED SYLLABUS
(I YEAR)

ELECTRONICS & COMMUNICATION ENGINEERING

For
B.Tech., Four Year Degree Course
(Applicable for the batches admitted from 2019-20)

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with "A" Grade and NBA (CSE, EEE & ME)
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B.Tech Course Structure –R19
(w.e.f the Academic Year 2019-20)

Semester – 0							
S. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**
1	R19BSH-HM1001	Physical Activities (Sports, Yoga and Meditation, Plantation)	BS	0	0	3	0
2	R19ECE-ES1001	Career Counseling	ES	3	0	0	0
3	R19ECE-ES1002	Orientation (Know your Department)	ES	3	0	0	0
4	R19CSE-ES1003	Fundamentals of Computers	ES	3	0	2	0
5	R19BSH-MA1001	Basic Aptitude and Mathematical Skills	BS	3	0	0	0
6	R19BSH-MA1002	Remedial Training in Foundation Courses	BS	5	0	0	0
7	R19BSH-HM1002	Human Values & Professional Ethics	HM	3	0	0	0
8	R19BSH-HM1003	Communication Skills (Listening, Speaking, Reading skills Writing skills)	HM	2	1	2	0
			Total	**22**	**1**	**7**	**0**

I YEAR- I SEMESTER							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**Credits**
1	R19BSH-MA1101	Linear Algebra and Ordinary Differential Equations	BS	3	0	0	3
2	R19BSH- EN1101	English	HM	3	0	0	3
3	R19BSH-PH1101	Engineering Physics	BS	3	0	0	3
4	R19EEE-ES1106	Network Analysis	ES	3	0	0	3
5	R19MEC-ES1102	Engineering Drawing	ES	1	0	3	2.5
6	R19BSH-EN1102	Communicative English Lab -I	HM	0	0	3	1.5
7	R19BSH-PH1103	Engineering Physics Lab	BS	0	0	3	1.5
8	R19ECE-ES1101	Electronics Workshop	ES	0	0	3	1.5
9	R19BSH-MC1101	Constitution of India	MC	3	0	0	0
			Total	16	0	12	19

I YEAR- II SEMESTER							
S. No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**Credits**
1	R19BSH-MA1205	Transform Techniques and Partial Differential Equations	BS	3	0	0	3
2	R19BSH-MA1202	Complex Variables and Multivariable Calculus	BS	3	0	0	3
3	R19BSH-CH1202	Engineering Chemistry	BS	3	0	0	3
4	R19CSE-ES1203	Problem Solving and Programming using C	ES	3	0	0	3
5	R19EEE-ES1201	Basic Electrical Engineering	ES	3	0	0	3
6	R19BSH-CH1203	Engineering Chemistry Lab	BS	0	0	3	1.5
7	R19BSH-EN1201	Communicative English Lab -II	HM	0	0	3	1.5
8	R19CSE-ES1204	Problem Solving and programming using C Lab	ES	0	0	3	1.5
9	R19EEE-ES1202	Basic Electrical Engineering -Lab	ES	0	0	3	1.5
10	R19BSH-MC1201	Environmental Science	MC	3	0	0	0
			Total	18	0	12	21

II YEAR –I SEMESTER							
S.No.	**Course Code**	**Course**	**Category**	**L**	**T**	**P**	**Credits**
1	R19ECE-PC2101	Electronics Devices and Circuits	PC	3	0	0	3
2	R19ECE-PC2102	Switching Theory and Logic Design	PC	3	0	0	3
3	R19ECE-PC2103	Signals and Systems	PC	3	0	0	3
4	R19CSE-ES2101	Data structure with C Programming	ES	3	0	0	3
5	R19BSH-MA2101	Computational Methods using MATLAB	BS	1	0	2	2
6	R19BSH-HM2101	Managerial Economics & Financial Analysis	HM	3	0	0	3
7	R19ECE-PC2104	Electronics Devices and Circuits-Lab	PC	0	0	3	1.5
8	R19ECE-PC2105	Switching Theory and Logic Design- Lab	PC	0	0	3	1.5
9	R19CSE-ES2102	Data structure with C Programming-Lab	ES	0	0	2	1
10	R19BSH-MC2101	Essential of Indian Traditional Knowledge	MC	2	0	0	0
11	R19BSH-MC2102	Industrial Psychology	MC	3	0	0	0
12	R19ECE-MC2103	MOOCS-1	MC	2	0	0	0
Total				**23**	**0**	**10**	**21**

II YEAR –II SEMESTER							
S.No	**Course Code**	**Course**	**Category**	**L**	**T**	**P**	**Credits**
1	R19ECE-PC2201	Electronics Circuit Analysis	PC	3	0	0	3
2	R19EEE-PC2202	Control Systems	PC	3	0	0	3
3	R19ECE-PC2203	Electromagnetic Waves and Transmission Lines	PC	3	0	0	3
4	R19ECE-PC2204	Random Variable and Stochastic Process	PC	3	0	0	3
5	R19CSE-ES2201	Computer Architecture and Organization	ES	3	0	0	3
6	R19BSH-HM2201	Management and Organizational Behavior	HM	3	0	0	3
7	R19ECE-PC2205	Electronics Circuit Analysis - Lab	PC	0	0	3	1.5
8	R19ECE-PC2206	Signal and systems-Lab	PC	0	0	3	1.5
9	R19CSE-SD2201	Python Programming-Lab	SD	2	0	2	1
10	R19ECE-SI2201	Summer Internship-I	SI	0	0	0	0
11	R19BSH-MC2201	Employability Skills (English)	MC	1	0	2	0
12	R19ECE-MC2202	MOOCS-2	MC	2	0	0	0
Total				**23**	**0**	**10**	**22**

III YEAR –I SEMESTER							
S. No.	**Course Code**	**Course**	**Category**	**L**	**T**	**P**	**Credits**
1	R19ECE-PC3101	Integrated Circuits and applications	PC	3	0	0	3
2	R19ECE-PC3102	Microprocessor and Microcontrollers	PC	3	0	0	3
3	R19ECE-PC3103	Analog and Digital Communications	PC	3	0	0	3
4	R19ECE-PC3104	Antennas and Wave Propagation	PC	3	0	0	3
5	R19ECE-PE3101.1 R19ECE-PE3101.2 R19ECE-PE3101.3 R19ECE-PE3101.4	**Professional Elective-I** 1. Electronic Measurements Instrumentation 2. Bio-Medical Engineering 3. EMI/EMC 4. Embedded System Design	PE	3	0	0	3
6	R19ECE-PC3105	Integrated Circuits and applications Lab	PC	0	0	3	1.5
7	R19ECE-PC3106	Analog and Digital Communications Lab	PC	0	0	3	1.5
8	R19ECE-PC3107	Microprocessor and Microcontrollers Lab	PC	0	0	3	1.5
9	R19ECE-SD3101	Hardware Design Engineering Lab	SD	0	0	3	0
10	R19BSH-MC3102	Entrepreneurship & Incubation	MC	2	0	0	0
11	R19BSH-MC3101	Employability Skills -2	MC	0	0	3	0
12	R19ECE-MC3101	MOOCS-3	MC	0	0	0	0
13	R19ECE-SI3101	Summer Internship-1 (Evaluation)	SI	0	0	0	0
				Total			**19.5**
Honors Course -2/Minor Course-2							

III YEAR –II SEMESTER							
S. No.	**Course Code**	**Course**	**Category**	**L**	**T**	**P**	**Credits**
1	R19ECE-PC3201	Microwave Engineering	PC	3	0	0	3
2	R19ECE-PC3202	VLSI	PC	3	0	0	3
3	R19ECE-PC3203	Digital Signal Processing	PC	3	0	0	3
4	R19ECE-PE3201.1 R19ECE-PE3201.2 R19ECE-PE3201.3 R19ECE-PE3201.4	**Professional Elective-II** 1. Information Theory and Coding 2. Analog IC Design 3. Real time Operating systems 4. Internet of Things	PE	3	0	0	3
5	R19CSE-OE3201 R19EEE-OE3201 R19CSE-OE3202 R19MEC-OE3201	**Open Elective-1** 1. OOPs through JAVA 2. Power Electronics 3. Introduction to AI 4. Robotics	OE	3	0	0	3
6	R19ECE-PC3204	VLSI Lab	PC	0	0	3	1.5
7	R19ECE-PC3205	Digital Signal Processing Lab	PC	0	0	3	1.5
8	R19ECE-PC3206	Antenna Modeling and Microwave Engineering lab	PC	0	0	3	1.5
9	R19ECE-PJ3201	Social Relevant Project	PJ	0	0	1	0.5
10	R19BSH-MC3201	Intellectual Property Rights (IPR) & Patents	MC	3	0	0	0
11	R19ECE-MC3201	MOOCS-4	MC	0	0	0	0
				Total			**20**
***Honors Course -3/Minor Course-3**							
Summer Internship-2(After Third Year & evaluated during IV-I Semester)							

**The Eligible students who opted the courses for B.Tech with Honors/Minor only*

**L-Lecture, T-Tutorial, P-Practical, C-Credits*

IV YEAR –I SEMESTER							
S. No.	**Course Code**	**Course**	**Category**	**L**	**T**	**P**	**Credits**
1	R19ECE-PC4101	Optical communication	PC	3	0	0	3
2	R19ECE-PC4103	Data Communications & Computer Networks	PC	3	0	0	3
3	R19ECE-PC4104	Digital Imaging and Video Processing	PC	3	0	0	3
4	R19ECE-PE4101	Professional Elective (PE3) 1. Cellular and Mobile Communication 2. SOC Architecture 3. Cognitive Radio 4. Low Power VL	PCE	3	0	0	3
5	R19ECE-PE4102	Professional Elective (PE4) 1. Satellite communication 2. Introduction to Machine Learning 3. Speech Processing 4. Optimization Techniques	PCE	3	0	0	3
6	R19ECE-OE4202	Open Elective (OE2) 1. DBMS (CSE) 2. Block chain Technology(CSSE) 3. Mobile application(CSIT) 4. Industrial Robotics (MECH)	OE	3	0	0	3
7	R19ECE-PC4105	Digital Imaging and Video signal Processing lab	PC	0	0	3	1.5
8	R19ECE-SD4106	Data Communication lab	SD	0	0	3	0
9	R19ECE-PJ4101	Project - Part I	PJ	0	0	8	4
				Sub-Total			**23.5**

IV YEAR –II SEMESTER							
S. No.	**Course Code**	**Course**	**Category**	**L**	**T**	**P**	**Credits**
1	R19ECE-OE4201	Open Elective (OE-3) 1. Operating Systems (CSE) 2. Electrical Power Distribution Systems (EEE) 3. Elements of Mechanical Engineering (MECH) 4. Software Engineering (CSIT)	OE	3	0	0	3
2	R19ECE-PE4103	Professional Elective (PE5) 1. Wireless Sensor Networks 2. VLSI Testing & Testability 3. Video Signal Processing 4. Radar Engineering	PCE	3	0	0	3
3	R19ECE - PJ4201	Project - Part II	PJ	0	0	16	8
				Sub-Total			**14**
				Total			**160**

I Year –I Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-MA1101	Linear Algebra and Ordinary Differential Equations	3	0	0	3

Course Objectives:

- This course is designed to equip the students with the necessary Mathematical skills and techniques that are essential for an engineering course.
- To enlighten the learners in the concept of Linear Algebra and Calculus.
- To furnish the learners with basic concepts and techniques at plus two level to leadthem into advanced level by handling various real world applications.

Course Outcomes:

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

1. Apply the matrix algebra techniques to engineering applications. (L3)
2. Apply the concepts of eigen values and eigen vectors to free vibration of a two mass systems. (L3)
3. Apply mean value theorems to real world problems.(L3)
4. Solve the first order ordinary differential equations related to various engineering fields. (L3)
5. Solve the higher order differential equations and analyze physical situations. (L3)

Unit I

Matrix Operations and Solving Systems of Linear Equations:

Rank: Rank of a matrix, echelon form and normal form of a matrix, finding the non singular matrices P, Q of a matrix A such that PAQ is in normal form.

Linear Equations: Solving system of homogeneous and non-homogeneous linear equations using-Row-Rank Method, Direct Methods (Gauss elimination method, Gauss Jordan method) and Iterative methods (Jacobi's iteration method, Gauss Seidel method).

Application: Finding the current in an electrical circuit.

Learning Outcomes:

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

- —find the rank of a given matrix. (L2)
- —solve the system of linear equations using various matrix techniques. (L3)
- —apply the matrix methods to find the current in an electrical circuit at any time. (L3)

Unit II

Eigen values, Eigen vectors and Quadratic forms:

Eigen values and Eigen vectors: Eigen values and Eigen vectors and their properties (without proofs), diagonalisation of a matrix, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by using Cayley-Hamilton theorem.

Quadratic forms: Quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation, rank, index and signature of a quadratic form, Sylvester's law of inertia (without proof), nature of the quadratic forms.

Application: Free vibration of two mass systems.

Learning Outcomes:

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

- —find the eigen values and eigen vectors of the given matrix.(L2)
- —find the inverse and powers of the matrix using Cayley- Hamilton theorem.(L2)
- —identify special properties of a quadratic form(or corresponding matrix). (L3)

Unit III

Mean Value Theorems & Sequences and Series (without proofs):

Mean Value Theorems: Rolle 's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders.

Sequences and Series: Sequence, series, convergence and divergence of series, geometric series, auxiliary series, comparison tests, ratio test, integral test, Cauchy's root test, Raabe's test, alternating series, Leibnitz test, absolute and conditional convergence.

Learning Outcomes:

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

- analyze the behaviour of functions by using mean value theorems. (L3)
- translate the given function as series of Taylor's and Maclaurin's with remainders. (L3)
- apply the suitable test to study the convergence of a given series. (L3)

Unit IV

Differential Equations of First Order and First Degree: Linear and Bernouill's differential equations, exact differential equations and differential equations reducible to exact equations.

Application: Orthogonal trajectories, simple electrical circuits.

Learning Outcomes:

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

- solve the first order differential equation by appropriate method. (L2)
- formulate the first order linear differential equation for a physical situation. (L3)
- apply suitable method to solve the real world problem using the concept of differential equations. (L3)

Unit V

Linear Differential Equations of Higher Order: Definitions, complete solution, operator D, rules for finding complementary function, inverse operator, rules for finding particular integral (The RHS term of the type e^{ax} , Sin ax, cos ax, polynomial in x, e^{ax} V(x), xV(x)), method of variation of parameters, simultaneous linear equations with constant coefficients using direct elimination method.

Applications: L-C-R Circuits.

Learning Outcomes:

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

- solve the linear differential equations with constant coefficients by appropriate method. (L3)
- solve the higher order differential equation by analyzing physical situations. (L3)
- convert second and third order differential equation to a system of linear differential equations. (L2)
- solve the system of linear differential equations with constant coefficients. (L3)

Textbooks

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
5. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.
6. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BS- EN1101	English	3	0	0	3

Course Objectives:

- Educate students in the acquisition of the English language through the study of literature and other contemporary forms of culture.
- Help students to explore literature in order to learn how the world works to understand the complex dynamics of human interpersonal relationships.
- Promote the development of empathy by engaging students in a discussion of literary works, highlighting the emotional aspects of the pieces.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy by involving them in life-long learning.
- Acquire a wide range of vocabulary, an understanding of grammar and knowledge to demonstrate students' ability to think creatively in order to express effectively.

Course Outcomes:

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

1. Understand the value of Human Conduct for career development through life skills: Ethics & Values and use root words and Prepositions without errors. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading
2. Observe the significance of imagery in poetry to use it in real-time contexts and learn to use and misuse of Articles, Prefixes, Suffixes, and Punctuations. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading
3. Acquire conversation skills through drama and enhance the correct use of Nouns, Pronouns, Verbs and Concord to write paragraphs effectively. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading
4. Develop reading for inspiration, interpretation & innovation and learn to use modifiers, synonyms and antonyms to write essays effectively. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading
5. Learn meaningful use of language by avoiding meaningless cliches, bureaucratic euphemisms and academic jargon in order to acquire the skill of summarising.Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading

Unit I

On the Conduct of Life: William Hazlitt-**Reading**; **Grammar**-Prepositions; **Vocabulary**-Word Formation-I; Introduction to Word Formation; **Writing**-Clauses and Sentences; **Life-Skills**: Values and Ethics. If-- Rudyard Kipling.

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--1. Strong Roots--2.Early Influences-3.Education Provides a Solid Foundation-for Extensive reading-Reading for Pleasure-Information and General Understanding

Learning Outcomes:

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

- instill one's own creativity through poetry and prose for LSRW skills development(L3)
- build one's critical thinking skills (L3)
- enrich social skills which in turn make him/her a good engineer to the society(L3)
- impart reading skills that sensitize about worldly topics.(L2)
- understand new phrases and vocabulary to use in both communication and writing (L2)
- inculcate a sense of extensive reading and imbibe the habit of reading text independently.(L3)
- read to write effectively through a biography(L2)

Unit II

The Brook: Alfred Tennyson: Reading; Grammar-Articles; **Vocabulary**-WordFormation-II: Root Words from Other Languages; **Writing**-Punctuation; **Life-Skills**: Self- Improvement. How I Became a Public Speaker:George Bernard Shaw.

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--4.Preparing to Start a Career--5.Work Begins in Earnest--6. From Hovercraft to Rockets **-**for Extensive reading**-**Reading for Pleasure-Information and General Understanding

Learning Outcomes:

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

- experience literary imagery to use it in conversational English(L4)
- become aware of his/her responsibility towards nation(L2)
- understand his/her ability to write effectively through reading(L2)
- acquaint with perfect use of grammar and language(L3)
- inculcate a sense of extensive reading and imbibe the habit of reading text independently.(L3)
- read to write effectively through a biography(L2)

Unit III

The Death Trap: Saki: Reading; Grammar-Noun-Pronoun Agreement-Subject-Verb Agreement; **Vocabulary**-Word Formation-III: Prefixes and Suffixes from Other Languages; **Writing**-Principal of Good Writing-Paragraph Writing; **Life-Skills**: Time Management- On Saving Time: Seneca

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--7.Adding Momentum to Space Research--8.Balancing Defence Technology with Space Research**--**for Extensive reading**-**Reading for Pleasure-Information and General Understanding

Learning Outcomes:

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

- instill empathy and a sense of humanity through the given literary piece (L3)
- acquire the ability to manage time in terms of goal setting (L3)
- communicate effectively with proper grammatical syntax and semantics (L3)
- understand new phrases and vocabulary to use in both communication and writing (L2)
- inculcate a sense of extensive reading and imbibe the habit of reading text independently.(L3)
- read to write effectively through a biography(L2)

Unit IV

Chindu Yellamma: Reading; Grammar-Misplaced Modifiers; **Vocabulary**-Synonyms & Antonyms; **Writing**-Essay Writing; **Life-Skills**: Innovations. Muhammad Yunus.

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--9. Dreaming of Satellites--10.The End of an Era**--**for Extensive reading**-**Reading for Pleasure-Information and General Understanding

Learning Outcomes:

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

- understand the significance of art that brings the change in human.(L2)
- construct sentences with appropriate usage of grammar.(L3)
- develop writing skills through essay writing. (L3)
- acquire a wide range of vocabulary through synonyms and Antonyms.(L2)
- inculcate a sense of extensive reading and imbibe the habit of reading text independently.(L3)
- read to write effectively through a biography(L2)

Unit V

Politics and the English Language-George Orwell: Reading; Grammar-Cliches and Redundancies; **Vocabulary**-Common Abbreviations; **Writing**-Writing a summary; **Life-Skills**: Motivation- The Dancer with a White Parasol: Ranjana Deva

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--11. Leading a Team--12. Dear ones Pass On--for Extensive reading-Reading for Pleasure-Information and General Understanding

Learning Outcomes:

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

- develop the Imagery techniques for speaking and writing. (L3)
- understand the gradual evolution in the field of Indian cinema. (L2)
- optimize the acquired skills of grammar and vocabulary contextually.(L3)
- inculcate a sense of extensive reading and imbibe the habit of reading text independently.(L3)
- read to write effectively through a biography(L2)

Textbooks:

1. Language and Life -A skills Approach by Orient Black Swan.
2. Wings of Fire An Autobiography APJ Abdula Kalam with Arun Tiwari Abridged by Universities Press

Online References:

1. https://www.gradesaver.com/the-poetry-of-dh-lawrence/study-guide/summary
2. https://englicist.com/notes/summary-where-the-mind-is-without-fear-rabindranath-tagore.
3. http://www.authorstream.com/Presentation/cse1amity-2314117-stench-kerosene-amrita-pritam/.
4. https://www.poemhunter.com/poem/dream-love-8/comments/
5. https://www.poetryfoundation.org/collections

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-PH1101	Engineering Physics	3	0	0	3

Course Objectives:

- To impart knowledge in basic concepts of Wave optics, Lasers and Fiber optics, Electromagnetic fields, Super conductors and physics of Nano materials, dielectric materials and Semiconductor physics.
- To familiarize the applications of Nano materials, Lasers and Fiber optics, Electromagnetic fields, Semiconductor physics relevant to Electronics and Communication Engineering.

Course Outcomes:

After the completion of this course, the student can able to

1. Interpret the interaction of optic energy with matter(L2)
2. Explain the properties of polarization and Lasers(L2)
3. Classify the given dielectric and semiconductor materials(L3)
4. Analyze Electromagnetic wave propagation in non-conducting medium(L3)
5. Apply the principles of Fiber Optics and nano materials to communication (L3)

Unit I

Wave optics:

Interference: Principle of superposition of waves- interference of light- Conditions for sustained interference- interference in thin films by Reflection-Newton's Rings

Applications: Colures of thin films, Determination of wavelength of given light source and refractive index of given unknown liquid

Diffraction: Introduction- comparison of interference and Diffraction-Types of diffraction-Fraunhofer diffraction- single slit Diffraction, double slit, N-slit, Diffraction Grating-Grating Spectrum- -Rayleigh's criterion, Resolving power of Grating

Applications: Determination of wavelength of monochromatic source of light and

Application of diffraction for determination of separation of lines on integrated circuit

Learning Outcomes

After the completion of this chapter the student can able to

- Outline the conditions for sustained interference(L2)
- Identify the Engineering applications of interference (L2)

Unit II

Polarization and Lasers:

Polarization: Polarization by reflection, refraction and double Refraction-Nicol Prism-Half Wave and Quarter Wave Plates.

Applications: Nicol prism as polarizer and analyzer, Glare reduction due to sunglasses

Lasers: Characteristics- Spontaneous and Stimulated Emissions- Pumping and Population Inversion-Ruby Laser-He-Ne-Laser

Applications: Medical applications and Communication applications

Learning Outcomes

After the completion of this chapter the student can able to

- Explain the Characteristics of Lasers(L2)
- Construct three level and four level laser systems(L3)
- Analyze the applications of lasers(L4)
- Analyze the differences between interference and diffraction (L3)
- Illustrate the concept of polarization and its applications (L2)

Unit III

Dielectric Materials and Semiconductor Physics:

Dielectric Materials: Introduction to Dielectrics- Electric Polarization- Dielectric Polarizability- Susceptibility and Dielectric Constant- Types of Polarization-Electronic, ionic, orientation (without proof) and space charge (without proof) – Frequency dependence on polarization- Lorentz (Internal) field – Claussius- Mosotti equation

Applications: Ferroelectrics and Piezoelectric.

Semiconductor Physics: Origin of Energy Bands- Classification of Solids based on Energy Bands- intrinsic and extrinsic (P-N) semiconductors- Fermi Energy- Direct and Indirect Band Gap Semiconductors- Hall Effect-Hall coefficient.

Applications: Thermister and applications of Hall Effect.

Learning Outcomes

The student can able to

- Compare the types of dielectric polarizations(L2)
- Analyze the frequency dependence on polarizations (L4)
- Demonstrate the applications of Dielectrics(L3)
- Classify the solids into conductors, semiconductors and insulators based on band theory(L3)
- Outline the properties of n-type and p-type semiconductors(L2)
- Differentiate the direct and indirect band gap in semiconductors(L2)
- Identify the type of semiconductor using Hall effect(L2)
- List the applications of semiconductors in electronic manufacturing(L2)

Unit IV

Electromagnetic Fields: Introduction-scalar and vector field-gradient-divergence-curl of a vector Field-statements of Gauss divergence theorem and stokes theorem (without proofs)-Gauss law in Electrostatics & Magnetism-

Faraday's laws - Ampere's circuit Law-Maxwell's Equations- differential form and integral Form-Propagation of electromagnetic fields through non conducting medium

Applications: Wave guides and signal propagation coaxial cable.

Learning Outcomes

After the completion of this chapter the student can able to

- Evaluate basic laws of electromagnetism(L3)
- Verify the velocity of Electromagnetic wave in isotropic medium(L3)
- Assess the Electromagnetic wave propagation in non-conducting medium(L2)

Unit V

Fiber Optics and Physics of Nanomaterials:

Fiber Optics: Introduction to optical Fibers-Total Internal Reflection-Critical Angle of Propagation-Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index Profile-Modes of Propagation of Electromagnetic wave through optical Fiber.

Applications: Block diagram of Fiber Optic communication, Medical Applications-Fiber Optic Sensors

Physics of Nanomaterials: Properties of Nanomaterials- Synthesis-Sol-gel Method, preparation of CNT-pulsed laser deposition techniques –Properties of CNT.

Applications: Electrical circuits, Computer applications, CNT gas sensor, Nano batteries, drug delivery systems

Learning Outcomes

After the completion of this chapter the student can able to

- Enumerate the classification of Fibers based on Total Internal Reflection, Critical angle of propagation(L3)
- Classify the modes of propagation of electromagnetic wave through Optical Fiber (L3)
- Demonstrate the Fiber Optic communication through block diagram and applications in various fields(L3)
- Analyze the size dependent properties of Nano materials (L3)
- Enumerate the methods for the preparation and characterization of CNT's (L2)

Text Books

1. M.N. Avadhanulu, P.G. Kshrisagar "A Text book of Engineering Physics" –S.Chand Publications, 2017.
2. H.K. Malik &A.K. Singh "Engineering Physics", - McGraw Hill Publishing Company Ltd, 2018.
3. Ch. Srinivas, Ch. Seshu Babu, "Engineering Physics", Cengage Learning.

Reference Books

1. David J. Griffiths, "Introduction to Electrodynamics" -4/e, Pearson Education, 2014
2. Gerd Keiser "Optical Fiber Communications" -4/e, Tata Mc GrawHill, 2008
3. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Publications.
4. S.M. Sze "Semiconductor Devices-Physics and Technology" –Wiley, 2008
5. T Pradeep " A Text Book of Nano Science and Nano Technology"- Tata Mc GrawHill,2013
6. 6.Sanjay D Jain, Girish G Shastra Buddi, "Engineering Physics" –University Press
7. Dr.K. Vijaya Kumar, Engineering Physics-S.Chandpublications

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19EEE-ES1106	Network Analysis	3	0	0	3

Course Objectives:

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To analyze DC and AC electrical circuits.
- To impart knowledge on applying theorems, mesh & nodal analysis techniques for solving electrical circuits
- To educate selecting appropriate and relevant technique for solving the electrical circuits under different conditions
- To introduce z, y, ABCD, h parameters and network functions for describing two port networks.

Course Outcomes:

After the completion of this course, the student can able to

1. Understand the concepts of passive elements, types of sources and various network reduction techniques. (L2)
2. Analyze steady state behavior of single phase and three phase AC electrical circuits (L4)
3. Solve DC and AC electrical circuits using theorems, mesh and nodal analysis techniques (L3)
4. Determine two port network parameters such as Z, Y, ABCD and h parameters for given electrical network (L5)
5. Analyze transient and steady state behavior of RL, RC & RLC circuits in time and Frequency domain (L4)

Unit I

DC Circuits: Passive components and their V-I relations, Sources (dependent and independent) -Kirchhoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, Mesh and Nodal analysis of networks with dependent and independent voltage and current sources.

Learning Outcomes:

The students are able to

- Recall Kirchhoff Voltage and Current laws (L1)
- Solve electric circuits using mesh and nodal analysis techniques (L3)
- Analyze simple electric circuits with dc excitation (L4)

Unit II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Concept of Resonance in series & parallel circuits, bandwidth and quality factor, Duality and Dual networks, Three-phase balanced circuits, voltage and current relations in star and delta connections.

Learning Outcomes:

The students are able to

- Analyze single phase AC circuits consisting of series and parallel RL, RC, RLC combinations (L4)
- Determine conditions for resonance in the series and parallel circuits (L5)
- Interpret voltages and currents in three-phase star - delta connections (L2)

- Understand significance of duality and dual networks (L2)
- Solve simple balanced three-phase ac systems (L3)

Unit III

Network Theorems: Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, and Reciprocity theorem as applied to AC and DC Circuits, Applications.

Learning Outcomes:

The students are able to

- Apply network theorems for electrical circuits analysis with dependent sources (L3)
- Determine maximum power transfer to the load (L5)

Unit IV

Two Port Networks and Network Functions: Two Port Networks, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters, hybrid and inverse hybrid parameters, relationship between parameters, interconnections of two port networks.

Learning Outcomes:

The students are able to

- Determine two port network parameters such as Z, Y, ABCD and h parameters for given electrical network (L5)
- Relate different two port network parameters (L4)
- Simplify complex networks using fundamental two port network parameters (L4)
- Examine various driving point & transfer functions of two port network (L4)

Unit V

Time and Frequency domain Analysis of electrical circuits: Solution of first and second order differential equations for Series and parallel R-L, R-C, RL-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions, Applications.

Learning Outcomes:

The students are able to

- Understand behavior of circuit elements under switching conditions (L2)
- Recognize importance of initial conditions in finding response of electric circuits in time and Frequency domain (L2)
- Analyze transient & steady state response of RL, RC & RLC circuits in time and Frequency domains (L4)
- Evaluate initial and final conditions in RL, RC and RLC circuits in frequency domain (L5)

Text Books

1. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.

References

1. Ravish R. Singh “Network Analysis and Synthesis”, McGraw Hill Education, 2013.
2. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
3. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.
4. Network Analysis and Filter Design by Chadha, Umesh Publications.

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19MEC-ES1102	Engineering Drawing	1	0	3	2.5

Course Objectives:

- To enhance the communications of the students using engineering drawing.
- To make the student familiar to the drawing practices and convection.
- To familiarize the techniques of constructing polygons, curves and scales.
- To introduce the orthographic projections, projections of points, lines and planes.
- To make the students understand as to how the industry communicates technical information. .
- To enable the student draft simple engineering components and analyze different views of components.

Course Outcomes:

After completing the course, the student will be able to

1. Apply the basics of engineering drawing to construct the polygons and curves. (L3)
2. Draw the orthographic projections of points and lines. (L3)
3. Draw the projections of planes in various conditions. (L3)
4. Draw the projections of regular solids inclined to one of the planes. (L3)
5. Imagine the isometric views of orthographic views and vice versa. (L6)

Unit I

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.

Polygons: - Construction of regular polygons using given length of a side;

Ellipse: - Arcs of circles and Oblong methods;

Scales: – Vernier and Diagonal scales.

Applications:

- Elliptical shape - bridges and arches, elliptical trammel.
- Diagonal scale is used in engineering to read lengths with higher accuracy as it represents a unit into three different multiple in metres, centimeters and millimeters.
- Vernier scales are used in Machine Shop Applications, Medical Applications, Research & Laboratory Applications etc.

Learning Outcomes:

- Identify the standards of BIS conventions. (L3)
- Construct the elliptical curve by using different methods. (L3)
- Construct the different types of scales(L3)

Unit II

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either two of the reference planes (HP,VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

Applications:

- Structural plans and elevations.
- Stair casing designs, Structural plans and elevations.

Learning Outcomes:

- Visualize and draw the projections of points in various quadrants. (L3)
- Visualize and draw the projections of lines in various conditions. (L3)

- Draw the projections of lines in various conditions. (L6)
- Construct the traces of a line in various conditions. (L6)

Unit III

Projections of Planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

Applications: Structural plans and elevations, stair casing designs.

Learning Outcomes:

- Visualize and draw the projections of planes in various conditions. (L3)
- Draw the planes inclined to both the reference planes in engineering. (L3)

Unit IV

Projections of Solids: – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

Applications: Machine component drawings, AC ducts, cooling towers , piping layout designs,

Learning Outcomes:

- Draw the different types of solids graphically. (L3)
- To visualize and draw the projections of various solids.(L3)

Unit V

Isometric projections: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Applications: Structural drawings –industrial components, architectural drawing.

Learning Outcomes:

- Identify the orthographic views and isometric views, able to convert isometric views to orthographic views and orthographic views to isometric views, (L3)
- Draw the isometric Projections by using isometric scale. (L3)

Text Books

1. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
2. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.
3. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.

Reference Books

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-EN1102	Communicative English Lab-I	0	0	3	1.5

Course Objectives

- Adopt activity-based teaching-learning methods to ensure that learners would be engaged in the use of language both in the classroom and laboratory sessions.
- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role-plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well-organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes:

At the end of the course, the learner will be able to

1. Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively.
2. Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely.
3. Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates
4. acquire effective strategies for good writing and demonstrate the same in summarizing and reporting
5. Gain knowledge of grammatical structures and vocabulary for day-to-day successful conversations.

Unit I

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learner will be able to

- identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)
- ask & answer general questions on familiar topics (L2)
- employ suitable strategies for skimming & scanning to get the general idea of a text and specific information (L3)
- recognize paragraph structure with beginnings/endings (L3)
- form sentences using proper grammatical structures and correct word forms (L3)

Unit II

Listening: Answering a series of questions about the main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learner will be able to

- comprehend short talks on general topics (L2)
- speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
- understand the use of cohesive devices for better reading comprehension (L2)
- write well-structured paragraphs on specific topics (L3)
- make necessary grammatical corrections in short texts (L3)

Unit III

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learner will be able to

- summarize the content with clarity & precision from short talks (L3)
- report what is discussed in informal discussions (L3)
- infer meanings of unfamiliar words using contextual clues (L3)
- write summaries based on global comprehension of reading/listening texts (L3)
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing (L3)

Unit IV

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Roleplays for the practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learner will be able to

- infer & predict about the content of spoken discourse (L4)
- engage in formal/informal conversations understanding verbal & non-verbal features of communication (L3)
- interpret graphic elements used in academic texts (L2)

- produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- use language appropriate for description and interpretation of graphical elements (L4)

Unit V

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidence **Grammar and Vocabulary:** Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture to answer questions (L3)
- make formal oral presentations using effective strategies (L3)
- produce a well-organized essay with adequate details (L3)
- edit short texts by correcting common errors (L4)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

Sample Web Resources

Grammar/Listening/Writing

1. 1-language.com
2. http://www.5minuteenglish.com/
3. https://www.englishpractice.com/

Grammar/Vocabulary

1. English Language Learning Online
2. http://www.bbc.co.uk/learningenglish/
3. http://www.better-english.com/
4. http://www.nonstopenglish.com/
5. https://www.vocabulary.com/
6. BBC Vocabulary Games
7. Free Rice Vocabulary Game

Reading

1. https://www.usingenglish.com/comprehension/
2. https://www.englishclub.com/reading/short-stories.htm
3. https://www.english-online.at/

Listening

1. https://learningenglish.voanews.com/z/3613
2. http://www.englishmedialab.com/listening.html

Speaking

All Skills

1. https://www.englishclub.com/
2. http://www.world-english.org/
3. http://learnenglish.britishcouncil.org/
4. https://www.talkenglish.com/
5. BBC Learning English – Pronunciation tips
6. Merriam-Webster – Perfect pronunciation Exercises

Online Dictionaries

1. Cambridge dictionary online
2. MacMillan dictionary
3. Oxford learner's dictionaries

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-PH1103	Engineering Physics Laboratory	0	0	3	1.5

Course Objectives:

- To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics and Semiconductor physics
- To familiarize the handling of basic physical apparatus like Vernier callipers, screw gauge, spectrometers, travelling microscope, laser device, optical fibre,etc.

Course Outcomes:

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

1. Apply the working principles of laboratory experiments in optics, mechanics, electromagnetic and electronics and perform the experiments using required apparatus. (L3)
2. Compute the required parameter by suitable formula using experimental values (observed values) in mechanics, optics, electromagnetic and electronic experiments. (L3)
3. Analyze the experimental results through graphical interpretation. (L4)
4. Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory. (L2)
5. Demonstrate the working principles, procedures and applications. (L3)

List of Experiments

1. Determine the thickness of fibre (thin paper/piece of hair) using wedge shaped film
2. Determination of the radius of curvature of the lens by Newton's rings method
3. Determination of the wavelength of mercury light by plane diffraction grating
4. Determination of wavelength of laser light by normal incidence method
5. Determine the Numerical Aperture of a given Optical Fiber and hence find its acceptance angle
6. Determine the energy band gap of a given semi-conductor
7. Determine the temperature co-efficient of resistance of a given Thermistor
8. Determine the resolving power of grating.

Virtual Lab Experiments

1. Determination of the Brewster's angle.
2. Determine the Hall coefficient & the carrier concentration of charge carriers in the given sample materialby Hall Effect.

Reference Books

1. 1.S.BalaSubrahmanian, M.N.Srinivasan "A TextBook of practical physics" by S.Chand publishers,2017
2. Engineering Physics Lab Manual by Dr.Y. Aparna&Dr.K.Venkateswarao (V.G.S.Book links).
3. Laboratory Experiments in College Physics, C.H. Bernard and C.D. Epp, John Wiley and Sons, Inc., New York, 1995.

Web Source References

1. http://vlab.co.in/ba_labs_all.php?id=8
2. http://va-iitk.vlabs.ac.in/
3. http://ml-iitb.vlabs.ac.in/

Subject Code	Subject Name	L	T	P	C
R19ECE- ES1101	Electronics Workshop	0	0	3	1.5

Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To equip with the knowledge of understanding data sheets of electronic components
- To give practical experience on soldering the electronic components on a PCB and using EDA Tools
- To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide training on Productivity tools like word processors, spreadsheets, presentations
- To provide knowledge in understanding working of various communication systems.

Course Outcomes:

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

1. Identify various electronic components, devices and measuring instruments used in electronic circuit design. (L3)
2. Test different electronic components, devices and instruments. (L3)
3. Apply various electronic components devices & EDA, office tools in electronic and communications field. (L3)
4. Differentiate the method of assembling and dissembling the basic electronic circuits & devices using PCB, EDA tools and other techniques. (L3)
5. Illustrate on electronic components instruments & devices using documentation tools, such as spread sheets, PPT's etc., (L3)

List of Exercises / Experiments

1. Familiarization of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students
2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that electronic measuring instruments are learned to be used by the students
3. Electronic Components:
   - Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.
4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
   - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments
5. Study of Cathode Ray Oscilloscope (CRO)
   - Find the Amplitude and Frequency of a signal
   - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures

6. Interpret data sheets of discrete components and IC's.
   - Write important specifications/ratings of components & ICs and submit it in the form of a report.
7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, Learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
   - Provide some exercises so that students are familiarized in using EDA tools
8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.
9. Familiarization with Computer Hardware & Operating System:
   - Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.
   - Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.
   - Install Operating system on the computer. Students should record the entire installation process.
10. Familiarization with Office Tools
    - Word Processor: Able to create documents using the word processor tool. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the featuresstudied.
    - Spreadsheet: Able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.
    - Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper-linking, running the slide show, setting the timing for slide show.
11. Familiarization of PA system with different microphones, loud speakers, mixer etc. Represent the same in the form of diagrams, write specifications and submit it in the form of a report.
12. Understand working of various Communication Systems like Television, Satellite Transmitter & Receiver, Radio Receiver, Mobile Phone. Prepare demo boards/charts of various communication systems.

Text Books

1. J.Millman and C.C.Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2007.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson/Prentice Hall, 10th Edition, 2008.
3. Shalivahana N. Suresh Kumar, A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill (India), 3rd edition, 2007.

4. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-Sangeeta Panchal,Alka Sabharwal

References

1. T.F. Bogart Jr., J.S.Beasley and G.Rico, “Electronic Devices and Circuits”,
2. Microsoft Office 2016 Step by Step 1st Edition by Joan Lambert (Author), Curtis Frye (Author) Pearson Education, 6th edition, 2004.

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-MC1101	Constitution of India	3	0	0	0

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state government aspects related to finance and administrative.

Course Outcomes:

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

- Impart knowledge on historical background of the constitution making and its importance for building a democratic India.(L2)
- Analyze the functioning of three wings of the government ie., executive, legislative and judiciary.(L2)
- Explain the value of the fundamental rights and duties for becoming good citizen of India.(L2)
- Analyze the decentralization of power between central, state and local self-government.(L4)
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.(L3)

Unit I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution- Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes:

After completion of this unit student will be able to

- Understand the concept of Indian constitution (L2)
- Apply the knowledge on directive principle of state policy (L3)
- Analyze the History, features of Indian constitution (L4)
- Evaluate Preamble Fundamental Rights and Duties (L5)

Unit II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.

Learning Outcomes:-

After completion of this unit student will be able to

- Understand the structure of Indian government (L2)
- Differentiate between the state and central government (L4)
- Explain the role of President and Prime Minister (L2)
- Know the Structure of supreme court and High court (L2)

Unit III

State Government and its Administration: Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

Learning Outcomes:-

After completion of this unit student will be able to

- Understand the structure of state government (L2)

- Analyze the role Governor and Chief Minister(L4)
- Explain the role of state Secretariat (L2)
- Differentiate between structure and functions of state secretariat (L4)

Unit IV

Local Administration: District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning Outcomes:-

After completion of this unit student will be able to

- Understand the local Administration (L2)
- Compare and contrast district administration role and importance (L4)
- Analyze the role of Myer and elected representatives of Municipalities (L4)
- Evaluate Zilla panchayat block level organization (L5)

Unit V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Learning Outcomes:-

After completion of this unit student will be able to

- Know the role of Election Commission apply knowledge (L3)
- Contrast and compare the role of Chief Election commissioner and Commissiononerate (L4)
- Analyze role of state election commission (L4)
- Evaluate various commissions of viz SC/ST/OBC and women (L5)

References

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics, SAGE Publications India Pvt Ltd
4. D.C. Gupta, Indian Government and Politics, Vikas publishing house
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans, Novelty & Co.,
7. J. Raj Indian Government and Politics, SAGE Publications India Pvt
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-Resources

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-MA1205	Transform Techniques and Partial Differential Equations	3	0	0	3

Course Objectives:

- To familiarize the transform techniques to solve partial differential and difference equations.
- To equip the students to solve application problems in their disciplines.

Course Outcomes:

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

1. Apply the Laplace transform for solving differential equations and integral equations. (L3)
2. Apply partial differentiation to find maxima and minima of functions of several variables. (L3)
3. Find the Fourier series expansions of various functions and apply integral expressions for the forward and inverse Fourier transform. (L3)
4. Solve partial differential equations of first and higher order using analytical methods. (L2)
5. Develop Z transform techniques to solve discrete time systems. (L3)

Unit I

Laplace transforms (All Theorems/Properties without proofs): Definition of Laplace transform, existence conditions, properties of Laplace transforms, inverse Laplace transforms, transforms of derivatives, transforms of integrals, multiplication by t^n, division by t, convolution theorem, periodic functions, unit step function, unit impulse function, initial and final value theorems.

Applications: Evaluation of improper integrals, solutions of ordinary differential equations, integral equations and system of ordinary differential equations.

Learning Outcomes:

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

- examine the properties of Laplace transforms (L2)
- apply the Laplace and inverse Laplace transforms for different types of functions. (L3)
- solve ordinary differential equations and system of ordinary differential equations by using Laplace transformation technique. (L3)

Unit II

Partial Differentiation: Partial derivatives, total derivative, chain rule, Taylor's series and Maclaurin's series of functions of two variables, change of variables, Jacobian, functional dependence.

Applications: Errors and Approximations, Tangent Planes and Normal Lines, maxima and minima of functions of two variables, method of Lagrange's multipliers.

Learning Outcomes:

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

- find partial derivatives, total derivatives and chain rule of functions of several variables. (L2)
- expand a function of two variables using Taylor's and Maclaurin's series expansion. (L2)
- apply the concept of Jacobian to test whether the given functions are functionally dependent or not. (L3)
- apply the knowledge of partial differentiation to find maxima and minima of functions of several variables. (L3)
- use partial differentiation to find tangent planes and normal lines. (L3)

Unit III

Fourier Series & Fourier transforms (without proofs):

Fourier Series: Fourier series, determination of Fourier coefficients, Dirichlet's conditions, Fourier series of even and odd functions, Fourier series of even and odd periodic functions in an arbitrary interval, Half-range Fourier sine and cosine expansions, Parseval's formula. Applications: Practical harmonic analysis

Fourier transforms: Fourier integrals, Fourier cosine and sine integrals, Fourier transform, sine and cosine transform, properties, convolution theorem.

Learning Outcomes:

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

- evaluate the Fourier series expansion for different periodic functions. (L3)
- understand the nature of the Fourier series that represent even and odd functions.(L3)
- examine the properties of Fourier transformation. (L2)
- apply Fourier transformation for different functions. (L3)

Unit IV

Partial Differential Equations (PDE): First order partial differential equations, solutions of first order linear and standard forms of non-linear PDE, solutions of homogenous higher order linear PDE with constant coefficients.

Learning Outcomes:

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

- solve the first order linear PDE. (L2)
- solve the first order non- linear PDE. (L2)
- solve the homogeneous higher order linear PDE with constant coefficients. (L2)

UNIT V

Z-transforms: Definition of Z-transform, elementary properties, linearity property, damping rule, shifting u_n to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z-transform, convolution theorem.

Applications: Solution of difference equations using Z-transforms.

Learning Outcomes:

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

- apply the properties of Z-transforms. (L2)
- find Z and inverse Z-transformations for different functions. (L3)
- solve difference equations by using Z-transforms. (L3)

Textbooks

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
6. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
7. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
8. Saber Elaydi, Introduction to Difference Equations, Springer, 3rd Edition.
9. W. G. Kelley, Allen C Peterson, Difference Equations, An Introduction with Applications, 2nd edition, Academic Press.

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-MA1202	Complex Variables and Multivariable Calculus	3	0	0	3

Course Objectives:

- To familiarize the learners with concepts of complex variables.
- To enlighten the learners in the concept of Multivariable Calculus

Course Outcomes:

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

1. Examine the analyticity of complex functions. (L3)
2. Apply Cauchy's theorem and Cauchy's residue method to evaluate complex integration. (L3)
3. Evaluate the volume and surface area of solids using multiple integrals and apply the special functions to engineering problems. (L3)
4. Understand the physical meaning of different operators such as gradient, curl and divergence. (L3)
5. Estimate the work done against a field, circulation and flux using vector integral theorems. (L3)

Unit I

Complex Variables and Analytic Functions: Functions of a complex variable, continuity, differentiation, analytic functions, Cauchy-Riemann equations (with out proof), Milne-Thompson method, harmonic functions, harmonic conjugate.

Applications: Flow problems

Learning Outcomes:

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

- examine continuity and differentiability for complex functions. (L2)
- apply Cauchy-Riemann equations to complex functions to determine the analyticity. (L3)
- apply Milne-Thompson method to find the analytic function. (L3)

Unit II

Complex Integration (All theorems without proofs): Contour integrals, Cauchy theorem, Cauchy integral formula, Taylor's series, Laurent's series, zeros of analytic functions, singularities, residues, and Cauchy residue theorem.

Applications: Evaluation of integrals of the type (a) Improper real integrals $\int_0^{2\pi} f(\cos\theta,\sin\theta)d\theta$ *(b)* $\int_{-\infty}^{\infty} f(x)dx$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$.

Learning Outcomes:

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

- evaluate the Taylor and Laurent expansions of simple functions.(L2)
- determine the nature of the singularities of an analytic function. (L2)
- find the residues of an analytic function. (L2)
- apply Cauchy residue theorem to evaluate improper real integrals. (L3)

Unit III

Multiple Integrals and Beta, Gamma Functions

Multiple Integrals: Double integrals, double integration in polar coordinates, change of variables, change of order of integration, evaluation of triple integrals, change of variables in triple integral (cartesian to cylindrical and spherical polar co-ordinates).Applications: Area enclosed by plane curves, volume of solids.

Beta, Gamma Functions: Definitions of Beta and Gamma functions and their properties, relation between Beta and Gamma functions. Applications: Evaluation of improper integrals.

Learning Outcomes:

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

- evaluate double integral of functions of several variables in two dimensions using cartesian and polar coordinates. (L3)
- evaluate triple integrals in cartesian, cylindrical and spherical geometries. (L3)
- apply double integration techniques in evaluating areas enclosed by plane curves. (L3)
- apply triple integration techniques in evaluating volumes bounded by a region. (L3)
- understand the properties of Beta and Gamma functions. (L2)
- apply properties of special functions to evaluate certain integrals. (L3)

Unit IV

Vector Differentiation: Scalar and vector point functions, vector operator del, del applied to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Application: Equation of continuity, potential surfaces.

Learning Outcomes:

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

- apply operator del to scalar and vector point functions. (L3)
- illustrate the physical interpretation of gradient, divergence and curl. (L3)

UNIT V

Vector Integration (All Theorems without proofs): Line integral, circulation, surface integral, volume integral, Green's theorem in the plane, Stoke's theorem, Divergence theorem.

Application: Work done, flux.

Learning Outcomes:

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

- find the work done in moving a particle along the path over a force field. (L2)
- evaluate the rates of fluid flow along and across curves. (L3)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals. (L3)

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44/e, 2017.

References

1. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.
3. Murray R. Spiegel, Seymour Lipschutz, John J. Schiller , Dennis Spellman, Schaum's Outline of Complex Variables, 2ed (Schaum's Outlines) 2nd Edition.
4. Erwin kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
5. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
6. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.
7. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
8. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
9. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH- CH1202	Engineering Chemistry	3	0	0	3

Course Objectives:

- To familiarize various properties and applications of polymers.
- To aware on factors influencing rate of corrosion and different methods for control of corrosion.
- To impart knowledge on the basic concepts of battery technology.
- To demonstrate the construction of photovoltaic cells.
- To introduce different types of Nano materials and importance of green chemistry.

Course Outcomes:

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

- Distinguish thermoplastics, thermosetting plastics and elastomers. (L4)
- Design the metallic materials to prevent the corrosion. (L6)
- Discuss the working principle and applications of primary, secondary battery cells, fuel cells and Photo Voltaic Cell. (L6)
- Compare the working principle and materials used in Floppy, CD and pen drive. (L4)
- Illustrate the preparation, properties and applications of Nano materials and importance of green chemistry. (L2)

Unit I

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth, step growth polymerization - coordination polymerization and copolymerization- mechanism of polymerisation - Free radical, anionic and cationic. Stereo regular polymers

Plastics: Thermoplastics and Thermosettings, compounding of plastic, Preparation, properties and applications of – Bakelite, Urea-Formaldehyde, Nylon-66.

Elastomers: Preparation, properties and applications of Buna-S, Buna-N.

Applications:

1. Polymers also used in automobile industries for making body panel, vision window.
2. Polymers used for making house hold purpose articles like water bottles, refrigerator components, curtains, dining table cloths and carrier bags.
3. Polymers used in bulletproof vests, bullet proof cars and fire-resistant jackets.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylon-66 (L2)
- Discuss Buna-S and Buna-N elastomers and their applications (L2)

Unit II

Corrosion Technology: Introduction to corrosion, wet/electrochemical theory of corrosion, metal oxide formation by dry/ chemical corrosion, Pilling Bedworth rule, galvanic corrosion, differential aeration cell corrosion - water line corrosion, pitting corrosion, factors affecting corrosion rate, corrosion control methods – corrosion inhibitors, cathodic and anodic protection, metallic coatings (Galvanizing, tinning, electroplating).

Applications:

1. To control corrosion of various machines used in large scale industries.
2. Control of corrosion by using paint in preventing the iron pipes, tables.
3. Control of corrosion used to prevent the underground pipes from leaking which causes environmental pollution.

Learning outcomes:

At the end of this unit, the students will be able to

- Apply Pilling Bedworth rule for corrosion and corrosion prevention (L3)

- Explain different types of corrosion (L2)
- Demonstrate the corrosion prevention methods and factors affecting corrosion (L2)

Unit III

Energy Sources And Applications:

Electrochemical Energy: Classification of batteries-important applications of batteries, Primary batteries-dry/Leclanche cell, secondary batteries- lead acid cell, lithium cells-Li MnO_2 cell, Fuel cells – hydrogen and oxygen fuel cell, Methanol and oxygen fuel cell.

Solar energy: Introduction-Thermal conversion (Solar water heater, parabolic dish and parabolic trough), photo voltaic conversion- construction and working of photo voltaic cell and its importance, applications of solar energy.

Applications:

1. The lead acid battery is used in lightning and ignition system of automobiles.
2. Alkaline batteries are designed for long lasting performance in remote controls, clocks, and radios. The high run time makes alkaline batteries ideal for digital cameras, hand held games, MP3 players.
3. These long life batteries are used in portable consumer instruments like calculators, iPods, digital diaries, wrist watches and stop watches, toys, and artificial pacemakers.
4. Solar energy is used at residential homes for heating water and for generation of electricity for domestic use.
5. PV cells are used in electrical goods such as cookers, calculators, toys.

Learning outcomes:

At the end of this unit, the students will be able to

- Classify different types of batteries. (L-2)
- Explain the concepts involved in the construction of lithium cells. (L-2)
- Apply principles for construction of batteries and fuel cells. (L-3)
- Explain how photovoltaic cells convert light into energy. (L-2)
- Illustrate the construction of PV cell. (L-2)

Unit IV

Superconductivity, Semiconductors, Storage Devices & Applications:

Superconductivity: Preparation, Properties and Engineering Applications.

Semiconductors: Preparation of semi conductors-Zone refining and Czochralski process, Stiochiometric, Non stichometric, Organic and Controlled Valency Semiconductors-applications.

Storage Devices - Materials used and working of Floppy, CD, and Pen drive.

Applications:

1. Super conductors are used in Maglev trains
2. Semi conductors are used in electronic circuit devices
3. Floppy, CD and pen drive are used to store large data.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain preparation, properties and applications of super conductors (L2)
- Demonstrate the applications of semiconductors (L2)
- Discuss the materials used in floppy, CD, pen drive. (L2)

Unit V

Advanced Topics In Chemistry:

Nanomaterials: Introduction – sol-gel method, chemical reduction method for preparation of metal Nano particles, Types of nano materials – carbon nano tubes and fullerenes (preparation, properties and applications)-Applications of nano materials.

Green Chemistry: Principles of Green Chemistry- Methods of Green Synthesis (Super Critical Fluid extraction, aqueous phase Method and Microwave Induction)-Applications of Green chemistry

Applications:

1. Nano materials are used in paints, lubricants and medicine technology.
2. Green synthesis is used to make eco friendly reactions.

Learning outcomes:

At the end of this unit, the students will be able to

- Classify nano materials. (L-2)
- Explain the synthesis and applications of nano materials. (L-2)
- Explain the importance of green synthesis. (L-2)

Text Books

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.
3. O G Palanna, Engineering Chemistry, Tata McGraw Hill Education Private Limited, (2009).

References

1. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003).
2. B.S Murthy and P. Shankar, A Text Book of Nano Science and NanoTechnology, University Press (2013).
3. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand & Co, (2010).
4. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).
5. K. Sesha Maheshwaramma and Mridula Chugh, Engineering Chemistry, Pearson India Edn services, (2016).

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19CSE-ES1203	Problem Solving and Programming using C	3	0	0	3

Course Objectives:

- Formulating solutions to problems using algorithms and flowcharts and also Learning
- Structure of C program, basic C programs, Compiling and executing C Programs
- Understand branching, iteration statements
- Modular programming and recursive solution formulation.
- Understanding arrays, pointers and dynamic memory allocation and Comprehension of file Handling and user defined data types.

Course Outcomes:

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

1. Develop algorithms and flowcharts and also Understand the compilation, debugging, execution and writing of basic C programs
2. Develop C Programs using control and iterative statements
3. Develop C programs using Arrays and functions
4. Apply the knowledge of strings and pointers in programming
5. Comprehend file handling and user defined data types

Unit I

Introduction to Computers, Algorithm and Flowchart design through Raptor:

Introduction-Computer Hardware, Bits and Bytes, Components, types of languages
Algorithm- Definition, Characteristics, Steps to develop, examples.
Flow chart-Definition, symbols, Input/output, Assignment, conditional if, repetition, function and sub charts.
Introduction to C Programming- structure of c program, Identifiers, The main () Function, The printf () Function, - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization, Compiling and Executing C program

Learning outcomes: Student will be able to

- Acquire the knowledge on basic computer components, algorithms and flowcharts(L2)
- Understand the structure of algorithm and flowchart(L2)
- Develop basic flowcharts and algorithms for performing Input, Output and Computations (L3)
- Solve numerical problems using Raptor (L3)
- Acquire the knowledge on fundamentals of c programming.(L2)

Applications: Computer Networks, Word Processor, Email Client

Unit II

Programming Style Assignment: Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

Control Flow-Relational Expressions - Logical Operators:

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.
Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement

Learning Outcomes: Student will be able to

- Analyze the structure of c programming (L4)
- Develop basic sequential programs(L3)
- Acquire the knowledge on control statements(L2)

- Analyze the different programs using loops and conditional statements.(L4)
- Implement programs using loops and branching statements.(L3)

Applications: Embedded Software's, Simulators, Development of New languages

Unit III

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Multi Dimensional Arrays-Matrices

Modular Programming: Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function. Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

Learning Outcomes: Student will be able to

- Acquire the knowledge on arrays and strings.(L2)
- Analyze the different types of arrays
- Acquire the knowledge on functions.(L2)
- Analyze the pre defined and user defined functions(L4)
- Implement functions of their own to solve complex problem.(L3)

Applications: Computer and Mobile Games, Design Compilers

Unit IV

Pointers, Strings:

Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

Learning Outcomes: Student will be able to

- Acquire the basic knowledge on pointers.(L2)
- Understand user defined data types(L2)
- Implement string editing operations of their own to solve complex problem.(L3)

Applications: Operating Systems, Test code, Developing Verification software

Unit V

Structures : Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, enumeration.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Learning Outcomes: Student will be able to

- Analyze the differences between structure, union.(L4)
- Implement different file handling programs using file handling functions.(L3)

Applications: Database and spread sheets, Word Processing, Database files systems, Online Reservation Systems.

Text Books

1. How to Solve It By Computer By R G Dromey
2. C for Programmers with an Introduction to C11 (Deitel Developer Series) 1st Edition, Kindle Edition
3. Programming in ANSI C , McGrawHill, seventh edition by E.Balagurusamy.
4. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education
5. ANSI C Programming, Gary J. Bronson, Cengage Learning.

Reference Books

1. Let us "C" - Yashwant Kanetkar
2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
4. Programming in C, Reema Thareja, OXFORD
5. C by Example, Noel Kalicharan, Cambridge
6. https://raptor.martincarlisle.com/ (Download and Install Raptor software, Use the tool to draw flowcharts for the problems given)

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19EEE-ES1201	Basic Electrical Engineering	3	0	0	3

Course Objectives:

- To learn about the DC machines.
- To explain working principles of transformer and determine the Transformer losses and efficiency
- To study the operation of AC machines.
- To Understand the Measuring instruments.
- To impart knowledge on low voltage electrical installations
- To Analyze transmission lines

Course Outcomes:

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

1. Determine motor losses and efficiency (L5)
2. Determine losses, efficiency, and voltage regulation of a transformer under specific operating conditions (L5)
3. Illustrate working principles of induction motor, and synchronous generator.(L3)
4. Understand the Measuring instruments (L2)
5. Describe working principles of protection devices used in electrical circuits. (L2)

Unit I

DC Machines: Construction and working of DC Generator, E.M.F. Equation, types and characteristics of generator, construction and working of DC Motor, Torque Equation, Three point Starter, types and characteristics of DC Motor and speed control of separately excited dc motor.

Learning Outcomes:

The students are able to

- Explain construction, working of DC Generator & DC motor (L2)
- Determine motor losses and efficiency (L5)

Unit II

Transformers: Magnetic materials, BH characteristics, Mutual coupled circuits, Dot Convention in coupled circuits, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer and three –phase transformers connections.

Learning Outcomes:

The students are able to

- Understand magnetic materials and their characteristics (L2)
- Compare ideal and practical transformers (L2)
- Determine losses, efficiency, and voltage regulation of a transformer under specific operating conditions (L5)
- Identify the connections of a three phase transformer (L3)

Unit III

AC Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor, Single-phase induction motor, construction, working, torque-speed characteristic, construction and working of synchronous generators.

Learning Outcomes:

The students are able to

- Illustrate effects of magnetic induction on moving parts (L2)
- Explain construction and working of induction motor & synchronous generator (L2)

Unit IV

Measuring Instruments: Classification – Deflection, controlling, damping torque, ammeter, voltmeter, wattmeter, MI, MC instruments – Energy meter – Construction of CRO.

Learning Outcomes:

The students are able to

- Understand the Electrical Measuring instruments (L2)
- Understand the Construction of CRO (L2)

Unit V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Important Characteristics for Batteries, Elementary calculations for energy consumption, power factor improvement and battery backup.

Learning Outcomes:

The students are able to

- Understand working principles of LT Switchgear components (L2)
- Perform elementary calculations for energy consumption, power factor improvement and battery backup (L3)

Text Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical electronics Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. B.L.Theraja, "Fundamentals of Electrical Engineering", volume-II, S.Chand publications
4. Ramanapilla, Electrical and Mechanical Technology, S.Chand publications

References

1. S.K. Bhattacharya, basic electrical and electronics engineering, Pearson Education,2011
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
4. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH- CH1203	Engineering Chemistry Lab	0	0	3	1.5

Course Objectives:

- To familiarize the students with the basic concepts of Engineering Chemistry lab.
- To train the students on how to handle the instruments.
- To demonstrate the digital and instrumental methods of analysis.
- To expose the students in practical aspects of the theoretical concepts.

Course Outcomes:

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

- Explain the functioning of the instruments such as pH, Viscometer, Conductivity and Potentiometric meters. (L-2)
- Interpret the graphical values to analyze the experimental results. (L-2)
- Determine the concentrations of Acid, Zinc, Iron and Copper. (L-5)
- Compare viscosities of different oils. (L-4)
- Prepare polymers and nano materials. (L-4)
- Identify the safety precautions to carry out the experiments in the laboratory using chemicals. (L-3)

List of Experiments:

1. Preparation of Phenol-Formaldehyde resin
2. Preparation of Urea-Formaldehyde resin
3. Determination of conductance by conductometric method
4. Determination of strength of an acid by pH metric method
5. Determination of Fe (II) in Mohr's salt by potentiometric method
6. Determination of sulphuric acid in lead-acid storage cell
7. Determination of Zinc by EDTA method.
8. Determination of copper in a copper ore
9. Determination of viscosity of a liquid
10. Determination of surface tension of a liquid
11. Preparation of TiO_2/ZnO nano particles
12. Determination of chromium (VI) in potassium dichromate

Text Books

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's Quantitative
2. Chemical Analysis 6/e, Pearson publishers (2000).
3. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-EN1201	Communicative English Lab-II	0	0	3	1.5

Course Objectives

- Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions.
- Facilitate active listening to enable inferential learning through expert lectures and talks
- Impart critical reading strategies for comprehension of complex texts
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing

Course Outcomes:

After the completion of this course, the student can able to

1. Enabling students to use Computer assisted Language Laboratory (CALL) to enhance their pronunciation through stress, intonation and rhythm for routine and spontaneous interaction
2. Attainment of communicative competence for the fulfilment of academic, professional and social purposes.
3. Attainment of language Proficiency through Contextualized, Task Based Activities to realize employment potential at the end of the course.
4. Acquired listening, speaking, reading and writing skills necessary for the survival in the post modern society through task-based and skill-based communication practices with judicious integration of modern tools.
5. Development of fluency and accuracy for effective and professional communication in real-time situations by using appropriate verbiage and contextual knowledge.

Unit I

Listening: Listening for presentation strategies and answering questions on the speaker, audience, and key points. **Speaking:** Formal presentations using PPT slides without graphic elements. **Reading:** Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style. **Writing:** Paraphrasing; using quotations in writing; using academic style - avoiding colloquial words and phrases. **Grammar and Vocabulary:** Formal/academic words and phrases.

Learning Outcomes

At the end of the module, the learners will be able to

- understand the purpose of a presentation & make note of key points (L2)
- make formal structured presentations on general topics using PPT slides without graphical elements (L3)
- prioritize information from reading texts after selecting relevant and useful points (L3)
- paraphrase short academic texts using suitable strategies and conventions (L3)
- cultivate awareness about plagiarized content and academic ethics (L2)

Unit II

Listening: Following an argument/ logical flow of thought; answering questions on key concepts after listening to extended passages of spoken academic discourse. **Speaking:** Formal presentations using PPT slides with graphic elements. **Reading:** Understand formal and informal styles; recognize the difference between facts and opinions. **Writing:** Formal letter writing and email writing (enquiry, complaints, seeking permission, seeking

internship); structure, conventions and etiquette. **Grammar and Vocabulary:** Phrasal prepositions; phrasal verbs.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend academic lectures by taking notes to answer questions (L2)
- make formal structured presentations on academic topics using PPT slides with relevant graphical elements (L3)
- distinguish facts from opinions while reading (L2)
- write formal letters and emails (L3)
- use a range of vocabulary in formal speech and writing (L2)

Unit III

Listening: Identifying views and opinions expressed by different speakers while listening to discussions. **Speaking:** Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position. **Reading:** Identifying claims, evidences, views, opinions and stance/ position. **Writing:** Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences. **Grammar and Vocabulary:** Language for different functions such as stating a point, expressing opinion, agreeing/ disagreeing, adding information to what someone has stated, and asking for clarification.

Learning Outcomes

At the end of the module, the learners will be able to

- follow a discussion (L2)
- participate in group discussions using appropriate conventions and language strategies (L3)
- comprehend complex texts identifying the author's purpose (L2)
- produce logically coherent argumentative essays (L3)
- use appropriate vocabulary to express ideas and opinions (L2)

Unit IV

Listening: Understanding inferences; processing of information using specific context clues from the text. **Speaking:** Group discussion; reaching consensus in group work (academic context). **Reading:** Reading for inferential comprehension. **Writing:** Applying for internship/ job **-** Writing one's CV/Resume and cover letter. **Grammar and Vocabulary:** Active and passive voice – use of passive verbs in academic writing.

Learning Outcomes

At the end of the module, the learners will be able to

- draw inferences and conclusions using prior knowledge and verbal cues (L3)
- express thoughts and ideas with acceptable accuracy and fluency (L2)
- develop advanced reading skills for deeper understanding of texts (L3)
- prepare a CV with a cover letter to seek internship/ job (L2)
- understand the use of passive voice in academic writing (L2)

Unit V

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge. **Speaking:** Formal team presentations on academic/ general topics using PPT slides. **Reading for Writing:** Structure and contents of a Project Report; identifying sections in project reports; understanding the purpose of each section; significance of references. **Grammar and Vocabulary:** Reinforcing learning; editing short texts; correcting common errors in grammar and usage.

Learning Outcomes

At the end of the module, the learners will be able to

- develop advanced listening skills for in-depth understanding of academic texts (L3)
- collaborate with a partner to make presentations (L2)
- understand the structure of Project Reports (L2)
- use grammatically correct structures with a wide range of vocabulary (L3)

Reference Books

- Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. Cambridge Academic English (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD)

Sample Web Resources

Grammar/Listening/Writing

1. 1-language.com
2. http://www.5minuteenglish.com/
3. https://www.englishpractice.com/

Grammar/Vocabulary

English Language Learning Online

1. http://www.bbc.co.uk/learningenglish/
2. http://www.better-english.com/
3. http://www.nonstopenglish.com/
4. https://www.vocabulary.com/
5. BBC Vocabulary Games
6. Free Rice Vocabulary Game

Reading

1. https://www.usingenglish.com/comprehension/
2. https://www.englishclub.com/reading/short-stories.htm
3. https://www.english-online.at/

Listening

1. https://learningenglish.voanews.com/z/3613
2. http://www.englishmedialab.com/listening.html

Speaking

1. https://www.talkenglish.com/
2. BBC Learning English – Pronunciation tips
3. Merriam-Webster – Perfect pronunciation Exercises

All Skills

1. https://www.englishclub.com/
2. http://www.world-english.org/
3. http://learnenglish.britishcouncil.org/

Online Dictionaries

1. Cambridge dictionary online
2. MacMillan dictionary
3. Oxford learner's dictionaries

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19CSE-ES1204	Problem Solving and Programming using C Lab	0	0	3	1.5

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

Course Outcomes:

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

1. Learn Basic computer Installations and Office Tools, Document and present the algorithms, flowcharts and programs in form of user-manual and also apply and practice logical ability to solve the problems.
2. Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
3. Analyzing the complexity of problems modularize the problems into small modules and then convert them into programs
4. Understand and apply the in-built functions and customized functions for solving the problems.
5. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

Exercise -1

Operating Systems and installation of Windows & LINUX Operating System

Exercise -2(Office Tools)

a) **Word:** Inserting Images, Auto Shapes, Header & Footer, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option,
b) **Excel:** Formulas & Data AutoFill, Format Cells, auto fill, Formatting Text
c) **PowerPoint:** PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables in PowerPoint, Costume Animations.

Exercise – 3 (Basic)

a) What are the OS Commands, Familiarization of Editors - vi, EMACS
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers from Command line

Draw the flow chart for the following problems using Raptor package

d) Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers
e) Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, linear search, Binary Search

Exercise - 4 (Basic Math)

a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise – 5 (Control Flow – I)

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 6 (Control Flow – II)

a) Write a C Program to Find Whether the Given Number is i) Prime Number ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 7 (Functions)

a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise –8 (Control Flow – III)

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function

Exercise –9 (Functions – Continued)

Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion.(use factorial function)

Exercise – 10 (Arrays)

Demonstration of arrays
a) Search-Linear. b) Sorting-Bubble, Selection. c) Operations on Matrix.

Exercises - 11 (Structures)

a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 12 (Arrays and Pointers)

a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 13 (Dynamic Memory Allocations)

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs

Exercise – 14 (Strings)

a) Implementation of string manipulation operations with library function.
i) copy ii) concatenate iii) length iv) compare
b) Implementation of string manipulation operations without library function.
i) copy ii) concatenate iii) length iv) compare

Exercise -15 (Files)

a) Write a C programming code to open a file and to print it contents on screen.
b) Write a C program to copy files

Exercise - 16 (Files Continued)

a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19EEE-ES1202	Basic Electrical Engineering Laboratory	0	0	3	1.5

Course Objectives:

- To plot the no load characteristics of a transformer.
- To find the voltages and currents in line and in phase.
- To know the performance characteristics of dc and ac machines
- To determine speed control of DC Shunt Motor
- To demonstrate components of LT Switchgear

Course Outcomes:

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

1. Examine the performance characteristics of a Transformer with and without load.(L4)
2. Distinguish star and delta connections and can find the line and phase components.(L4)
3. Determine the performance characteristics of DC and AC machines(L5)
4. Organize the speed of a DC Shunt motor.(L3)
5. Get exposure to components of LT switchgear.(L2)

List of Experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
3. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
4. To determine the performance characteristics of a Series Motor.
5. To determine the performance characteristics of a Shunt Motor.
6. To determine the performance characteristics of a Compound Motor.
7. To determine speed control of DC Shunt Motor.
8. To determine the load characteristics of a Shunt Generator.
9. To determine the load characteristics of a Single Phase Induction Motor.
10. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
11. Demonstration of components of LT switchgear.
12. Verification of Kirchhoff's Laws KVL and KCL.
13. Verification of DC Superposition Theorem.
14. Verification of Thevenin's Theorem and Norton's Theorem.

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-MC1201	Environmental Science	3	0	0	0

Course Objective:

- To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations.
- Students get awareness on pollution that is caused due to the day to day activities of human life to save earth from the inventions by the engineers.
- To make student get awareness on the social issues, environmental legislation.

Course Outcomes:

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

1. Understand about the environment and natural resources.
2. Illustrate about the ecosystem and knows the importance of conservation of biodiversity.
3. Understands about various attributes of different types of pollution and their impacts on the environment and control methods along with waste management practices.
4. Relate the current environmental impacts with the societal problems.
5. Identify the current population growth with their impacts and apply the knowledge how to manage environment issues.

Unit I

Multidisciplinary Nature of Environmental Science: Definition, Multi disciplinary nature of environmental sciences, Scope and Importance, Need for Public Awareness.

Natural Resources: Forest resources – Uses and deforestation-causes, consequences, Water resources – Use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams – benefits and problems, Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems, pesticide related problems, water logging, salinity, Energy resources: Renewable and non-renewable resources – Natural resources and associated problems, Land Resources: Land degradation, Soil erosion, Desertification.

Learning Outcomes

Students will be able to

- Relate scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.(L1)
- Explain how water resources should be used.(L2)
- Articulate basic understanding of effects of modern agriculture on environment.(L2)
- Explain why renewable and non-renewable energy resources are important.(L2)
- Get awareness about land degradation, soil erosion & desertification.(L2) **Applications:**

Different conservation methods of different natural resources like afforestationprograms, social forestry programs, soil conservation practices.

Unit II

Environmental Pollution and Solid Waste Management:

Environmental Pollution: Definition, Cause, effects and control measures of

(a) Air Pollution. (b)Water pollution (c)Marine pollution (d) Noise pollution

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes, e-waste management, Role of an individual in prevention of pollution.

Disaster management: floods, earthquake, cyclone and landslides.

Learning Outcomes

Students will be able to

- Define and explain the various causes, effects and control measures of different types of pollution.(L3)
- Characterize solid waste and e-waste management.(L2)

- Summarize about different natural disasters and how they could be managed.(L1)

Applications: Different treatment methods for different types of pollution cyclone separator, electrostatic precipitators, waste water treatment, solid waste management, e-waste management.

Unit III

Ecosystems, Biodiversity and its Conservation:

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem – Producers, consumers and decomposers, Food chains, food webs, Energy flow in the ecosystem, primary and secondary productivity, ecosystem regulation and development.

Biodiversity And Its Conservation: Definition: levels of biodiversity- genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity- consumptive use, Productive use, social, ethical, aesthetic and option values, ecosystem service value, India as a mega-diversity Nation, Hot-spots of biodiversity- Indo Burma, Eastern Himalayas, Western Ghats, Threats to biodiversity- habitat loss, poaching of wildlife, Global environmental issues, Pollution, Man-wildlife conflicts, Endangered and endemic species of India-Red Data Book, Conservation of biodiversity- In-situ and Ex-situ conservation of biodiversity.

Learning Outcomes

Students will be able to

- Understand the structure and functions of ecosystems.(L2)
- Identify the threats to biodiversity.(L2)
- Conduct basic conservation biology research.(L3)
- Compare endangered and endemic species of India.(L2)

Applications: Different conservation methods like gene bank, seed bank, botanical garden.

Unit IV

Social Issues and the Environment:

Social Issues And The Environment: From Unsustainable to Sustainable development, Water conservation- rain water harvesting and watershed management, Resettlement and rehabilitation issues of people, its problems and concerns, case studies, Climate change- global warming, acid rain, ozone layer depletion, nuclear accidents- their causes, effects and control measures, Environmental legislation- Wildlife Protection Act, Forest Conservation Act, Air (Prevention and Control of Pollution) Act and Water (Prevention and control of Pollution) Act.

Learning Outcomes:

Students will be able to

- Articulate the basic structure, functions, and processes of key social systems affecting the environment.(L3)
- Aware of the reasons for various global environmental challenges.(L2)
- Explain the enforcement of Environmental legislation.(L1)
- Remember the various Acts enforced in India and some of their features.(L1)

Applications:

1. Water conservation practices like rainwater harvesting, soaking pits, and modern agricultural methods to minimize the environmental effects.
2. Energy conservations methods in houses, industrial sector and commercial sector, apply environmental related laws in environmental issues.

Unit V

Human Population and Environmental Management:

Human Population- Population growth, variation among nations, Population explosion, Role of information Technology in Environment.

Environmental Management- Environmental Impact Assessment- Methodology, Environmental Impact Statement, Environmental Management Plan, Environmental Audit-process, Significance of EIA.

Learning Outcomes:

Students will be able to

- Understand about the population effects on environment.(L2)
- Be acquainted with role of information technology in environment.(L2)
- Understand about the various environmental management practices. (L2)

Applications:

1. Information Technology in different natural calamities and health aspect of view.
2. Industrial and developmental activities.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain, Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Text Books

1. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014.
2. Text Book of Environmental Studies, K. Raghavan Nambiar, Scitech Publications.
3. Environmental Studies by Palaniswamy – Pearson education
4. Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

References

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental Studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.