Central University of Jammu
Rahya-Suchani (Bagla) District Samba – 181143, Jammu (J&K)
Department of Electronics and Communication Engineering

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Course Syllabus (Semester-I) Electronics and Communication Engineering- Avionics- 2024

Central University of Jammu

Rahya-Suchani (Bagla) District Samba – 181143, Jammu (J&K)

Department of Electronics and Communication Engineering

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Engineering Mathematics-I

Course Code: BEECA1C001
Course Title: Engineering Mathematics-**I**
Semester: I
Credits: 04

Rationale

To familiarize with the important tools and theorems of calculus and differential equations is essential in all the branches of engineering. It will also develop the in-depth knowledge of Fourier series and Fourier Transform in a comprehensive manner.

Course Outlines

Contents	No. of Lectures
Unit - I **Ordinary Differential Equation Of First Order First Degree And First Order Higher Degree:** Reorientation of differential equation first order first degree, Exact differential equation and Integrating factors, first order higher degree odes, solvable for p, y and x, Clairaut's equation.	**10**
Unit - II **Application Of Differential Equation (Mathematical Modelling):** Modelling of Real-world problems, particularly Engineering Systems, Electrical network models (RL & RC circuit), the spread of epidemic (SI, SIS, SIR), Newton's Law of cooling, Single compartment modelling.	**10**
Unit -III **Infinite Series:** Introduction, Positive term series, Comparison test, Cauchy's root test, D'Alembert's test, Raabe's test, Logarithmic test, Integral test, Gauss's test, Series with arbitrary terms, Rearrangement of terms.	**10**
Unit - IV **Fourier Series:** Definition, Fourier Series with Arbitrary Period, In Particular Periodic Function With Period 2π. Fourier Series of Even and Odd Functions, Half Rang Fourier Series.	**10**
Unit - V **Fourier Integral And Transform :** Fourier Integral Theorem, Fourier Sine and Cosine Integral Complex Form of Integral, Inversion Formula for Fourier Transforms, Fourier Transforms of the derivative of a Function.	**10**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Learn various methods of solving ordinary differential equations of the first order and their importance in engineering problems

- Develop mathematical models through ordinary differential equations of the first order
- Describe the convergence and divergence of infinite series and analyse the Fourier integral and Fourier transform of a function
- Familiarise with special functions to evaluate some proper and improper integrals using beta and gamma functions
- Develop the basic concept of linear algebra for electronics engineering problems.

Text Books

1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House, 2016, Fifth Edition.
2. Calculus and Analytic Geometry, George B. Thomas and Ross L. Finney, Pearson, 2020, Ninth Edition.

Reference Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 2015, Eighth Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill, Jones & Bartlett Learning, 2018, Sixth Edition
3. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2012, Forty-second Edition.

Central University of Jammu

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Department of Electronics and Communication Engineering

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Engineering Physics

Course Code: BEECA1C002

Course Title: Engineering Physics

Semester: I

Credits: 4

Rationale

Applied Physics includes the study of a large number of diverse topics all related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Course Outlines

Contents	No of Lectures
Unit-I Wave Optics and Modern Physics: Interference: Concept of Interference of Light-Division of Amplitude and Wavefront with examples- Michelson and Fabry perot Interferometers- Applications Diffraction: Fraunhofer's Class of Diffraction at Single, Double and MultipleSlits-Gratings and Applications Polarization: Production and Detection of Polarised Light—Wave Plates- Optical Activity-Laurent's. half shade polarimeter.	**10**
Unit-II Lasers: Interaction of Radiation with Matter-Spontaneous and Stimulated Emissions-Basic requirements for the construction of Lasers-Construction and working of He-Ne, CO2, Nd-YAG and Semiconductor Lasers, Holography and HNDT Optical Fibers: Principle and working of optical Fiber, structure, Classification and advantages of optical fiber, Light guiding mechanism in Optical Fibers - Numerical Aperture, Signal Degradation, Attenuation, Absorption, Inter and intra modal Dispersions. Fiber optics sensors and optical fiber communications.	**10**
Unit-III Quantum Physics:Quantum Mechanics - Introduction to quantum theory, concepts and experiments led to the discovery, wave particle duality-Davisson-Germer experiment, Heisenberg uncertainty principle, Schrodinger time independent wave equation, the free particle problem - particle in an infinite and finite potential well, quantummechanical tunnelling – applications; Hydrogen Atom Wave Functions, Angular Momentum Operators, Identical Particles, Quantum Optics - Introduction to quantum optics and Quantum Imaging.	**10**

Unit-IV Engineering Materials: Magnetic Materials: Weiss Theory of Ferromagnetism – Properties – Domains – Curie Transition - Hard and soft magnetic materials – Ferrites – Structure, Classification, Applications in Computers. Superconductors: Introduction to superconductivity, Meissner effect - Type-I and Type-II Superconductors – Applications in Computers. Semiconductor Materials and Devices: Types of semiconductor materials, temperature and concentration effects on band gap, Hall effect, PN junction diode,photodiode, LED, junction transistor, phototransistor. Nano-materials – Introduction to Nano-materials and Nano-technology.	**10**
Unit-V **Computers Sensors and Sensing Technologies:** Introduction, The Human Body as a Sensor System, Passive and Active sensors, the sensor as part of a measurement system, sensor properties, Classification of Sensors – Infrared Sensor, Bio Sensors, Piezoelectric Sensors, Thermal Sensors, Quantum Sensors and Applications in Computer Science and Engineering.	**10**

Course Outcomes

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

- Apply the concepts of wave and particle nature of matter and energy for solving problems
- Understand the applications of Interference, diffraction, optical fibers, holography and lasers in engineering
- Understand the basics of semiconductors, magnetism, super conductivity, nano materials and their applications in engineering.
- Comprehend sensing technologies and their applications in computer science and engineering

Text Books

1. Ajoy K.Ghatak, "*Optics*", Tata McGraw Hill, Sixth Edition, 2017.
2. Gerd Keiser, "*Optical Fibre communications*", McGraw Hill, 4th Edition

Reference Books

1. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "*Concepts of Modern Physics*", McGraw Hill Publications, Sixth edition,2009
2. M.N. Avadhanulu, P.G. Khirsagar, "*A Text Book of Engineering Physics*", 9th edition,2011
3. John Vetelino and Aravind Reghu, "*Introduction to Sensors*", CRC Press, 1st Edition, 2010.
4. Narciso Garcia, Arthur Damask and Steven Schwarz, "*Physics for Computer Science Students*", Springer, 2012, 2nd Edition.
5. Jeff Hecht, "*Understanding Lasers An Entry-Level Guide*", Wiley Publications, Fourth edition, 2018.

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Department of Electronics and Communication Engineering

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Engineering Physics Lab

Course Code: BEECA1C002

Course Title: Engineering Physics Lab

Semester: I

Credits: 01

Rationale

Applied physics practical's aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence.

List of experiments

1. Determination of Wavelength of Sodium light using Newton's Rings.
2. Determination of Wavelength of He-Ne laser – Metal Scale.
3. Measurement of Width of a narrow slit using He- Ne Laser.
4. Determination of Specific rotation of Cane sugar by Laurent Half-shade Polarimeter.
5. Determination of capacitance by using R-C circuit.
6. Determination of resonating frequency and bandwidth by LCR circuit.
7. Measurement of half-life of radioactive source using GM Counter.
8. Diffraction grating by normal incidence method.
9. Measurement of numerical aperture of optical fiber.

Course Outcomes

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

- Use CRO, signal generator, spectrometer, polarimeter and GM counter for making measurements
- Test optical components using principles of interference and diffraction of light
- Determine the selectivity parameters in electrical circuits
- Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements

Text Books

1. "Physics Laboratory Manual" by Physics Department, NIT Warangal,2021.
2. P.R. Sasi Kumar, "Practical Physics", PHI publications, first edition,2011

Reference Books/ Online Resources

1. G.L.Squire, "Practical Physics", Cambridge University press, fourth edition,2001.
2. Dr.S.K.Gupta Krishna,"Engineering Physics Practical", Prakashan Publications, ninth edition,2010.
3. https://nptel.ac.in/courses/115/105/115105110/

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Department of Electronics and Communication Engineering

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English for Technical Communication

Course Code: BEECA1C003
Course Title: English for Technical Communication
Semester: I
Credits: 04

Rationale

The goal of this course is to prepare engineering students with the individual and collaborative technical writing, presentation, and research skills necessary to be effective technical communicators in academic and professional environments.

Course Outlines

Contents	No. of Lectures
Unit-I Grammar Principles (Correction of sentences, Concord) and Vocabulary Building (synonyms and antonyms) - Idioms and Phrasal verbs, patterns of use and suggestions for effective employment in varied contexts. Effective Sentence Construction - Strategies for bringing variety and clarity in sentences, removing ambiguity, editing long sentences for brevity and clarity.	**10**
Unit - II Reported speech - Contexts for use of reported speech, its impact on audiences and readers, active and passive voice, reasons for preference for passive voice in scientific English. Paragraph-writing - Definition of paragraph, types, features of a good paragraph, unity of theme, coherence, linking devices, direction, patterns of development.	**10**
Unit -III Note-making – Definition, the need for note-making, its benefits, various note formats, like tree diagram, block or list notes, tables, etc. Letter-Writing - Its importance in the context of other channels of communication, qualities of effective letters, types- personal & official letters for various purposes, emphasis on letter of application for jobs, cover letter and resume types, examples and exercises.	**10**
Unit - IV Reading techniques - Definition- Skills and sub-skills of reading, Skimming and Scanning, their uses and purposes, examples and exercises. Reading Comprehension - Reading silently and with understanding, process of comprehension, types of comprehension questions (technical paper reading, patents).	**10**
Unit - V Features of Technical English - Description of technical objects and process, Report-Writing - definition, purpose, types, and structure, formal and informal reports, stages in developing report, proposal, progress and final reports examples and exercises.	**10**

Book Reviews - Oral and written review of a chosen novel/play/movie, focus on appropriate vocabulary and structure, language items like special vocabulary and idioms used.	

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Understand basic grammar principles
- Write clear and coherent passages
- Write effective letters for job application and complaints
- Prepare technical reports and interpret graphs
- Enhance reading comprehension
- Comprehend English speech sound system, stress and intonation

Text books

1. English for Engineers and Technologists (Combined edition, Vol. 1 and 2) Orient Blackswan 2010.
2. Ashraf, M Rizvi. Effective Technical Communication. Tata McGraw-Hill, 2006

Reference books

1. Meenakshi Raman and Sangeetha Sharma. Technical Communication: Principles and Practice 2nd Edition, Oxford University Press, 2011.

Language laboratory

1. English Sound System - vowels, consonants, Diphthongs, phonetic symbols using dictionary to decode phonetic transcription, Received Pronunciation, its value and relevance, transcription of exercises.
2. Stress and Intonation - word and sentence stress, their role and importance in spoken English
3. Intonation in spoken English - definition, patterns of intonation, falling, rising, etc., use of intonation in daily life-exercises
4. Introducing one in formal and social contexts- Role plays, their uses indeveloping fluency and communication in general.
5. Oral presentation - definition, occasions, structure, qualities of a good presentation with emphasis on body language and use of visual aids.
6. Listening Comprehension - Challenges in listening, good listening traits, some standard listening tests, practice and exercises.
7. Debate/ Group Discussions - concepts, types, Do's and don'ts, intensive practice.

Software

1. Clear Pronunciation – Part-1 Learn to Speak English.
2. Clear Pronunciation – Part-2 Speak Clearly with Confidence
3. Study Skills
4. English Pronunciation

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Department of Electronics and Communication Engineering

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Data Structures using C

Course Code: BEECA1C004

Course Title: Data Structures using C

Semester: I

Credits: 03

Rationale

Data structures plays significant role for designing efficient and accurate algorithms in several application areas of computer engineering. Various data structures such as arrays, stack, queue, trees are used for developing algorithms in Artificial intelligence, computer vision, and image processing etc. Moreover, design and analysis of algorithms using time and space complexity is also important parameter that needs basic knowledge of different data structures.

Course Outlines

Contents	No. of Lectures
Unit - I Introduction to Data Structures, Abstract Data Type (ADT), Arrays and Strings, Structures, Recursion, Pointers, Dynamic memory allocation Algorithm Design, Scalability, Introduction to Complexity Analysis, Big O Notation, Relationship between time complexity and hardware performance	8
Unit - II Linked Lists:- ADT type, Linear List , Linear Linked list, doubly linked list, circular linked list, header Linked list, various implementations and applications of Linked Lists	8
Unit - III Stack: - ADT type, specifications, array based and linked list based, recursion and its removal with stack, stack as buffer, searching, matching, integration and other applications, managing multiple stacks, various implementations and applications of Stacks, Queues:- ADT type, array based and linked list based,, queue as buffer, searching, Circular queues, Deque, Managing multiple queues, , various implementations and applications of Queues	8
Unit - IV Binary Trees:- Introduction to non-linear data structures, ADT type, array based and linked list based, binary tree, binary search tree, AVL tree, tree traversal, various implementations and applications of Trees Searching:- Linear and Binary Search Hashing:- Hash table, Various implementations and applications of Searching and Hashing	10

Unit – V Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Shell Sort, Radix Sort, various implementations and applications of Sorting, Graphs: - ADT type, array based and linked list based, graph traversal algorithms i.e. Breadth First & Depth First, various implementations and applications of graphs	**8**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Understand the concepts of basic data structures.
- Implementation of various data structures using c programming language.
- To apply data structures in a variety of real-life and engineering applications.
- To analyse space and time complexity of different algorithms.
- To understand and use various searching and sorting algorithms in other engineering applications.

Text Books

1. Symour Lipschutz,' Theory and Problems of Data Structures'', St. Schaum's Outline series in Computers, Tata McGraw – Hill.
2. Horowitz, E. , and Sahni, S. , ''Fundamentals of data structures'' , Computer Science Press.
3. Tanhenbaum, A.M., and Augenstein, M.J. , "Data Structures with C" , Prentice – Hall.
4. "Tremblay & Sorenson , An introduction to Data Structures with Applications:, TataMcGraw – Hill.

Reference Books

1. Aho, A.V. , Hopcraft, and Ullman, J.E., ''Data structures and Algorithms'' , Addison Wesley.
2. Thomas Coremen, Introduction to Algorithms, Second edition, Prentice Hall of India (2007) 2nd ed.
3. Mark Allen Weiss, Data Structures & Algorithm analysis in C, Dorling Kingsley (2002) 3rd ed.
4. Reema Thareja: Data Structures Using C, 2e, Oxford University Press 2014. R2: Horowitz and Sahani: Fundamental of Data Structures in C, 2nd Edn, 2008 R3: Kruse, Tonso, Leung: Data Structures and Program Design in C, 2000
5. Richard F. Gilberg & Behrouz Forouzan: Data Structures, A Pseudocode Approach with C, 2001.
6. Weiss: Data Structures and Algorithm Analysis in C/C++, 3rd Edn, 2006
7. Carrano and Prichard: Data Abstraction and Problem solving with C++, 5th Edn, 2007 R7: Sedgewick : Algorithms in C/C++
8. Sahani : Data Structures, Algorithms and applications in C++, 1997.
9. Corman et al: Introduction to Algorithms, 3rd Edn., 2009.
10. Heileman : Data Structures, Algorithms and Object Oriented Programming, 2002. R11: Sorenson and Tremblay: An Introduction to Data Structures with Applications, 2nd Edn, 2008.
11. Knuth: The Art of Computer programming Vol I, Vol III
12. Hubbard, John R.: Schaum's Outline of Data Structures with C++, 2000

Central University of Jammu

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Department of Electronics and Communication Engineering

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Basic Electrical and Instrumentation Engineering

Course Code: BEECA1C005
Course Title: Basic Electrical and Instrumentation Engineering
Semester: I
Credits: 03

Rationale

To understand the analysis of steady state response in D.C. circuits and A.C circuits. It will also develop the in-depth knowledge of types and operations on matrices and algebra in a comprehensive manner. To understand construction and working of AC/DC Bridges Measurements, Measurement System, and Perform test on basic laws of electrical engineering and network theorems.

Course Outlines

Contents	No. of Lectures
Unit - I **DC Circuits :** Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton Theorems and Maximum power.	**10**
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), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections	**10**
Unit -III **Transformers :** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, voltage regulation and efficiency.	**10**
Unit - IV **AC/DC Bridge Measurements:** Wheatstone bridge, Kelvin Bridge, Anderson Constant current loop; resistance ration bridge, Schering bridge, Parallel C bridge, De Sauty bridge,Wein bridge, Maxwell's bridge, hay bridge, Owen bridge, Anderson bridge, Heaviside Mutual inductance bridge. Measurement of high resistance including loss of charge method and Mega Ohm bridge method.	**10**
Unit - V **Measurement Systems:** Measurement system architecture, errors in measurements. Standard used in measurement: Electrical standards, time and	**10**

frequency standards,physical standards.	

Course Outcomes

Upon successful completion of this course, candidates will be able to:

1. Analyze steady state response in D.C. circuits.
2. Analyze steady state response in A.C circuits.
3. Understand construction and working of AC/DC Bridge measurements.
4. Study of measurement systems.
5. Perform test on basic laws of electrical engineering and network theorems.

Text Books

1. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
2. T. K. Nagsarkar and M. S. Sukhija, "Basic Electrical Engineering", Oxford University Press, 2017.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

Reference Books

1. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. E. Hughes, "Electrical and Electronics Technology", Pearson 2010.
4. A. K. Sawhney, "Electrical and Electronic measurement and Instrumentation".

Central University of Jammu

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Department of Electronics and Communication Engineering

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Engineering Workshop

Course Code: BEECA1C006
Course Title: Engineering Workshop
Semester: I
Credits: 01

Rationale

To understand the analysis of steady state response in D.C. circuits and A.C circuits. It will also develop the in-depth knowledge of types and operations on matrices and algebra in a comprehensive manner. To understand construction and working of AC/DC Bridges Measurements, Measurement System, and Perform test on basic laws of electrical engineering and network theorems.

Course Outlines

Contents	No. of Lectures
Unit - I **Safety Procedures and Practices:** Introduction to workshop safety protocols, including the proper use of personal protective equipment (PPE), emergency procedures, and equipment operation guidelines. **Introduction to Tools and Equipment:** Familiarization with basic hand tools such as hammers, screwdrivers, wrenches, and power tools like drills, saws, and grinders. Instruction on the correct usage, handling, and maintenance of these tools.	10
Unit - II **Measurement and Metrology:** Understanding measurement techniques using tools such as vernier calipers, micrometers, gauges, and rulers. Practice in accurately measuring dimensions and tolerances.	10
Unit -III **Material Handling and Processing:** Introduction to different types of materials used in engineering, including metals, plastics, and composites. Instruction on material properties, cutting, shaping, and joining processes.	10
Unit - IV **Basic Machining Operations:** Overview of machining processes such as turning, milling, drilling, and grinding. Hands-on practice with manual and CNC (Computer Numerical Control) machines to fabricate simple components.	10
Unit - V **Welding and Joining Techniques:** Introduction to various welding methods such as arc welding, gas welding, and spot welding. Instruction on soldering, brazing, and adhesive bonding techniques. **Sheet Metal Work:** Understanding sheet metal properties, cutting, bending, forming, and joining processes. Practice in fabricating sheet metal components using hand tools and machinery.	10

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Analyze steady state response in D.C. circuits.
- Analyze steady state response in A.C circuits.
- Understand construction and working of AC/DC Bridge measurements.
- Study of measurement systems.
- Perform test on basic laws of electrical engineering and network theorems.

Text Books

1. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
2. T. K. Nagsarkar and M. S. Sukhija, "Basic Electrical Engineering", Oxford University Press, 2017.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

Reference Books

1. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. E. Hughes, "Electrical and Electronics Technology", Pearson 2010.
4. A. K. Sawhney, "Electrical and Electronic measurement and Instrumentation".

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Department of Electronics and Communication Engineering

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Environmental Studies

Course Code: BEECA1C007
Course Title: Environmental Studies
Semester: I
Credits: N/A

Rationale

This course aims to build on conceptual understanding of students by exposing them to the basic principles behind various eco-systems and environmental processes. It will explore the interconnectedness among all the biotic and abiotic components of environment and the dynamic nature of the ecological processes in maintaining equilibrium in nature.The course has been divided into three sections, with the view to introduce students to the concepts of eco systems, natural resources and various pollutants.

Course Outlines

Contents	No. of Lectures
Unit - I Environmental Studies: Ecosystems, Bio-diversity and its Conservation (i) The Multidisciplinary Nature of Environmental Studies Definition, scope and importance of Environmental Studies. Biotic and a biotic component of environment, need for environmental awareness. (ii) Ecosystems Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structures and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).	10
Unit - II Renewable and Non-renewable Natural Resources: Concept and definition of Natural Resources and need for their management, Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management, Mineral resources: Uses are exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes causes by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Urban problems related to energy, case studies. Land resources: Land as a	10

resource, land degradation, man induced landslides, soil erosion and desertification.	
Unit -III Environmental Pollution Definition, types, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards. Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste. Chemical toxicology-Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.	**10**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Understand the concepts of Eco systems.
- To make students aware about natural resources.
- To introduce about various types of pollutions in environments and its remedies.
- To analyse various types renewable and non-renewable resources.

Text Books

1. E. Barucha, Textbook of Environmental Studies for Undergraduate Courses, Universities Press(India) Pvt. Ltd., 2005.
2. S. Chawla, A Textbook of Environmental Studies, McGraw Hill Education Private Limited, 2012

Reference Books

1. G. T. Miller, Environmental Science, Thomas Learning, 2012.
2. W. Cunningham and M. A. Cunningham, Principles of Environment Science: Enquiryand Applications,
3. Tata McGraw Hill Publication, N. Delhi, 2003.
4. R. Rajagopalan, Environmental Studies: From Crisis to Cure, 2nd Edition, OxfordUniversity Press, 2011.
5. A.K. De, Environmental Chemistry, New Age Int. Publ. 2012,
6. Kaushik and C.P. Kaushik, Perspectives in Environment Studies, 4th Edition, New Age International Publishers,2013.
7. Environmental Engineering by Gerard Kiely, Tata McGraw-Hill Publishing CompanyLtd., New Delhi,2010

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Course Syllabus (Semester-I) Electronics and Communication Engineering 2024

Central University of Jammu

Rahya-Suchani (Bagla) District Samba – 181143, Jammu (J&K)

Department of Electronics and Communication Engineering

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Engineering Mathematics-I

Course Code: BEECE1C001
Course Title: Engineering Mathematics-**I**
Semester: I
Credits: 04

Rationale

To familiarize with the important tools and theorems of calculus and differential equations is essential in all the branches of engineering. It will also develop the in-depth knowledge of types and operations on matrices and algebra in a comprehensive manner.

Course Outlines

Contents	**No. of Lectures**
Unit - I Linear dependence and independence of vectors, Rank of a matrix, Consistency of the system of linear equations, Eigen values and eigenvectors of a matrix, Cayley-Hamilton theorem and its applications, Reduction to diagonal form.	**10**
Unit - II Reduction of a quadratic form to canonical form - orthogonal transformation and congruent transformation, Properties of complex matrices - Hermitian, skew-Hermitian and Unitary matrices.	**10**
Unit -III Taylor's theorem with remainders, Taylor's and Maclaurin's expansions, Asymptotes, Curvature; Curve tracing, Functions of several variables - partial differentiation, total differentiation, Euler's theorem and generalization, Change of variables – Jacobians, maxima and minima of functions of several variables (2 and 3 variables) - Lagrange's method of multipliers	**10**
Unit - IV Geometric interpretation of solutions of first order ODE $y' = f(x, y)$, Exact differential equations, integrating factors, orthogonal trajectories, Higher order linear differential equations with constant coefficients - homogeneous and non- homogeneous.	**10**
Unit - V Euler and Cauchy's differential equations; Method of variation of parameters; System of linear differential equations; applications in physical problems - forced oscillations, electric circuits, etc	**10**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Solve the consistent system of linear equations

- Apply orthogonal and congruent transformations to a quadratic form.
- Find the maxima and minima of multivariable functions
- Solve arbitrary order linear differential equations with constant coefficients
- Apply the concepts in solving physical problems arising in engineering.

Text Books

1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House, 2016, Fifth Edition.
2. Calculus and Analytic Geometry, George B. Thomas and Ross L. Finney, Pearson, 2020, Ninth Edition.

Reference Books

4. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 2015, Eighth Edition.
5. Advanced Engineering Mathematics, Dennis G. Zill, Jones & Bartlett Learning, 2018, Sixth Edition
6. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2012, Forty-second Edition.

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Department of Electronics and Communication Engineering

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Engineering Physics

Course Code: BEECE1C002

Course Title: Engineering Physics

Semester: I

Credits: 4

Rationale

Applied Physics includes the study of a large number of diverse topics all related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Course Outlines

Contents	No of Lectures
Unit-I Wave Optics and Modern Physics: Interference: Concept of Interference of Light-Division of Amplitude and Wavefront with examples- Michelson and Fabry perot Interferometers- Applications Diffraction: Fraunhofer's Class of Diffraction at Single, Double and MultipleSlits-Gratings and Applications Polarization: Production and Detection of Polarised Light—Wave Plates- Optical Activity-Laurent's. half shade polarimeter.	10
Unit-II Lasers: Interaction of Radiation with Matter-Spontaneous and Stimulated Emissions-Basic requirements for the construction of Lasers-Construction and working of He-Ne, CO2, Nd-YAG and Semiconductor Lasers, Holography and HNDT Optical Fibers: Principle and working of optical Fiber, structure, Classification and advantages of optical fiber, Light guiding mechanism in Optical Fibers - Numerical Aperture, Signal Degradation, Attenuation, Absorption, Inter and intra modal Dispersions. Fiber optics sensors and optical fiber communications.	10
Unit-III Quantum Physics:Quantum Mechanics - Introduction to quantum theory, concepts and experiments led to the discovery, wave particle duality-Davisson-Germer experiment, Heisenberg uncertainty principle, Schrodinger time independent wave equation, the free particle problem - particle in an infinite and finite potential well, quantummechanical tunnelling – applications; Hydrogen Atom Wave Functions, Angular Momentum Operators, Identical Particles, Quantum Optics - Introduction to quantum optics and Quantum Imaging.	10

Unit-IV Engineering Materials: Magnetic Materials: Weiss Theory of Ferromagnetism – Properties – Domains – Curie Transition - Hard and soft magnetic materials – Ferrites – Structure, Classification, Applications in Computers. Superconductors: Introduction to superconductivity, Meissner effect - Type-I and Type-II Superconductors – Applications in Computers. Semiconductor Materials and Devices: Types of semiconductor materials, temperature and concentration effects on band gap, Hall effect, PN junction diode,photodiode, LED, junction transistor, phototransistor. Nano-materials – Introduction to Nano-materials and Nano-technology.	**10**
Unit-V **Computers Sensors and Sensing Technologies:** Introduction, The Human Body as a Sensor System, Passive and Active sensors, the sensor as part of a measurement system, sensor properties, Classification of Sensors – Infrared Sensor, Bio Sensors, Piezoelectric Sensors, Thermal Sensors, Quantum Sensors and Applications in Computer Science and Engineering.	**10**

Course Outcomes

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

- Apply the concepts of wave and particle nature of matter and energy for solving problems
- Understand the applications of Interference, diffraction, optical fibers, holography and lasers in engineering
- Understand the basics of semiconductors, magnetism, super conductivity, nano materials and their applications in engineering.
- Comprehend sensing technologies and their applications in computer science and engineering

Text Books

1. Ajoy K.Ghatak, "*Optics*", Tata McGraw Hill, Sixth Edition, 2017.
2. Gerd Keiser, "*Optical Fibre communications*", McGraw Hill, 4th Edition

Reference Books

6. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "*Concepts of Modern Physics*", McGraw Hill Publications, Sixth edition,2009
7. M.N. Avadhanulu, P.G. Khirsagar, "*A Text Book of Engineering Physics*", 9th edition,2011
8. John Vetelino and Aravind Reghu, "*Introduction to Sensors*", CRC Press, 1st Edition, 2010.
9. Narciso Garcia, Arthur Damask and Steven Schwarz, "*Physics for Computer Science Students*", Springer, 2012, 2nd Edition.
10. Jeff Hecht, "*Understanding Lasers An Entry-Level Guide*", Wiley Publications, Fourth edition, 2018.

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Department of Electronics and Communication Engineering

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Engineering Physics Lab

Course Code: BEECE1C002

Course Title: Engineering Physics Lab

Semester: I

Credits: 01

Rationale

Applied physics practical's aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence.

List of experiments

10. Determination of Wavelength of Sodium light using Newton's Rings.
11. Determination of Wavelength of He-Ne laser – Metal Scale.
12. Measurement of Width of a narrow slit using He- Ne Laser.
13. Determination of Specific rotation of Cane sugar by Laurent Half-shade Polarimeter.
14. Determination of capacitance by using R-C circuit.
15. Determination of resonating frequency and bandwidth by LCR circuit.
16. Measurement of half-life of radioactive source using GM Counter.
17. Diffraction grating by normal incidence method.
18. Measurement of numerical aperture of optical fiber.

Course Outcomes

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

- Use CRO, signal generator, spectrometer, polarimeter and GM counter for making measurements
- Test optical components using principles of interference and diffraction of light
- Determine the selectivity parameters in electrical circuits
- Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements

Text Books

3. "Physics Laboratory Manual" by Physics Department, NIT Warangal,2021.
4. P.R. Sasi Kumar, "Practical Physics", PHI publications, first edition,2011

Reference Books/ Online Resources

3. G.L.Squire, "Practical Physics", Cambridge University press, fourth edition,2001.
4. Dr.S.K.Gupta Krishna,"Engineering Physics Practical", Prakashan Publications, ninth edition,2010.
3. https://nptel.ac.in/courses/115/105/115105110/

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Department of Electronics and Communication Engineering

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English for Technical Communication

Course Code: BEECE1C003
Course Title: English for Technical Communication
Semester: I
Credits: 04

Rationale

The goal of this course is to prepare engineering students with the individual and collaborative technical writing, presentation, and research skills necessary to be effective technical communicators in academic and professional environments.

Course Outlines

Contents	No. of Lectures
Unit-I Grammar Principles (Correction of sentences, Concord) and Vocabulary Building (synonyms and antonyms) - Idioms and Phrasal verbs, patterns of use and suggestions for effective employment in varied contexts. Effective Sentence Construction - Strategies for bringing variety and clarity in sentences, removing ambiguity, editing long sentences for brevity and clarity.	**10**
Unit - II Reported speech - Contexts for use of reported speech, its impact on audiences and readers, active and passive voice, reasons for preference for passive voice in scientific English. Paragraph-writing - Definition of paragraph, types, features of a good paragraph, unity of theme, coherence, linking devices, direction, patterns of development.	**10**
Unit -III Note-making – Definition, the need for note-making, its benefits, various note formats, like tree diagram, block or list notes, tables, etc. Letter-Writing - Its importance in the context of other channels of communication, qualities of effective letters, types- personal & official letters for various purposes, emphasis on letter of application for jobs, cover letter and resume types, examples and exercises.	**10**
Unit - IV Reading techniques - Definition- Skills and sub-skills of reading, Skimming and Scanning, their uses and purposes, examples and exercises. Reading Comprehension - Reading silently and with understanding, process of comprehension, types of comprehension questions (technical paper reading, patents).	**10**
Unit - V Features of Technical English - Description of technical objects and process, Report-Writing - definition, purpose, types, and structure, formal and informal reports, stages in developing report, proposal, progress and final reports examples and exercises.	**10**

Book Reviews - Oral and written review of a chosen novel/play/movie, focus on appropriate vocabulary and structure, language items like special vocabulary and idioms used.	

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Understand basic grammar principles
- Write clear and coherent passages
- Write effective letters for job application and complaints
- Prepare technical reports and interpret graphs
- Enhance reading comprehension
- Comprehend English speech sound system, stress and intonation

Text books

1. English for Engineers and Technologists (Combined edition, Vol. 1 and 2) Orient Blackswan 2010.
2. Ashraf, M Rizvi. Effective Technical Communication. Tata McGraw-Hill, 2006

Reference books

1. Meenakshi Raman and Sangeetha Sharma. Technical Communication: Principles and Practice 2nd Edition, Oxford University Press, 2011.

Language laboratory

8. English Sound System - vowels, consonants, Diphthongs, phonetic symbols using dictionary to decode phonetic transcription, Received Pronunciation, its value and relevance, transcription of exercises.
9. Stress and Intonation - word and sentence stress, their role and importance in spoken English
10. Intonation in spoken English - definition, patterns of intonation, falling, rising, etc., use of intonation in daily life-exercises
11. Introducing one in formal and social contexts- Role plays, their uses indeveloping fluency and communication in general.
12. Oral presentation - definition, occasions, structure, qualities of a good presentation with emphasis on body language and use of visual aids.
13. Listening Comprehension - Challenges in listening, good listening traits, some standard listening tests, practice and exercises.
14. Debate/ Group Discussions - concepts, types, Do's and don'ts, intensive practice.

Software

5. Clear Pronunciation – Part-1 Learn to Speak English.
6. Clear Pronunciation – Part-2 Speak Clearly with Confidence
7. Study Skills
8. English Pronunciation

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Department of Electronics and Communication Engineering

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Data Structures using C

Course Code: BEECE1C004

Course Title: Data Structures using C

Semester: I

Credits: 03

Rationale

Data structures plays significant role for designing efficient and accurate algorithms in several application areas of computer engineering. Various data structures such as arrays, stack, queue, trees are used for developing algorithms in Artificial intelligence, computer vision, and image processing etc. Moreover, design and analysis of algorithms using time and space complexity is also important parameter that needs basic knowledge of different data structures.

Course Outlines

Contents	No. of Lectures
Unit - I Introduction to Data Structures, Abstract Data Type (ADT), Arrays and Strings, Structures, Recursion, Pointers, Dynamic memory allocation Algorithm Design, Scalability, Introduction to Complexity Analysis, Big O Notation, Relationship between time complexity and hardware performance	8
Unit - II Linked Lists:- ADT type, Linear List , Linear Linked list, doubly linked list, circular linked list, header Linked list, various implementations and applications of Linked Lists	8
Unit - III Stack: - ADT type, specifications, array based and linked list based, recursion and its removal with stack, stack as buffer, searching, matching, integration and other applications, managing multiple stacks, various implementations and applications of Stacks, Queues:- ADT type, array based and linked list based,, queue as buffer, searching, Circular queues, Deque, Managing multiple queues, , various implementations and applications of Queues	8
Unit - IV Binary Trees:- Introduction to non-linear data structures, ADT type, array based and linked list based, binary tree, binary search tree, AVL tree, tree traversal, various implementations and applications of Trees Searching:- Linear and Binary Search Hashing:- Hash table, Various implementations and applications of Searching and Hashing	10

Unit – V Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Shell Sort, Radix Sort, various implementations and applications of Sorting, Graphs: - ADT type, array based and linked list based, graph traversal algorithms i.e. Breadth First & Depth First, various implementations and applications of graphs	**8**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Understand the concepts of basic data structures.
- Implementation of various data structures using c programming language.
- To apply data structures in a variety of real-life and engineering applications.
- To analyse space and time complexity of different algorithms.
- To understand and use various searching and sorting algorithms in other engineering applications.

Text Books

5. Symour Lipschutz,' Theory and Problems of Data Structures'', St. Schaum's Outline series in Computers, Tata McGraw – Hill.
6. Horowitz, E. , and Sahni, S. , ''Fundamentals of data structures'' , Computer Science Press.
7. Tanhenbaum, A.M., and Augenstein, M.J. , "Data Structures with C" , Prentice – Hall.
8. "Tremblay & Sorenson , An introduction to Data Structures with Applications:, TataMcGraw – Hill.

Reference Books

13. Aho, A.V. , Hopcraft, and Ullman, J.E., ''Data structures and Algorithms'' , Addison Wesley.
14. Thomas Coremen, Introduction to Algorithms, Second edition, Prentice Hall of India (2007) 2nd ed.
15. Mark Allen Weiss, Data Structures & Algorithm analysis in C, Dorling Kingsley (2002) 3rd ed.
16. Reema Thareja: Data Structures Using C, 2e, Oxford University Press 2014. R2: Horowitz and Sahani: Fundamental of Data Structures in C, 2nd Edn, 2008 R3: Kruse, Tonso, Leung: Data Structures and Program Design in C, 2000
17. Richard F. Gilberg & Behrouz Forouzan: Data Structures, A Pseudocode Approach with C, 2001.
18. Weiss: Data Structures and Algorithm Analysis in C/C++, 3rd Edn, 2006
19. Carrano and Prichard: Data Abstraction and Problem solving with C++, 5th Edn, 2007 R7: Sedgewick : Algorithms in C/C++
20. Sahani : Data Structures, Algorithms and applications in C++, 1997.
21. Corman et al: Introduction to Algorithms, 3rd Edn., 2009.
22. Heileman : Data Structures, Algorithms and Object Oriented Programming, 2002. R11: Sorenson and Tremblay: An Introduction to Data Structures with Applications, 2nd Edn, 2008.
23. Knuth: The Art of Computer programming Vol I, Vol III
24. Hubbard, John R.: Schaum's Outline of Data Structures with C++, 2000

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Basic Electrical and Instrumentation Engineering

Course Code: BEECE1C005
Course Title: Basic Electrical and Instrumentation Engineering
Semester: I
Credits: 03

Rationale

To understand the analysis of steady state response in D.C. circuits and A.C circuits. It will also develop the in-depth knowledge of types and operations on matrices and algebra in a comprehensive manner. To understand construction and working of AC/DC Bridges Measurements, Measurement System, and Perform test on basic laws of electrical engineering and network theorems.

Course Outlines

Contents	No. of Lectures
Unit - I **DC Circuits :** Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton Theorems and Maximum power.	**10**
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), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections	**10**
Unit -III **Transformers :** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, voltage regulation and efficiency.	**10**
Unit - IV **AC/DC Bridge Measurements:** Wheatstone bridge, Kelvin Bridge, Anderson Constant current loop; resistance ration bridge, Schering bridge, Parallel C bridge, De Sauty bridge,Wein bridge, Maxwell's bridge, hay bridge, Owen bridge, Anderson bridge, Heaviside Mutual inductance bridge. Measurement of high resistance including loss of charge method and Mega Ohm bridge method.	**10**
Unit - V **Measurement Systems:** Measurement system architecture, errors in measurements. Standard used in measurement: Electrical standards, time and	**10**

frequency standards,physical standards.	

Course Outcomes

Upon successful completion of this course, candidates will be able to:

6. Analyze steady state response in D.C. circuits.
7. Analyze steady state response in A.C circuits.
8. Understand construction and working of AC/DC Bridge measurements.
9. Study of measurement systems.
10. Perform test on basic laws of electrical engineering and network theorems.

Text Books

4. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
5. T. K. Nagsarkar and M. S. Sukhija, "Basic Electrical Engineering", Oxford University Press, 2017.
6. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

Reference Books

5. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
6. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
7. E. Hughes, "Electrical and Electronics Technology", Pearson 2010.
8. A. K. Sawhney, "Electrical and Electronic measurement and Instrumentation".

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Engineering Workshop

Course Code: BEECE1C006
Course Title: Engineering Workshop
Semester: I
Credits: 01

Rationale

To understand the analysis of steady state response in D.C. circuits and A.C circuits. It will also develop the in-depth knowledge of types and operations on matrices and algebra in a comprehensive manner. To understand construction and working of AC/DC Bridges Measurements, Measurement System, and Perform test on basic laws of electrical engineering and network theorems.

Course Outlines

Contents	No. of Lectures
Unit - I **Safety Procedures and Practices:** Introduction to workshop safety protocols, including the proper use of personal protective equipment (PPE), emergency procedures, and equipment operation guidelines. **Introduction to Tools and Equipment:** Familiarization with basic hand tools such as hammers, screwdrivers, wrenches, and power tools like drills, saws, and grinders. Instruction on the correct usage, handling, and maintenance of these tools.	**10**
Unit - II **Measurement and Metrology:** Understanding measurement techniques using tools such as vernier calipers, micrometers, gauges, and rulers. Practice in accurately measuring dimensions and tolerances.	**10**
Unit -III **Material Handling and Processing:** Introduction to different types of materials used in engineering, including metals, plastics, and composites. Instruction on material properties, cutting, shaping, and joining processes.	**10**
Unit - IV **Basic Machining Operations:** Overview of machining processes such as turning, milling, drilling, and grinding. Hands-on practice with manual and CNC (Computer Numerical Control) machines to fabricate simple components.	**10**
Unit - V **Welding and Joining Techniques:** Introduction to various welding methods such as arc welding, gas welding, and spot welding. Instruction on soldering, brazing, and adhesive bonding techniques. **Sheet Metal Work:** Understanding sheet metal properties, cutting, bending, forming, and joining processes. Practice in fabricating sheet metal components using hand tools and machinery.	**10**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Analyze steady state response in D.C. circuits.
- Analyze steady state response in A.C circuits.
- Understand construction and working of AC/DC Bridge measurements.
- Study of measurement systems.
- Perform test on basic laws of electrical engineering and network theorems.

Text Books

4. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
5. T. K. Nagsarkar and M. S. Sukhija, “Basic Electrical Engineering”, Oxford University Press, 2017.
6. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.

Reference Books

5. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
6. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
7. E. Hughes, “Electrical and Electronics Technology”, Pearson 2010.
8. A. K. Sawhney, “Electrical and Electronic measurement and Instrumentation”.

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Environmental Studies

Course Code: BEECE1C007
Course Title: Environmental Studies
Semester: I
Credits: N/A

Rationale

This course aims to build on conceptual understanding of students by exposing them to the basic principles behind various eco-systems and environmental processes. It will explore the interconnectedness among all the biotic and abiotic components of environment and the dynamic nature of the ecological processes in maintaining equilibrium in nature.The course has been divided into three sections, with the view to introduce students to the concepts of eco systems, natural resources and various pollutants.

Course Outlines

Contents	No. of Lectures
Unit - I Environmental Studies: Ecosystems, Bio-diversity and its Conservation (i) The Multidisciplinary Nature of Environmental Studies Definition, scope and importance of Environmental Studies. Biotic and a biotic component of environment, need for environmental awareness. (ii) Ecosystems Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structures and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).	10
Unit - II Renewable and Non-renewable Natural Resources: Concept and definition of Natural Resources and need for their management, Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management, Mineral resources: Uses are exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes causes by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Urban problems related to energy, case studies. Land resources: Land as a	10

resource, land degradation, man induced landslides, soil erosion and desertification.	
Unit -III Environmental Pollution Definition, types, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards. Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste. Chemical toxicology-Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.	**10**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Understand the concepts of Eco systems.
- To make students aware about natural resources.
- To introduce about various types of pollutions in environments and its remedies.
- To analyse various types renewable and non-renewable resources.

Text Books

3. E. Barucha, Textbook of Environmental Studies for Undergraduate Courses, Universities Press(India) Pvt. Ltd., 2005.
4. S. Chawla, A Textbook of Environmental Studies, McGraw Hill Education Private Limited, 2012

Reference Books

1. G. T. Miller, Environmental Science, Thomas Learning, 2012.
2. W. Cunningham and M. A. Cunningham, Principles of Environment Science: Enquiryand Applications,
3. Tata McGraw Hill Publication, N. Delhi, 2003.
4. R. Rajagopalan, Environmental Studies: From Crisis to Cure, 2nd Edition, OxfordUniversity Press, 2011.
5. A.K. De, Environmental Chemistry, New Age Int. Publ. 2012,
6. Kaushik and C.P. Kaushik, Perspectives in Environment Studies, 4th Edition, New Age International Publishers,2013.
7. Environmental Engineering by Gerard Kiely, Tata McGraw-Hill Publishing CompanyLtd., New Delhi,2010