



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

COURSE STRUCTURE AND SYLLABUS – I-II

(Artificial Intelligence & Machine Learning) (R20) (w. e. f A.Y. 2020-21)

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2020002	Engineering Mathematics - II	BS	3	1	0	4	30	70	100
2	2020006	Applied Physics	BS	3	1	0	4	30	70	100
3	2020502	Data Structures	ES	3	0	0	3	30	70	100
4	2020009	Communicative English	HSMC	2	0	0	2	30	70	100
5	2020071	Applied Physics Lab	BS	0	0	3	1.5	30	70	100
6	2020572	Data Structures Lab	ES	0	0	2	1	30	70	100
7	2020074	Communicative English Lab	HSMC	0	0	2	1	30	70	100
8	2020021	Environmental Science	MC	2	0	0	0	-	-	-
Total Credits				13	2	07	16.5	210	490	700

2020002: ENGINEERING MATHEMATICS-II

B.Tech. I Year II Semester

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Course Objectives: To learn

- Methods of solving the differential equations of 1st and higher order.
- The applications of the differential equations to Newton's law of cooling, Natural growth and decay, etc.
- Concept of Sequence and nature of the series.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes: After learning the contents of this paper the student must be able to

Co 1: Identify whether the given differential equation of first order is exact or not

Co 2: Solve higher differential equation and apply the concept of differential equation to real world problems.

Co3: Analyse the nature of sequence and series.

Co 4: Apply the del operator to vector and scalar valued functions.

Co5: Evaluate the line, surface and volume integrals and converting them from one to Another.

UNIT-I: First Order and First-Degree ODE and its applications

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Learning outcomes:

- Identify whether the given differential equation of first order is exact or not.
- Apply the concept of differential equation to real world problems.
- Understand the concepts of linear and Non linear differential equations.
- Analyze Exact and Non Exact differential equations.
- Explain formation of differential equations, Homogeneous equations.

UNIT-II: Higher Order Linear Differential equations

Linear differential equations of second and higher order with constant coefficients, RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, and x^n , $e^{ax} V(x)$, $x^n V(x)$, method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Learning outcomes:

- Identify essential characteristics of linear differential equations with constant coefficients.
- Apply higher order DE's for solving some real world problems.
- Understand the differential equations with constant coefficients by appropriate method.
- Analyse Legendre's equation and Cauchy-Euler equation.
- Explain Method of variation of parameters.

UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series:

Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test, logarithmic test; Cauchy's Integral test; Cauchy's root test; Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Learning outcomes:

- Identify the Sequence, types of sequences.
- Apply the concept of sequence and series to real world problems.
- Understand the logical knowledge of forming the series.
- Analyze the nature of sequence and series.
- Explain Alternating series.

UNIT-IV: Vector Differential Calculus

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives. Solenoidal and Irrotational vectors, Scalar potential functions. Vector Identities.

Learning outcomes:

- Identify scalar and vector point functions.
- Apply Del to scalar and vector point functions.
- Understand the concepts of Solenoidal and irrotational vectors.
- Analyze the physical interpretation of Gradient, Divergence and curl.
- Explain vector identities.

UNIT-V: Vector Integral Calculus

Line integral-Work done, Surface Integrals-Flux of a vector valued function and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Learning outcomes:

- Identify the work done in moving a particle along the path over a force field.
- Apply Greens, Stokes and Divergence theorems in evaluation of double and triple integrals.
- Understand the concepts of Line Integral.
- Analyze the Flux of a vector valued function.
- Explain Vector valued theorems to real world problems.

TEXT BOOKS:

- 1 B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
- 2 Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
- 3 G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

2020006: APPLIED PHYSICS

B.Tech. I Year II Semester

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Course Objectives:

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics, optoelectronics and dielectric and magnetic properties and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: Upon graduation:

- The student would be able to learn the fundamental concepts on Quantum behavior of matter in its micro state.
- The knowledge of fundamentals of Semiconductor devices and their applications.
- Design, characterization and study of properties of optoelectronic devices help the students to prepare new materials for various engineering applications.
- Study about Lasers and fiber optics which enable the students to apply to various systems involved with communications.
- The course also helps the students to be exposed to the phenomena of dielectric and magnetic properties.

UNIT-I: Quantum Mechanics

Introduction to quantum physics, Black body radiation, Photoelectric effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

Learning Outcomes:

Understand the fundamental concepts of quantum mechanics.

Explain the physical significance of wave function.

Apply Schrödinger's wave equation for a free particle.

Analyze the particle behavior in different potential regions.

Evaluate the significance of energy values in one dimensional box.

UNIT-II: Semiconductor Physics

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier transport: diffusion and drift, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation, Hall effect.

Learning Outcomes:

Understand the energy band formation of semiconductors.

Explain the properties of n-type and p-type semiconductors.

Apply the Hall effect for various types of semiconductors.

Analyze the various types of diodes.

Evaluate the hall coefficient of semiconductors.

UNIT-III: Optoelectronics

Radiative and non-radiative recombination mechanisms in semiconductors, LED : Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche photodiode and their structure, working principle and Characteristics.

Learning Outcomes:

- Understand the basic principle involved in LED.
- Explain about various types of photodiodes.
- Apply the knowledge on various diodes.
- Analyze the working of PIN and Avalanche diodes.
- Evaluate the characteristics of diodes.

UNIT-IV: Lasers and Fibre Optics

Lasers: Introduction to Lasers, Coherence, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, Carbon dioxide (CO₂) laser, He-Ne laser, Semiconductor laser; Applications of laser.

Fibre Optics: Introduction, Block diagram of fiber optic communication system, Total internal reflection, Acceptance angle and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

Learning Outcomes:

- Understand about Laser and fiber optics.
- Explain the working principle of laser and optical fibers.
- Apply optical fibers in communication system.
- Analyze the applications of optical fibers in medical, communication and other fields.
- Evaluate the laser and fiber optic concepts in various fields.

UNIT-V: Dielectric and Magnetic Properties

Dielectric properties: Introduction to dielectrics, Polarisation, Permittivity and Dielectric constant, Types of polarisation (Qualitative), Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics.

Magnetic properties: Introduction to magnetism, Magnetisation, permeability and susceptibility, Classification of magnetic materials, Domain theory of ferro magnetism, Hysteresis, Applications of magnetic materials.

Learning Outcomes:

- Understand the concept of polarization in dielectric materials.
- Explain various types of polarization of dielectrics and classification of magnetic materials.
- Apply Lorentz field and Clausius- Mosotti relation in dielectrics.
- Analyze the ferromagnetism on the basis of domain theory.
- Evaluate the applications of dielectric and magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCES:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL.

2020502: DATA STRUCTURES

B.Tech. I Year II Semester

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Prerequisites

A course on “Programming for Problem Solving “

Objectives

- Exploring basic data structures such as linked list, stacks and queues.
- Describes searching and sorting techniques.
- Introduces trees and graphs.

Outcomes

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for searching and sorting.
- Design programs using a variety of data structures- lists, stacks, queues, trees and graphs.

UNIT - I Introduction to Data Structures, Linear list – singly linked list, Doubly linked list, Circular linked list - operations and its applications

UNIT-II

Stacks- Introduction, Operations, array and linked representations of stacks, stack applications (Infix to postfix conversion and postfix evaluation), Queues-Introduction, operations, array and linked representations of queues and its applications.

UNIT - III

Searching: Linear Search and Binary Search and its applications.

Sorting: Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort and its applications.

UNIT-IV

Trees - Introduction, Types of trees, Binary tree, recursive and non- recursive Traversals of Binary Tree, Binary search tree- Operations and its applications.

UNIT - V

Graphs: Introduction, Types of graphs, Representation of graphs, Graph Traversal Methods, comparison between trees and graphs and its applications.

TEXT BOOKS

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.

2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson

education.

REFERENCES

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

2010009 : COMMUNICATIVE ENGLISH

B. Tech I Year II Semester

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Learning Objectives:

- Improve language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
- Analyze a variety of texts and interpret them to demonstrate in writing or speech.
- Write clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
- Develop language components to communicate effectively in formal and informal situations.

Course Outcomes:

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts in their profession.
- Acquire basic proficiency in English including LSRW skills.
- Use prewriting techniques to develop ideas and produce multiple drafts of different types of paragraphs.
- Recognize and incorporate basic grammar, mechanics, and sentence variety in writing.

SYLLABUS

UNIT –I: ‘The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press

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

Grammar: Common Errors: Articles and Prepositions.

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

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

Learning Outcomes

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

- Understand the concept of word formation, root words and their usage in English.
- know the types of sentences and analyze the sentence structure
- use articles and prepositions appropriately
- use punctuation marks correctly in writing
- understand the techniques of effective reading
- write paragraphs effectively

UNIT –II: Writing Skills.

Vocabulary: Synonyms and Antonyms.

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

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

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

Learning Outcomes

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

- enrich their vocabulary using synonyms and antonyms
- noun, pronoun and subject verb agreement accurately
- understand the techniques of reading comprehension
- write formal letters in various context.

UNIT –III : ‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press

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

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. **Reading:** Sub-skills of Reading- Skimming and Scanning

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

Learning Outcomes

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

- use Prefixes and Suffixes from Foreign Languages in English
- understand the use misplaced modifiers and uses of tenses
- skim and scan the given text appropriately
- write definitions, descriptions and classifications

UNIT –IV: ‘What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

Learning Outcomes

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

- understand the importance of food pyramid in your daily life.
- explain the Active and passive Voice Subject Verb Agreement (Concord)
- apply the One word Substitutes in your every day vocabulary.
- analyze the Intensive and Extensive reading skills.
- evaluate the importance of Technical Report Writing, and E-mail writing.

UNIT –V ‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Learning Outcomes

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

- understand the Technical Vocabulary and their Usage.
- avoid common errors in English
- read any text using the sub skills of reading
- write technical reports using manual script format.

PRESCRIBED TEXTBOOKS:

1. Sudarshan, N. P. and Savitha, C. (2018). English for Engineers, Cambridge University Press
2. Wren & Martin. (2017). High School English Grammar and Composition Book, S Chand Publishing

REFERENCES:

1. Murphy, R. (2015). Essential Grammar in Use. Cambridge University Press.
2. Current English Grammar and Usage with Composition by R. P Sinha
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Swan, M. (2016). Practical English Usage. Oxford University Press.
5. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

2020071: APPLIED PHYSICS LAB

B. Tech I Year II Semester

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COURSE OBJECTIVES:

- To gain practical knowledge by applying the experimental methods to correlate with the theoretical knowledge of physics concepts.
- To learn the usage of electrical and optical systems for measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills through discussion on basic principles of scientific concepts in a group.

COURSE OUTCOMES:

- Understand the concepts of the error and analysis.
- Explain the different measuring devices and meters to record the data with precision.
- Apply the experimental skills to design new experiments in engineering.
- Analyze the theoretical knowledge and correlate with the experiment.
- Evaluate the various parameters accurately.

List of Experiments:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Photoelectric effect: To determine work function of a given material.
4. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
5. LASER: To study the V-I characteristics of LASER sources.
6. Optical fibre: To determine the Numerical aperture and bending losses of Optical Fibres
7. Stewart – Gee's experiment:
Determination of magnetic field induction along the axis of a current carrying coil.
8. Hall effect: To determine Hall co-efficient of a given semiconductor.
9. LCR Circuit: To determine the resonance frequency and Quality factor of LCR Circuit.
10. R-C Circuit: To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed

2020572: DATA STRUCTURES LAB

B. Tech I Year II Semester

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Prerequisites:

A Course on “Programming for problem solving”

Objectives

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Outcomes

- Ability to develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
i) Creation ii) Insertion iii) Deletion
3. Write a program that uses functions to perform the following operations on circular linked list: i) Creation ii) Insertion iii) Deletion
4. Write a program that implement stack operations using i) Arrays ii) Pointers
5. Write a c program to implement infix to postfix conversion using stack.
6. Write a c program to implement postfix evaluation.
7. Write a program that implement Queue operations using i) Arrays ii) Pointers
8. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
9. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Merge sort ii) Quick sort
10. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search
11. Write a program to implement the tree traversal methods using both recursive and non-recursive.
12. Write a program to implement the graph traversal methods.

TEXT BOOKS

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

REFERENCES

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition,

Cengage Learning.

2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

2020074: Communicative English Lab

B.Tech. I Year II Semester

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The Communicative English Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- Enhance English language skills, communication skills and to practice soft skills.
- Improve fluency and pronunciation intelligibility by providing an opportunity for practice in speaking.
- Train students in different interview and public speaking skills such as JAM, debate, role play, group discussion etc.
- Instill confidence and make them competent enough to express fluently and neutralize their mother tongue influence.

Learning Outcomes:

By the end of the course students will be able to-

- Better perception of nuances of English language through audio- visual experience.
- Neutralization of accent for intelligibility.
- Participate in group activities.
- Speaking skills with clarity and confidence which in turn enhances their employability.
- Apply effective communication skills in a variety of public and interpersonal settings

Communicative English Language Lab (CELL) shall have two parts:

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

Listening Skills

Objectives

- a. Enable students develop their listening skills to appreciate its role in the LSRW skills approach to language and improve their pronunciation.
- b. Equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

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

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

Speaking Skills

Objectives

- a. Involve students in speaking activities in various contexts.
- b. Enable students express themselves fluently and appropriately in social and professional contexts.
 - Oral practice: Just A Minute (JAM) Sessions

- Describing objects/situations/people
- Role play – Individual/Group activities
- Group Discussions
- Debate

Exercise – I

CALL Lab: Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab: Understand: Communication at Work Place- Spoken vs. Written language. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab: Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab: Understand: Features of Good Conversation – Non-verbal Communication. Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab: Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI). Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab: Understand: How to make Formal Presentations. Practice: Formal Presentations.

Exercise – IV

CALL Lab: Understand: Listening for General Details. Practice: Listening Comprehension Tests.

ICS Lab: Understand: Public Speaking – Exposure to Structured Talks. Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab: Understand: Listening for Specific Details. Practice: Listening Comprehension Tests.

ICS Lab: Understand: Interview Skills. Practice: Mock Interviews.

REFERENCE BOOKS:

1. Kumar, S. & Lata, P. (2011). Communication Skills. Oxford University Press.
2. Balasubramanian, T. (2008). A Text book of English Phonetics for Indian Students, Macmillan.
3. Thorpe, E. (2006). Winning at Interviews, Pearson Education.
4. Sethi, J. et al. (2005). A Practical Course in English Pronunciation (with CD), Prentice Hall of
5. Effective Technical Communication by M Ashraf Rizvi

2020021: ENVIRONMENTAL SCIENCE

B.Tech. I Year II Semester.

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Course Objectives:

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

Course Outcomes:Based on this course, the Engineering graduate will

- Understand the technologies on the basis of ecological principles
- Apply the environmental regulations which in turn helps in sustainable development.
- Understand the various classifications of ecosystems and natural resources.
- Apply environmental regulations to different acts.
- Evaluate the values of social, ethical and aesthetic.

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnifications, Field visits.

Learning Outcomes:

- Understand the importance of ecosystem.
- Explain the various classifications.
- Apply to different cycles.
- Analyse the importance field visit.
- Evaluate the flow of energy.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

Learning Outcomes:

- Understand the importance of natural resources.
- Explain the various classifications of natural resources.
- Apply to different renewable resources.
- Analyse the usage of resources.
- Evaluate the value of renewable and non renewable energy sources.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem

diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

Learning Outcomes:

- Understand the importance of Biodiversity.
- Explain the types of Biodiversity.
- Apply to different Biotic Resources.
- Analyse the importance Biodiversity And Biotic Resources.
- Evaluate the values of social, ethical and aesthetic.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

Learning Outcomes:

- Understand the importance of Pollution and control technologies.
- Explain the classifications of pollutions.
- Apply to environment.
- Analyse the importance waste management.
- Evaluate the value of Ozone depletion and Ozone depleting substances.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building.

Learning Outcomes:

- Understand the importance of Environmental Policy, Legislation.
- Explain the various acts.
- Apply to different Environmental Management Plan.
- Analyse the importance of environmental education.
- Evaluate the value of green building.

TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

