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PROFESSIONAL ENGLISH-I

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COURSE OBJECTIVES:

- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.
- Present information in an appropriate oral form.
- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write anything convincingly with grammatical accuracy.

UNIT I – Listening

Theory

Listening to news and understanding its perspectives - Listening to motivational speech to comprehend the purpose - Listening to technical talks to understand its significance - Listening to classroom lecture to equip content knowledge - Listening comprehension

English Laboratory

Listening audios and answering MCQs - Watching video clips on famous speeches, motivational videos, documentaries and answering MCQs - TED talks.

UNIT II – Speaking

Theory

Everyday activities for day to day communication - Extempore/Impromptu to develop spontaneous thoughts - Self introduction to face interviews - Public speaking for persuading the audience - Movie reviews to promote critical thinking.

English Laboratory

Prepared talk - Story knitting - Picture talk - Brainstorming - Debate - Group discussion - Elevator speech - Mock HR interviews - Story narration - Miming - Short skits.

UNIT III- Reading

Theory

Newspaper reading to upgrade world knowledge – Reading Comprehension to analyse the text – Novels to improve creativity - Biography/Autobiography to synthesise experience - Technical articles for upgrading technical knowledge.

English Laboratory

Classification - Alphabet test - Logical sequence of words - Statement & conclusions - Statement & courses of action - Situation reaction test - Theme detection - Deriving conclusions from passages.

UNIT IV- Writing Theory

Definitions – Instructions – Checklists – Recommendations- Essays- Invitation and quotation letters - Email etiquettes - Reports - Minutes of a meeting

English Laboratory

Resume writing - Letter writing (Covering letter – Follow up letter - Letter of thanks giving - appreciation – Gratitude) - Paragraph writing – Jumbled paragraph – Error spotting.

UNIT V- Language Development Theory

Technical vocabulary - Parts of speech - Articles - Tenses - Voices - Numerical adjectives – Question tags - Misspelled words – Singular and plural nouns - Modals – Conditionals.

English Laboratory - Career Skills

Vocabulary Test (GRE, TOEFL, TOEIC & CAT Exam words) - Confused Pair of words - Contronyms – Time management – Stress management– Decision making – Negotiation - Sentence correction.

TOTAL: 60 HOURS

Lab Requirements:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

COURSE OUTCOMES:

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

CO1: Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully.

CO2: Speak appropriately and effectively in varied formal and informal contexts.

CO3: Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.

CO4: Communicate the corporate and social requirements in an impressive written mode.

CO5: Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.

TEXT BOOKS:

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana. N. P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.
3. Uttham Kumar. N. Professional English - I (with work book). Sahana Publications, Coimbatore, 2016.
4. Agarwal R. S. A Modern Approach to Verbal and Non-verbal Reasoning. Chand & Co., New Delhi, 2012.
5. Ashraf Rizvi M. Effective Technical Communication. TATA McGraw Hill, New Delhi, 2007.

REFERENCES:

1. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad, 2015.
3. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.
6. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.
7. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi, 2014.
8. Sharon Weiner Green and Ira K. Wolf, Barron's GRE, Glagotia Publications Pvt. Ltd., 18th Edition, New Delhi, 2011.
9. Mohamed Elias, R. Gupta's IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition, New Delhi, 2016.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Speak appropriately and effectively in varied formal and informal contexts	2		1		2		2		1		1	2	1	2	2
CO 2	Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes		1	2	1		1	3	1	2	2		1		1	1
CO 3	Determine the Communicate the corporate and social requirements in an impressive written mode		1	2	1		1		1	2	2		1	3	1	1
CO 4	Communicate the corporate and social requirements in an impressive written mode	2		1		2		2		1		1	2	1	2	2
CO 5	Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.		1	2	1		1		1	2	2		1	3	1	1

COURSE OBJECTIVES

- To understand the eigenvalue problems.
- To learn the derivatives of multivariable functions and applications.
- To solve differential equations of certain types, including systems of differential equations that they might encounter in engineering subjects.
- To understand double and triple integration concepts.
- To study vector calculus comprising of surface and volume integrals along with the classical theorems involving them.

UNIT I MATRICES**9+3**

Eigenvalues and eigenvectors of a real symmetric matrix – Properties – Cayley - Hamilton theorem (Statement and applications only) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II FUNCTIONS OF SEVERAL VARIABLES**9+3**

Partial derivatives – Euler’s theorem for homogenous functions – Total derivatives – Jacobians – Taylor’s expansion – Maxima and Minima – Method of Lagrangian multipliers.

UNIT III ORDINARY DIFFERENTIAL EQUATIONS**9+3**

Second order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients – Applications to Engineering problems – Electric Circuits, Simple Harmonic Motions and Bending of beams.

UNIT IV MULTIPLE INTEGRALS**9+3**

Double integration – Cartesian and polar co-ordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

UNIT-V VECTOR CALCULUS**9+3**

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal, vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (Statement and applications only) – Simple applications involving cubes and rectangular parallelepipeds.

TOTAL: 45+15= 60 PERIODS**COURSE OUTCOMES:**

After completing this course, the student will be able to:

CO 1: Apply the matrix algebra concepts for solving practical problems.

CO 2: Compute extremities of a function using multivariable derivatives.

CO 3: Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.

CO 4: Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.

CO 5: Expertise the concept of vector calculus and apply in core subjects.

TEXT BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 10th edition New Delhi 2016.
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017.

REFERENCES

1. T.Veerarajan, "Engineering Mathematics" ,Tata McGraw-Hill Publishing company, New Delhi, 2014.
2. Kandasamy.P, Thilagavathy,K., &Gunavathi.K., "Engineering Mathematics for first year "., S.Chand &Company Ltd., New Delhi,2014.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
5. V.Prameelakaladharan and G.Balaji, "Engineering Mathematics - I", 3rd Edition, Amrutha marketing,Chennai, 2017.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Apply the matrix algebra concepts for solving practical problems.	3	2	2									2	2	2	
CO 2	Compute extremities of a function using multivariable derivatives.	3	3	2									2	2	2	
CO 3	Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.	3	3	3									2	2	2	
CO 4	Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.	3	3	3									2	2	2	
CO 5	Expertise the concept of vector calculus and apply in core subjects.	3	3	3									2	2	2	

COURSE OBJECTIVES:

- Different engineering subjects and applications.
- Acoustics in building and Non-destructive techniques.
- Application of lasers in engineering and technology.
- Basics of Quantum theory.
- Identification of structure of engineering materials.
- Atomic and nuclear related theories.

UNIT I ACOUSTICS AND ULTRASONICS**9**

Sound – classification – characteristics of musical sound – loudness – Decibel – Intensity of sound – Weber-Fechner law – Reverberation and Reverberation time – Sabine’s law – derivations – Absorption coefficient – Measurement of absorption coefficients – Factors affecting acoustics of buildings and their remedies.

Ultrasonics – production – Magnetostriction effect – Magnetostriction oscillator – Piezoelectric effect – Inverse piezoelectric effect – Piezoelectric oscillator-Detection of ultrasonic waves-properties-Cavitations-Applications-NDT-pulse echo system-Determination of depth of sea.

UNIT II OPTICAL PHYSICS**9**

Lasers – Spontaneous and Stimulated Emissions-Types of lasers-Nd-YAG, Helium-Neon, CO₂ -Semiconductor lasers [Homojunction and Heterojunction (qualitative)]- Interference- Air wedge and its applications- Michelson interferometer: construction, working, determination of wavelength and thickness.

UNIT III QUANTUM PHYSICS**9**

Blackbody Radiation-Laws of blackbody Radiation-Planck’s quantum theory of blackbody radiation(derivation)-Photo Electric Effect-Compton effect(derivation)-Matter Waves-De- Broglie’s Concept-Schrodinger wave Equation-Time independent and Time dependent equations(derivations)-Physical significance of wave function-particle in a box (one dimensional case).

UNIT IV PROPERTIES OF MATTER AND THERMAL PHYSICS**9**

Elasticity-Hook’s law-stress- strain diagram-factors affecting Elasticity-Poisson’s ratio- Bending Moment-Cantilever-Heavy Cantilever-Young’s Modulus-Uniform and Non- uniform bending (Theory and Experiment). Modes of heat Transfer-Thermal Conductivity-Newton’s Law of Cooling-Lee’s disc Method-Radial Heat Flow-Cylindrical Shell Method-Thermal conductivity of Rubber-Heat conduction through a compound media.

UNIT V NUCLEAR AND ATOMIC PHYSICS**9**

Nuclear fission-chain Reaction-Nuclear reactor-condition for sustained chain reaction-Controlled chain reaction-Pressurized water reactor (PWR)-Boiling water reactor (BWR)- Nuclear power plant-Nuclear fusion- Differences between fission and fusion-Raman effect-applications-Raman spectroscopy.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After successful completion of this course, the students should be able to:

CO1: Apply the Acoustics and NDT techniques and modern engineering tools necessary for engineering practice.

CO2: Categorize and illustrate the Lasers and its application to engineering

CO3: Apply the quantum concepts in engineering field.

CO4: Examine the elastic and thermal properties in various materials.

CO5: Discuss the role of nuclear physics in energy production.

REFERENCES:

1. Dr. R.N. Jayaprakash, Engineering Physics, Dhanam Publications, 2018.
2. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
3. Palanisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
4. Avadhanulu M.N. and Kshirsagar P.G., A Textbook of Engineering physics, S.Chand & Company Ltd, New Delhi, 2005.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Apply the Acoustics and NDT techniques and modern engineering tools necessary for engineering practice	2		1		2		2		1		1	2	1	2	2
CO 2	Categorize and illustrate the Lasers and its application to engineering		1	2	1		1		1	2	2		1		1	1
CO 3	Apply the quantum concepts in engineering field	2		1		2		2		1		1	2	1	2	2
CO 4	Examine the elastic and thermal properties in various materials	2		1		2		2		1		1	2	1	2	2
CO 5	Discuss the role of nuclear physics in energy production	2		1		2		2		1		1	2	1	2	2

COURSE OBJECTIVES:

At the end of the course the students would be exposed to fundamental knowledge in

- To understand the chemistry behind water technology
- To understand the chemistry of Corrosion
- To acquaint the student with concepts of important photo physical and photochemical processes and spectroscopy
- To acquaint the students with the basics of fuels, and chemistry behind combustion process.
- To understand the basic concepts of phase equilibrium

UNIT I WATER TECHNOLOGY**9**

Physical, Chemical & Biological characteristics -Hardness of water - estimation of hardness (EDTA method) - Dissolved oxygen –determination and significances, Alkalinity – determination and significances - disadvantages of using hard water in boilers- Internal conditioning - phosphate, calgon and carbonate conditioning methods – External treatment: Zeolite, ion exchange methods - desalination – reverse osmosis and electrodialysis - domestic water treatment.

UNIT II CORROSION SCIENCE**9**

Basic concepts - mechanism of chemical, electrochemical corrosion - Pilling Bedworth rule – Types of Electrochemical corrosion - galvanic corrosion - differential aeration corrosion –Measurement of corrosion (wt. loss method only) - factors influencing corrosion. Corrosion control: Cathodic protection - sacrificial anodic method and impressed cathode current method. Electroplating (Copper plating) and Electroless plating (Nickel plating).

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY**9**

Photochemistry: Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law. Quantum efficiency –Photophysical Process- Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitization. Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation – applications.

UNIT IV FUELS AND COMBUSTION**9**

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal- analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) – petroleum – Fractional distillation - manufacture of synthetic petrol (Bergius process)- knocking- octane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG). Combustion of fuels – (simple problems) flue gas analysis (ORSAT Method).

Gibbs phase rule-definition of terms involved- Thermal analysis-application of phase rule to one Component system-water system – Sulphur system. Reduced Phase rule-application of phase rule to two Component system- lead-silver system - KI-water system and Ferric Chloride water system

COURSE OUTCOMES:

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

CO1: Developing the knowledge of chemistry behind water technology

CO2: Understanding the chemistry of Corrosion

CO3: Applying the basic concepts of photon on matter

CO4: Understanding basics of fuels, and chemistry behind combustion process.

CO5: Understanding the basic concepts of phase equilibrium

Text Books

1. P.C. Jain and Monika Jain, Engineering Chemistry, DhanpatRai and Sons, NewDelhi 2004.16th Edition.
2. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry,2nd Edition.PHI Learning PVT., LTD, New Delhi, 2008. 3rd Edition.
3. K. Sivakumar, Applied Chemistry, Sahana Publishers, Coiambatore 2022.4th Edition.

Reference Books

1. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. NewDelhi. 2008. Reprint edition.
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P)Ltd., Meerut, 2001.
3. ArunBhal, B.S. Bhal, G. D. Tuli, Essentials of Physical Chemistry, S. Chand & Co., Ltd. New Delhi. 26th Edition.
4. P. W. Atkins & Julio de Paula, Atkins' Physical Chemistry, Oxford University Press York, 7thEdn, 2002.
5. ShashiChawla, A Text Book of Engineering Chemistry, 3rd Edition, DhanpatRai&New Delhi, 2007.
6. S. Vairam, P. Kalyani&Suba Ramesh, Engineering Chemistry, 1stEdn, John Wiley &Sons, India, 2011.
7. Lee J.D., Concise Inorganic Chemistry, 7th Edn, Blackwel Science Publications Oxford, London, 2004.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Developing the knowledge of chemistry behind water		1	2	1		1		1	2	2		1		1	1
CO 2	Understanding the chemistry of Corrosion		1	2	1		1		1	2	2		1		1	1
CO 3	Applying the basic concepts of photon on matter	2		1		2		2		1		1	2	1	2	2
CO 4	Understanding basics of fuels, and chemistry behind combustion process	2		1		2		2		1		1	2	1	2	2
CO 5	Understanding the basic concepts of phase equilibrium		1	2	1		1		1	2	2		1		1	1

COURSE OBJECTIVES:

- To know the basics of algorithmic problem solving
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Fundamentals of Computing, Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL STATEMENTS AND FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: Create- add- delete from a Dictionary- Operations associated with pairs of data, and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, date and time, errors and exceptions, handling exceptions, debugging, modules, packages; Illustrative programs: word count, copy file. Case Study: Python Libraries (Numpy, Pandas, SciPy, PyGame).

COURSE OUTCOMES:

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

- CO1: Develop algorithmic solutions to simple computational problems
- CO2: Read, write, execute by hand simple Python programs.
- CO3: Structure simple Python programs for solving problems and decompose into functions.
- CO4: Represent compound data using Python lists, tuples, and dictionaries.
- CO5: Read and write data from/to files in Python Programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016. (<http://greenteapress.com/wp/think-python/>)
2. Guido van Rossum and Fred L. Drake Jr, -"An Introduction to Python" – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCE BOOKS:

1. John V Guttag, -"Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, -"Introduction to Programming in Python: An Inter-Disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, -Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, - "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
5. Charles Dierbach, - "Introduction to Computer Science using Python: A Computational Problem"- Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, - "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Develop algorithmic solutions to simple computational problems	2		1		2		2		1		1	2	1	2	2
CO 2	Read, write, execute by hand simple Python programs		1	2	1		1		1	2	2		1		1	1
CO 3	Structure simple Python programs for solving problems and decompose into functions		1	2	1		1		1	2	2		1		1	1
CO 4	Represent compound data using Python lists, tuples, and dictionaries	2		1		2		2		1		1	2	1	2	2
CO 5	Read and write data from/to files in Python Programs	2		1		2		2	3	1		1	2	1	2	2

122CMT06	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
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COURSE OBJECTIVES:

- To gain the knowledge in surveying and construction materials.
- To understand the building structures.
- The student should familiar with foundry, welding and forging processes.
- To know the working of IC engines and Boilers.
- To gain the knowledge about sources of energy and refrigeration.

PART-A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 09

Surveying: Objects, types, classification, principles, measurements of distances, angles, leveling, determination of areas, illustrative examples.

Civil Engineering Materials: Bricks, stones, sand, cement, concrete, steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 10

Foundations: Types, Bearing capacity, Requirement of good foundations.

Superstructure: Brick masonry, stone masonry, beams, columns, lintels, roofing, flooring, plastering, Mechanics, Internal and external forces, Stress, Strain, Elasticity, Types of Bridges and Dams, Basics of Interior Design and Landscaping.

PART-B – MECHANICAL ENGINEERING

UNIT III FOUNDRY WELDING AND FORGING 10

Foundry: Introduction - Patterns –materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. Welding: Definition and Classification, Gas welding, Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding - Classification, Spot welding and Seam welding. Soldering, Definition and Classification. Brazing – Definition and Classification. Forging: Types of Forging, Differences between Hot working and Cold working processes.

UNIT IV IC ENGINES & BOILERS 08

Internal combustion engines, Working principle of Petrol and Diesel Engines, Four stroke and Two stroke cycles, Comparison of four stroke and two stroke engines, Boilers: Introduction of boilers, classification, Lancashire boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories and applications (no sketches).

UNIT V SOURCE OF ENERGY & REFRIGERATION 08

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy, hydro power plant. Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigeration system, Layout of typical domestic refrigerator, Window and Split type room Air conditioner.

TOTAL HOURS:45

COURSE OUTCOMES:

The students will have an ability to

CO1: Explain the usage of construction material and proper selection of construction materials.

CO2: Design building structures.

CO3: Gain knowledge on manufacturing processes like foundry, welding and forging.

CO4: Demonstrate working principles of petrol and diesel engine and the components used in power plants.

CO5: Explain the components of Refrigeration and Air conditioning cycle.

TEXT BOOKS:

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical", S.S.Publishers, 2014.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2018.

REFERENCE BOOKS:

1. Shanmugasundaram. S and Mysamy. K, "Basics of Civil and Mechanical Engineering", Cenage Learning India Pvt. Ltd, New Delhi, 2012.
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd, 3rd Edition reprint, 2013.
3. Gopalakrishna K R, "Elements of Mechanical Engineering", Subhas Publications, Bangalore, 2008.
4. Khanna O.P, Foundry Technology, Dhanpat Rai Publishing Co. (P) Ltd, 2011.
5. Venugopal.K and Prabhu Raja.V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2015.
6. Shantha Kumar S R J, "Basic Mechanical Engineering", Hi-Tech Publications, Mayiladuthurai, 2001.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Explain the usage of construction material and proper selection of construction materials		1	2	1		1		1	2	2		1		1	1
CO 2	Design building structures	2		1		2		2		1		1	2	1	2	2
CO 3	Gain knowledge on manufacturing processes like foundry, welding and forging	2		1		2		2		1		1	2	1	2	2
CO 4	Demonstrate working principles of petrol and diesel engine and the components used in power plants		1	2	1		1		1	2	2		1		1	1
CO 5	Explain the components of Refrigeration and Air conditioning cycle	2		1		2		2		1		1	2	1	2	2

UNIT I LANGUAGE AND LITERATURE**3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature- Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS**3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS**3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS**TEXT BOOKS:**

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by :International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi)
(Published by: International Institute of Tamil Studies.)
5. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly
Published by:Department of Archaeology & Tamil Nadu Text Book and
Educational Services Corporation,Tamil Nadu)
6. Studies in the History of India with Special Reference to Tamil Nadu
(Dr.K.K.Pillay) (Published by: The Author)

COURSE OBJECTIVES:

- To understand the practical concepts of interference and diffraction.
- To understand the concept of velocities of sound in different liquids.
- To get better knowledge of modulus of elasticity.
- To understand the concepts of thermal conductivity.
- To understand the concept of viscosity of liquids.

LIST OF EXPERIMENTS

1. (a) Determination of laser Parameters-Wavelength.
(b) Particle size determination using diode laser.
1. Determination of Young's modulus of the material- uniform bending.
2. Determination of (i) the moment of inertia of the disc and (ii) the rigidity modulus of the material of a wire.
3. Determination of thickness of a thin Wire-Air wedge method.
4. Determination of velocity of sound and compressibility of liquid- Ultrasonic interferometer.
5. Determination of wavelength of mercury spectrum-spectrometer grating.
6. Determination of Young's modulus of the material-Non uniform bending.
7. Determination of viscosity of liquid-Poiseuille's method.
8. Determination of acceleration due to gravity 'g' – Compound pendulum.
9. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
10. Determination of wavelength of monochromatic light – Newton's ring method.

COURSE OUTCOMES:

At the end of the course students will be able to:

1. Understand the moduli of elasticity of various materials.
2. Understand the phenomenon of diffraction and interference of light using optical components.
3. Acquire knowledge of viscosity and compressibility of various liquids.
4. Understand the concept of heat transfer through conductors and bad conductors using Lee's disc.
5. Acquire knowledge about acceleration due to gravity.

COURSE OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

LIST OF PROGRAMS:

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers and largest number in a list using functions
7. Finding factorial of a given number using recursive function.
8. Take a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Programs that take command line arguments (word count)
15. To import specific items from a library module.
16. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL HOURS: 45**COURSE OUTCOMES:**

Upon completion of the course, students will be able to:

- CO1: Write, test, and debug simple Python programs.
CO2: Implement Python programs with conditionals and loops.
CO3: Develop Python programs step-wise by defining functions and calling them.
CO4: Use Python lists, tuples, dictionaries for representing compound data.
CO5: Read and write data from/to files in Python

LIST OF EQUIPMENTS AND SOFTWARE FOR A BATCH OF 30 STUDENTS**Hardware:**

LAN System with 30 Nodes (OR) Stand-alone PCs -30 No's.
Printer – 3 No's.

Software:

Operating System : Linux / Windows.
Open Source Software: Python.
Database : MySQL.
Open Source Platform: XAMPP, Eclipse IDE

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Write, test, and debug simple Python programs	2		1		2		2		1		1	2	1	2	2
CO 2	Implement Python programs with conditionals and loops		1	2	1		1		1	2	2		1		1	1
CO 3	Develop Python programs step-wise by defining functions and calling them.		1	2	1		1		1	2	2		1		1	1
CO 4	Use Python lists, tuples, dictionaries for representing compound data	2		1		2		2		1		1	2	1	2	2
CO 5	Read and write data from/to files in Python	2		1		2		2	3	1		1	2	1	2	2

222ENI01

PROFESSIONAL ENGLISH-II

L	T	P	C
2	0	2	3

COURSE OBJECTIVES:

The Course prepares second semester Engineering and Technology students to:

- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.
- Present information in an appropriate oral form.
- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write anything convincingly with grammatical accuracy.
- Nurture the holistic perspective of industry readiness

UNIT I: Listening Theory

Conversation - Telephonic conversation - Class memory quiz - Interviews of famous persons - A scene from a film - Podcast - Stories - Product description - Process description

English Laboratory

Scientific lectures - Educational videos - Gap filling exercises - Presentations - Formal job interviews - Introduction to classmates - Debates - Panel discussion - INK talks

UNIT II: Speaking Theory

Exchanging personal information - Greeting - Leave taking - Introducing friends - Reporting - Role play - Describing a person/place/thing - Small talk - Celebrity interview

English Laboratory

Narrating personal experiences - Presentation - Information gap - Simulations - Find the difference - Giving and asking for directions - News brief - Alibi - Untranslatable

UNIT III: Reading Theory

Short stories: The Gift of the Magi, A Service of Love and The Last Leaf by O. Henry - Magazines - Jigsaw - Newspaper reports - Newspaper articles - Journals - Travelogues

English Laboratory

Brochures - Social media messages - Excerpts from literature - Editorials - Case studies - Critical reviews - Excerpts of interview with professionals - Technical texts - One word splash

UNIT IV: Writing

Theory

Developing hints - Note-making - Note-taking - Agenda - Advertisement - Transfer of information (Pie chart, Bar chart and Flow chart) - Précis writing and summarizing - Free writing - Short stories

English Laboratory

Letter writing - Essay writing - What if? - Poetry - Cubing - Defining technical terms - Character description - One minute paper - Feedback

UNIT V: Language Development Theory

Consonants & vowels - Phonetic transcription - British and American English - Infinitive and gerund - Types of sentences - Information and emphasis - Cause and effect - Purpose and function - Phrasal verbs

English Laboratory - Career Skills

Abbreviations and acronyms - Homonyms and homophones - Word formation - One word substitution - Compound nouns - Concord - Life etiquettes - Emotional intelligence - Notable Indian start-ups - Work ethic

TOTAL: 60 HOURS

Lab Requirements:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

COURSE OUTCOMES:

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

CO1: Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully.

CO2: Speak appropriately and effectively in varied formal and informal contexts.

CO3: Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.

CO4: Communicate the corporate and social requirements in an impressive written mode.

CO5: Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.

TEXT BOOKS:

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana. N. P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.
3. Uttham Kumar. N. Professional English - II (with work book). Sahana Publications, Coimbatore, 2023.
4. Agarwal R. S. A Modern Approach to Verbal and Non-verbal Reasoning. Chand & Co., New Delhi, 2012.
5. Ashraf Rizvi M. Effective Technical Communication. TATA McGraw Hill, New Delhi, 2007.

REFERENCES:

1. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad, 2015.
3. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, English & Communication for Colleges. Cengage Learning, USA: 2007.
6. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.
7. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi, 2014.
8. Sharon Weiner Green and Ira K. Wolf, Barron's GRE, Glagotia Publications Pvt. Ltd., 18th Edition, New Delhi, 2011.
9. Mohamed Elias, R. Gupta's IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition, New Delhi, 2016.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully	2		1		2		2		1		1	2	1	2	2
CO 2	Speak appropriately and effectively in varied formal and informal contexts	2		1		2		2	3	1		1	2	1	2	2
CO 3	Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes	2		1		2		2		1		1	2	1	2	2
CO 4	Communicate the corporate and social requirements in an impressive written mode		1	2	1		1		1	2	2		1		1	1
CO 5	Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well		1	2	1		1		1	2	2		1		1	1

COURSE OBJECTIVES:

- To impart the knowledge of basic probabilistic theory.
- To learn one dimensional discrete and continuous probability distributions occurring in natural phenomena.
- To extend the probability theory to two dimensional random variable and to study the statistical measures.
- To introduce the concept of sampling distributions and testing hypothesis techniques useful in decision making.
- To expose the statistical methods for analysis of variance and control limits.

UNIT I PROBABILITY AND RANDOM VARIABLES**9 + 3**

Axioms of probability - Conditional probability - Total probability – Baye’s theorem- Random variables - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II PROBABILITY DISTRIBUTIONS**9 + 3**

Binomial, Poisson, Geometric, Uniform, Exponential, and Normal distributions and their properties - applications.

UNIT III TWO-DIMENSIONAL RANDOM VARIABLES**9 + 3**

Joint Probability Distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Central limit theorem (Statement and applications only for independent and identically distributed random variables).

UNIT IV TESTING OF HYPOTHESIS**9 + 3**

Sampling distributions - Tests for single mean, proportion, difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-square test for Independence of attributes using contingency table and Goodness of fit.

UNIT V DESIGN OF EXPERIMENTS**9 + 3**

Analysis of variance – Completely Randomized Design (CRD) (one way classification) – Randomized Block Design (RBD) (two way classification) - Latin Square Design (LSD) - Control charts for measurements - \bar{x} chart, R-chart.

TOTAL: 45 + 15 = 60 PERIODS

Note: Use of approved statistical table is permitted in the examination.

Course outcomes

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

CO 1: Apply probability concepts in real life problems.

CO 2: Identify and design probability distribution models and interpret.

CO 3: Use the concept of two dimensional random variables that helps to understand and analyze the

statistical measures of probability functions.

CO 4: Draw inference & conclusion through hypothesis testing.

CO 5: Implement the knowledge of analysis of variance and control limits in real time applications.

TEXT BOOKS

1. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2012.
2. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishing company Limited, New Delhi, 2014.

REFERENCES

1. Spiegel, M.R, Schiller, J and Alu Srinivasan, R, "Schaum's Outlines Probability and Statistics", Tata McGraw-Hill Publishing Company Ltd. New Delhi , 2010.
2. Gupta.S.C., & Kapoor,V.K., "Fundamentals of mathematical statistics", 11th edition, Sultan Chand & Sons publishers, New Delhi, 2013.
3. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007.
4. Kandasamy.P, Thilagavathy,K., & Gunavathi.K., "Probability, Statistics and Queueing Theory", S.Chand & Company Ltd., New Delhi, 2014.
5. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill edition, New Delhi, 2014.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Apply probability concepts in real life problems.	3	3	3	1	1							2	2	2	
CO 2	Identify and design probability distribution models and interpret.	3	3	3	1	1							2	2	2	
CO 3	Use the concept of two dimensional random variables that helps to understand and analyze the statistical measures of probability functions.	3	3	3	2	2							2	2	2	
CO 4	Draw inference & conclusion through hypothesis testing.	3	3	3	2	2							2	2	2	
CO 5	Implement the knowledge of analysis of variance and control limits in real time applications.	3	3	2	2	2							2	2	2	

COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyse climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

UNIT I ENVIRONMENT AND BIODIVERSITY**6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

UNIT II ENVIRONMENTAL POLLUTION**6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

UNIT III RENEWABLE SOURCES OF ENERGY**6**

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT IV SUSTAINABILITY AND MANAGEMENT**6**

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT V SUSTAINABILITY PRACTICES**6**

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio-economical and technological change.

COURSE OUTCOMES:

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

- CO1: To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- CO2: To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
- CO3: To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
- CO4: To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
- CO5: To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38. Edition 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation	2		1		2		2		1		1	2	1	2	2
CO 2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society		1	2	1		1		1	2	2		1		1	1
CO 3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations	2		1		2		2		1		1	2	1	2	2
CO 4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development	2		1		2		2		1		1	2	1	2	2
CO 5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization	2		1		2		2		1		1	2	1	2	2

COURSE OBJECTIVES:

- To gain knowledge on graphical skills for drawing the object.
- To comprehend the principle of orthographic projection of points, lines and plane surfaces.
- To study the principle of simple solids.
- To comprehend the principle of section and development of solids.
- To comprehend the principle of Isometric and Orthographic projections.

Concepts and conventions (Not for Examination)**03**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE AND SPECIAL CURVES**09**

Conics – Construction of ellipse, Parabola and hyperbola by Eccentricity method – Construction of cycloid – Construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES**12**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS**12**

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**12**

Sectioning of simple solids like prisms, pyramids, cylinders and cones in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS**12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Representation of Three-Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

TOTAL HOURS :60

COURSE OUTCOMES

The student will be able to

- CO1: Recognize the conventions and apply dimensioning concepts while drafting simple objects.
- CO2: Draw the orthographic projection of points, line, and plane surfaces.
- CO3: Draw the orthographic projection of simple solids.
- CO4: Draw the section of solid drawings and development of surfaces of the given objects.
- CO5: Apply the concepts of Isometric and Orthographic projections in engineering practice.

TEXT BOOKS:

1. Ranganath G, "Engineering Graphics", Second Edition, Sahana Publishers, Reprint, 2021.
2. Bhatt. N.D., "Engineering Drawing" Charotar Publishing House, 53th Edition, 2014.

REFERENCE BOOKS:

1. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2017.
2. Gopalakrishnana. K. R, "Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.
3. Basant Agarwal and C.M.Agarwal, "Engineering Drawing", Tata McGraw Hill, 2013.
4. Natrajan K. V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.
5. M.B.Shaw and B.C.Rana, "Engineering Drawing", Pearson Education India, 2011.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Recognize the conventions and apply dimensioning concepts while drafting simple objects		1	2	1		1		1	2	2		1		1	1
CO 2	Draw the orthographic projection of points, line, and plane surfaces		1	2	1		1		1	2	2		1		1	1
CO 3	Draw the orthographic projection of simple solids	2		1		2		2		1		1	2	1	2	2
CO 4	Draw the section of solid drawings and development of surfaces of the given objects	2		1		2		2	3	1		1	2	1	2	2
CO 5	Apply the concepts of Isometric and Orthographic projections in engineering practice	2		1		2		2		1		1	2	1	2	2

COURSE OBJECTIVES:

- To study the principles of light, sound and ultrasound and its properties
- To study various types of spontaneous radioactive emissions and various methods of producing radionuclide's.
- To study about the non-ionizing radiation and their effects.
- To study about the mechanical characteristics of lungs and cardiopulmonary system and application of Bernoulli's principle to cardiovascular system.
- To study the various types of acute and delayed effects of radiation and the various organs affected due to the radiation

UNIT I PHYSICS OF SENSE**6**

Vision: Physics of light, Intensity of light, Threshold of vision, Visual acuity, Visual sensitivity, Colour vision. **Audition:** General properties of Sound-Physical properties of sound, Sound intensity level, Reflection and transmission of sound at barriers, Ultrasound fundamentals.

UNIT II NUCLEAR PHYSICS**6**

Principles of Nuclear Physics – Natural radioactivity, Decay series, Half-life period, type of radiation and their applications. Production of radio nuclides – Cyclotron produced Radionuclide- Reactor produced Radionuclide – fission and electron Capture reaction, Radionuclide Generator – Milking Process - Linear accelerator, Radionuclide used in Medicine and technology.

UNIT III NON-IONIZING RADIATION**6**

Non- ionizing radiation- Electromagnetic Radiation Tissue as a leaky dielectric – Relaxation Processes – Overview of non – ionizing radiation effects -Low Frequency Effect – Higher frequency effect

UNIT IV PHYSICS OF CARDIOPULMONARY SYSTEM**6**

The Airways, - blood and lung interaction – measurement of lung volume – pressure air flow volume relationships of lungs – physics of alveoli – the breathing mechanism – Major components of cardiovascular system – O₂ and CO₂ exchange in the capillary system – Physical activity of heart – transmural pressure – Bernoulli's principles applied to cardiovascular system - Blood flow – laminar and turbulent

UNIT V RADIATION EFFECTS

6

Acute Radiation Effects - The concept of LD 50 – Radiation syndromes- Central nervous system syndrome - Gastro-intestinal syndrome –Bone Marrow syndrome. Delayed Effects of Radiation - Stochastic and Deterministic effects – Late Deterministic effect in different organs and tissues.

TOTAL HOURS: 30 PERIODS

COURSE OUTCOMES:

Upon Completion of this course, students will be able to:

CO1: Study the principles of light, sound and ultrasound and its properties

CO2: Understand the various types of spontaneous radioactive emissions and various methods of producing radionuclides.

CO3: Understand the about the non-ionizing radiation and their effects

CO4: Study about the mechanical characteristics of lungs and cardiopulmonary system and application of Bernoulli's principle to cardiovascular system

CO5: Understand the various radiation effects on human body

TEXT BOOKS:

1. B.H Brown, PV Law ford, R H Small wood , D R Hose , D C Barber , “Medical Physics and Biomedical Engineering”, Taylor & Francis, 1999.
2. Gopal B.Saha “Physics and Radiobiology of Nuclear Medicine” Springer, 4th edition, 2012.

REFERENCE BOOKS:

1. John R. Cameron and James G. Skofronick, “Medical Physics”, John–Wiley & Sons, 1992.
2. P.Uma Devi, A. Nagarathnam, B S Satish Rao, “Introduction to Radiation Biology” B.I.Churchill Livingstone Pvt Ltd, 2000.

COURSE OBJECTIVES:

1. Analyse the electrical circuits using different theorems
2. Gain the knowledge on the principle and operation of Transformers, DC Machines and Special Machines
3. Understand the concept of Semiconductor Diodes and Regulated Power supplies
4. Gain the knowledge of different configurations of transistors and their characteristics
5. Obtain the knowledge on concept of special semiconductor diodes and display devices

UNIT – I CIRCUIT ANALYSIS TECHNIQUES**12**

Ohm's Law, Kirchhoff's current and voltage laws – series and parallel connection of independent sources – R, L and C. Mesh & Nodal analysis, Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

UNIT - II ELECTRICAL MACHINES**12**

Principle - Theory of ideal transformer - Construction details of shell and core type transformers - Construction and working principle of D.C. Machines - Constructional features of stepper motor – Principle of operation – Variable reluctance motor – Hybrid motor – Switched reluctance motor – Brushless D.C motor -Permanent magnet synchronous motor - Repulsion type motor – Universal motor – Hysteresis motor.

UNIT – III SEMICONDUCTOR DIODES AND REGULATED POWER SUPPLIES**12**

Review of intrinsic & extrinsic semiconductors: Theory of PN junction diode – Energy band structure – Diode Equation and I-V characteristics, Zener diode – characteristics, Reverse saturation current, Zener and avalanche breakdown. Voltage regulator: Block diagram of regulated power supply, Line and Load regulation, Zener diode as voltage regulator.

UNIT-IV TRANSISTORS**12**

Principle of operation of PNP and NPN transistors – Study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation –comparison of BJT with MOSFET.

UNIT - V SPECIAL SEMICONDUCTOR DIODES AND DISPLAY DEVICES**12**

Special semiconductor diodes: Varactor diode, Tunnel diode, PIN diode, SCR characteristics. Display Devices: LED, LCD and solar cell, 7-segment display, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells , Optocouplers.

LIST OF EXPERIMENTS:

1. Study of Electronic Components, Equipment and colour coding of Resistors.
2. Verification of KVL and KCL
3. Verification of Thevenin and Norton Theorems.
4. Verification of superposition Theorem.

5. Verification of Maximum power transfer Theorem.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of SCR
10. Characteristics of JFET and MOSFET.

TOTAL HOURS: 60 PERIODS

COURSE OUTCOMES:

Upon Completion of this course, students will be able to:

CO1: Analyse the electrical circuits using different techniques

CO2: Extend the principle of Transformers, DC Machines and Special Machines on their operation

CO3: Illustrate the characteristics of semiconductor diodes and Power supplies

CO4: Identify the configuration and working of transistors.

CO5: Compute the characteristics of special semiconductor diodes and display devices

TEXT BOOKS:

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai & Sons, New Delhi, 2020.
2. S. Salivahanan, N. Suresh kumar and A. Vallavaraj, "Electronic Devices and Circuits", 4th Edition, 2012.
3. Nagrath.I.J. & Kothari.D.P, "Electrical Machines", Tata McGraw-Hill, New Delhi, 5th Edition, 2012

REFERENCE BOOKS:

1. Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill, First Edition, 2019.
2. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.
3. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Edition, 2006.
4. William H. Hayt, J.V. Jack, E. Kemmebly and Steven M. Durbin, "Engineering Circuit Analysis", TMH, 6th Edition, 2002.
5. J. Millman & Halkins, Satyabranta Jit, "Electronic Devices & Circuits", TMH, 2nd Edition, 2008.
6. Theraja, B.L., "A Text book of Electrical Technology", Vol.II, S.C Chand and Co., New Delhi, 2007.

COURSE OUTCOMES		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Analyse the electrical circuits using different techniques	3	3	3	3	1				1			1	1	2	2
CO2	Extend the principle of Transformers, DC Machines and Special Machines on their operation	3	2	3	3								1	1	2	2
CO3	Illustrate the characteristics of semiconductor diodes and Power supplies	3	2	3	3	1				1			1	1	2	2
CO4	Identify the working of transistors	3	2	3	3	1				1			1	1	2	2
CO5	Categorize the special semiconductor diodes and display devices	3	2	3	3	1				1			1	1	2	2

COURSE OBJECTIVES:

Students will be conversant with the estimation of various compounds using volumetric and instrumental analysis.

LIST OF EXPERIMENTS

1. Estimation of Total hardness by EDTA
2. Determination of percentage of calcium in Lime Stone by EDTA
3. Estimation of chloride in water sample
4. Estimation of alkalinity of Water sample
5. Determination of DO in Water (Winkler's Method)
6. Determination of Rate of Corrosion of the given steel specimen by weight loss method (Without inhibitor)
7. Determination of Rate of Corrosion of the given steel specimen by weight loss method (With inhibitor)
8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using BaCl_2 vs Na_2SO_4
11. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$)
12. PH titration (acid & base)
13. Determination of water of crystallization of a crystalline salt -Copper sulphate
14. Preparation of Bio-Diesel by Trans etherification method.

A minimum of TEN experiments shall be offered.

COURSE OUTCOMES:

- CO1: Carry out the volumetric experiments and improve the analytical skills.
- CO2: Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering.
- CO3: Understand the principle and handling of electrochemical instruments and Spectrophotometer.
- CO4: Apply their knowledge for protection of different metals from corrosion by using different inhibitors

REFERENCE BOOKS:

1. Arthur I. Vogel's, "Quantitative Inorganic Analysis including Elementary Instrumental Analysis", ELBS, Group, 7th Edition, 2000.
2. Dr. K .Sivakumar, "Engineering Chemistry lab manual", S.S publishers, 2022.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Carry out the volumetric experiments and improve the analytical skills		1	2	1		1		1	2	2		1		1	1
CO 2	Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering		1	2	1		1		1	2	2	3	1		1	1
CO 3	Understand the principle and handling of electrochemical instruments and Spectrophotometer	2		1		2		2		1		1	2	1	2	2
CO 4	Apply their knowledge for protection of different metals from corrosion by using different inhibitors	2		1		2		2		1		1	2	1	2	2

COURSE OBJECTIVES:

- To get the knowledge on welding techniques and sheet metal operation.
- To know the principle involved in plumbing work and in carpentry work.
- To know about wiring various electrical joints in common household electrical and wire work.
- To know about the working procedure of electrical appliances.
- To get the knowledge about basics of electronics and to know the characteristics of switching devices.

PART –A (MECHANICAL)**LIST OF EXPERIMENTS WELDING:**

Study of Electric Arc welding equipment's.

Preparation of welding joints:

i) Butt joint ii) Lap joint iii) T - joint.

SHEET METAL WORK:

Study of sheet metal tools and operations

Preparation of sheet metal models: i) Rectangular Tray ii) Funnel

PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

Preparation of plumbing models: Basic pipe connections with PVC and GI pipe fittings.

CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

Preparation of carpentry models:

i) Lap joint ii) Dovetail joint iii) T-Joint

PART B (ELECTRICAL AND ELECTRONICS)**LIST OF EXPERIMENTS**

1. Introduction to House Wiring.
2. Staircase Wiring.
3. Fluorescent lamp Wiring.
4. Measurement of single phase energy meter.
5. Measurement of Power, Power factor by using two- wattmeter Method.
6. Study of Electrical iron box and fan with regulator.
7. Characteristics of SCR and Diode
8. Introduction to color coding of resistor.

COURSE OUTCOMES:*The students will be able to*

CO1: Weld various joints in steel plates using arc welding work; Assemble simple mechanical assembly of common household equipment's; Make a tray out of metal sheet using sheet metal work.

CO2: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work

CO3: Wire various electrical joints in common household electrical wire work.

CO4: Basic knowledge about electrical appliances.

CO5: Basic knowledge about electronics devices.

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Weld various joints in steel plates using arc welding work; Assemble simple mechanical assembly of common household equipment's; Make a tray out of metal sheet using sheet metal work		1	2	1		1		1	2	2		1		1	1
CO 2	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work	2		1		2		2		1		1	2	1	2	2
CO 3	Wire various electrical joints in common household electrical wire work	2		1		2		2		1		1	2	1	2	2
CO 4	Basic knowledge about electrical appliances		1	2	1		1		1	2	2		1		1	1
CO 5	Basic knowledge about electronics devices		1	2	1		1		1	2	2		1		1	1

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322MAT01	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	3	1	0	4

Category: Basic Science

COURSE OBJECTIVES

- To learn various methods to solve the partial differential equations.
- To introduce Fourier series analysis which plays a vital role in many applications in engineering.
- To understand the boundary value problems and to obtain the solution using partial differential equations.
- To acquaint the Fourier transform techniques used in wide variety of situations.
- To develop z-transform techniques which analyze the discrete time signals.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9+3

Solutions of first order partial differential equations-Standard types-Singular solutions-Lagrange’s Linear equation- Method of grouping and Method of multipliers-Solution of homogeneous and non-homogenous linear equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 9+3

Dirichlet’s conditions – General Fourier series – Change of scale - Odd and even functions – Half-range Sine and Cosine series – Parseval’s identity applications – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS 9+3

Classification of Partial Differential Equations – Method of separation of Variables – Solutions of one dimensional wave equations and One-dimensional heat equations –Applications using Fourier series solutions in Cartesian coordinates - Steady state solution of two-dimensional heat equation.

UNIT IV FOURIER TRANSFORMS 9+3

Fourier integral theorem – Fourier transform pair - Sine and Cosine transforms – Properties – Fourier Transform of simple functions – Convolution theorem (statement and applications only) – Parseval’s identity (statement and applications only).

UNIT V Z – TRANSFORMS 9+3

Z-Transform - Elementary properties and applications – Initial and final value theorems (statement and applications only) - Inverse Z-Transform – Partial fractions method, Residue theorem method and Convolution theorem (statement and applications only) - Solution of difference equations by applying Z-transforms.

TOTAL: 45+15=60 PERIODS

COURSE OUTCOMES

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

- CO 1: Know the methods to solve partial differential equations occurring in various physical and engineering problems.
- CO 2: Describe an oscillating function which appears in a variety of physical problems by Fourier series which helps them to understand its basic nature deeply.
- CO 3: Acquire the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods.
- CO 4: Apply the Fourier transform techniques in engineering field.
- CO 5: Gain the concept of analysis of linear discrete system using Z-transform approach.

TEXT BOOK

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 44th edition, 2017.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition Wiley India, 2016.

REFERENCES

1. Andrews L.C and Shivamoggi. B.K., "Integral Transforms for Engineers", SPIE Press Book, 1999
2. Wylie C R and Barrett L C, "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Co., New Delhi, 1995.
3. T.Veerarajan,"Engineering Mathematics-III", Tata McGraw-Hill Publishing company, New Delhi,2015.
4. P.Kandasamy, K.Thilagavathy, K.Gunavathy, " Engineering Mathematics-III", S.Chand Publishers,2015.
5. V.Prameelakaladharan and G.Balaji ,"Engineering Mathematics-III", Amrutha marketing, Chennai,2016.

COURSE OUTCOMES		P	P	P	P	P	P	P	P	P	P	P	PS	PS	PS	
		O	O	O	O	O	O	O	O	O	O	O	O	O	O	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Know the methods to solve partial differential equations occurring in various physical and engineering problems.	3	2	2									2	2	2	
CO2	Describe an oscillating function which appears in a variety of physical problems by Fourier series which helps them to understand its basic nature deeply.	3	3	2									2	2	2	
CO3	Acquire the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods.	3	3	3									2	2	2	
CO4	Apply the Fourier transform techniques in engineering field.	3	2	2									2	2	2	
CO5	Gain the concept of analysis of linear discrete system using Z-transform approach.	3	2	2									2	2	2	

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322BMT02	BIOCHEMISTRY	3	0	0	3

Category: Professional Core

Pre-requisites: Engineering Chemistry

COURSE OBJECTIVES:

- To have a sound knowledge on classification, structure and properties of carbohydrates
- To know about the overview of classification and functions of lipids and fatty acids
- To understand the structure and classification of amino acids and proteins
- To gain knowledge on nucleosides and nucleotides
- To summarize the types and applications of hormones and vitamins

UNIT I CARBOHYDRATES 9

Introduction to carbohydrate, Classification of carbohydrates -Structural aspects of monosaccharides, Structure of glucose, Reactions of Monosaccharides, Glycosides, Derivatives of Monosaccharides, Disaccharides-Maltose, Lactose and Sucrose, Polysaccharides-Homopolysaccharides, Heteropolysaccharides

UNIT II LIPIDS AND FATTY ACIDS 9

Lipids-Classification and functions, Phospholipids, Glycolipids, Amphipathic lipids, Fatty acids-Nomenclature of fatty acid, Essential fatty acid, Triacylglycerols - Properties of triacylglycerol

UNIT III AMINO ACIDS AND PROTEINS 9

Amino Acids-Introduction to amino acid, Structure and classification of amino acid, Properties of amino acids, **Proteins**-Structure, properties and classification of proteins, Lipoproteins, Glycoprotein and Nucleoprotein, Denaturation, Biologically important peptides

UNIT IV NUCLEIC ACIDS 9

Nucleic acids- Structure and functions of Nucleotides, Difference between nucleotide and nucleoside, Structure of DNA-DNA double helix (Watson and crick) model, Types of DNA, Structure of RNA and its types.

UNIT V VITAMINS AND HORMONES 9

Vitamins-Nomenclature of vitamins, Classification of vitamins-Vitamin A, Vitamin D, Vitamin E, Vitamin K, Vitamin C, Thiamine (Vitamin B1), Cobalamin (Vitamin B12), **Hormones**-Overview of hormones, Classification of hormones-Hypothalamic and pituitary hormones, Thyroid hormones, GUT hormones, Hormones of adrenal cortex, hormones of adrenal medulla.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the structure and types of carbohydrates

CO2: Gain knowledge on classification and functions of lipids and fatty acids

CO3: Understand the properties of proteins and amino acids

CO4: Gain knowledge on structure of DNA, RNA

CO5: Know about the overview of the hormones and vitamins

TEXT BOOKS:

1. Satyanarayana U., Chakrapani U., "Biochemistry", Elsevier, 6th edition, 2021.
2. Albert L. Lehninger , "Principles of Biochemistry", W. H. Freeman publication, 7th edition, 2017.

REFERENCE BOOKS:

1. Keith Wilson & John Walker, "Practical Biochemistry - Principles & Techniques", Oxford University Press, 2009.
2. Pamela.C.Champe & Richard.A.Harvey, "Lippincott Biochemistry Lippincott's Illustrated Reviews", Raven publishers, 2005.

COURSE OUTCOMES		P	P	P	P	P	P	P	P	P	P	P	PS	PS	PS	
		O	O	O	O	O	O	O	O	O	O	O	O	O	O	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Explain the structure and types of carbohydrates	3	2				2							3	1	1
CO2	Gain knowledge on classification and functions of lipids and fatty acids	3	2		1		1							3	1	1
CO3	Understand the properties of proteins and amino acids	3	2		1		1							3	1	1
CO4	Gain knowledge on structure of DNA, RNA	3	2		1		1							3	1	1
CO5	Know about the overview of the hormones and vitamins	3	2		1		1							3	1	1

Sensory Organs: Anatomy of the Eye and Ear.

LIST OF EXPERIMENTS

1. Collection of Blood Samples
2. Identification of Blood groups
3. Bleeding and Clotting time
4. Estimation of Hemoglobin
5. Total RBC and WBC Count
6. Differential count of Blood cells
7. Estimation of ESR, PCV, MCH, MCV, MCHC
8. Hearing test – Tuning fork
9. Visual Activity – Snellen’s Chart and Ishihara chart

TOTAL HOURS: (THEORY: 45 + LAB:30) 75 PERIODS

COURSE OUTCOMES:

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

- CO1: Compare the importance of transport of substances across the cell membrane and tissue types.
- CO2: Explain the knowledge of blood components in blood grouping, structure and functions of cardiac system.
- CO3: Identify the function of respiratory, digestive system and physiology of kidney.
- CO4: Enumerate the significance of, various types of bones and muscles.
- CO5: Illustrate the physiological process of Nervous system, image formation and vision, sound perception and different types of deafness in the ears.

TEXT BOOKS:

1. Essential of human Anatomy and Physiology, Elaine.N.Marieb, Eighth edition, Pearson Education New Delhi ,2021.
2. Ross & Wilson Anatomy and Physiology in Health and Illness, Anne Waugh & Allison Grant, Fourteenth Edition, Elsevier, 2022.

REFERENCE BOOKS:

1. Review of Medical Physiology, William F.Ganong, 22nd edition, Mc Graw Hill, New Delhi,2010.
2. Text book of Physiology, Prof. A.K. Jain, Tenth edition, Volume I and II, Avichal Publishing company, New Delhi,2023.
3. Essentials of Medical Physiology, K.Sembulingam and Prema Sembulingam, 8th edition, Jaypee Publications,2019.

COURSE OUTCOMES		P	P	P	P	P	P	P	P	P	P	P	PS	PS	PS	
		O	O	O	O	O	O	O	O	O	O	O	O	O	O	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Compare the importance of transport of substances across the cell membrane and tissue types.	2	3	3	2		2	1					2	3	1	1
CO2	Enumerate the significance of, various types of bones and muscles.	2	3	3	2		2	1					2	3	1	1
CO3	Explain the knowledge of blood components in blood grouping, structure and functions of cardiac system.	2	3	3	2		2	1					2	3	1	1
CO4	Identify the function of respiratory, digestive system and physiology of kidney.	2	3	3	2		2	1					2	3	1	1
CO5	Illustrate the physiological process of Nervous system, image formation and vision, sound perception and different types of deafness in the ears.	2	3	3	2		2	1					2	3	1	1

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322CST04	C PROGRAMMING AND DATA STRUCTURES	3	0	0	3

Category: Engineering Science

Pre-requisites: Nil

COURSE OBJECTIVES:

- Familiarize the basic programming concepts in C.
- Solve real time problems using functions, structure and union.
- Impart the basic concepts of linear data structures.
- Solve problem using nonlinear data structures.
- Identity the various Sorting, Searching and hashing algorithms.

UNIT I C PROGRAMMING BASICS

9

Structure of a C program - compilation and linking processes - Constants, Variables – DataTypes - Expressions using operators in C - Managing Input and Output operations - Decision Making and Branching - Looping statements. Arrays - Initialization - Declaration - One dimensional and Two-dimensional arrays. Strings - String operations - String Arrays.

UNIT II FUNCTIONS, POINTERS, STRUCTURES AND UNIONS

9

Functions - Pass by value - Pass by reference - Recursion - Pointers - Initialization - Pointers arithmetic. Structures and unions - Structure within a structure - Union - Files- Operations on Files- Memory Management

UNIT III LINEAR DATA STRUCTURES

9

Abstract Data Types - Linked list Implementation of List- polynomial addition- Linked List Implementation of Stack- Balancing Symbols - Postfix Expressions - Infix to Postfix Conversion - Linked list Implementation of Queues- Circular Queue

UNIT IV NON LINEAR DATA STRUCTURES

9

Preliminaries -Binary Trees -Tree Traversals - Binary Search Tree -Operations on Binary Search Tree - Heaps - Binary Heaps - Operations of Heaps - Graph and its representations -Graph Traversals -Shortest Path Algorithm: Dijkstra’s Algorithm- Minimum Spanning Tree: Prim’s Algorithm – Kruskal’s Algorithm.

UNITV SEARCHING, SORTING AND HASHING

9

Linear Search - Binary Search -Bubble Sort - Insertion Sort - Quick Sort - Merge Sort - Hash Functions - Separate Chaining -Open Addressing

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Summarize the basic concepts of C

CO2: Develop programs for real-time application using functions, structures, union

CO3: Gain knowledge on operations of linear data structures

CO4: Develop applications using nonlinear data structures

CO5: Apply appropriate sorting, searching technique for given problem.

TEXT BOOKS:

1. ReemaThareja, "Programming in C", Second Edition, Oxford University Press, 2016.
2. Ashok.N. Kamthane, - "Computer Programming", Pearson Education, Second edition(India), 2012
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education,1997.

REFERENCES:

1. Paul J. Deitel, Harvey Deitel, "C How to Program", Seventh Edition, Pearson Education, 2013.
2. PradipDey and Manas Ghosh, —Programming in C, Second Edition, Oxford University Press, 2011.
3. E. Balagurusamy, - "Computing fundamentals and C Programming", Tata McGraw-Hill Publishing Company Limited, 2008.
4. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008

Course Code	Course Title	Hours/week			Credits
		L	T	P	
322BMT05	SIGNALS AND SYSTEMS FOR BIOMEDICAL ENGINEERING	3	0	0	3

Category: Professional Core

Pre-requisites: Nil

COURSE OBJECTIVES:

- To understand the classification of signals and systems
- To analyze the CT periodic and aperiodic signals using CT Fourier and Laplace transform methods.
- To understand the characterization of total response, impulse response and frequency response of LTI CT systems.
- To analyze discrete Time Fourier Transforms and Z transform for the discrete time signals and systems.
- To acquire the knowledge on Biomedical signals and its difficulties

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous Time signals (CT signals), Discrete Time signals (DT signals) - Step, Ramp, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, Energy and power, even and odd, Deterministic and Random signals, Transformation on Independent variables -CT systems and DT systems, Properties of Systems – Linearity, Causality, Time Invariance, Stability.

UNIT II ANALYSIS OF CT SIGNALS 9

Fourier Series Analysis, Continuous Time Fourier Transform and Laplace Transform in Signal Analysis, Properties of Fourier Transform, Laplace Transform-ROC, Parseval's Theorem, Sampling Theorem and Aliasing.

UNIT III LTI-CT SYSTEMS 9

Differential equations-Total Response- Fourier Transform & Laplace Transform, Impulse response, Convolution Integral, Frequency response.

UNIT IV ANALYSIS OF DT SIGNALS AND SYSTEMS 9

Discrete Time Fourier Transform (DTFT), Z-Transform in signal analysis, Z-transform-Properties-ROC and Inverse Z Transform-Partial Fraction-Long Division, Difference equations, Total Response-Z- Transform, Impulse response, Convolution sum

UNIT V BIOMEDICAL SIGNALS AND ANALYSIS 9

The nature of Biomedical Signals, **Origin of Biosignals** - Electroneurogram (ENG), Electromyogram (EMG), Electrocardiogram (ECG), Electroencephalogram (EEG), Event related potentials (ERPs), Electrogastragram (EGG), Phonocardiogram (PCG), Goals of Biomedical Signal Analysis, Challenges in Biomedical Signal Analysis.

COURSE OUTCOMES:

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

CO1: Categorize the properties and representation of discrete and continuous time signals.

CO2: Analyze the continuous time signal using Fourier and Laplace transform.

CO3: Determine total response, impulse response and frequency response of LTI-CT systems

CO4: Analyze the discrete time signals and systems using Discrete Time Fourier Transforms and Z transform

CO5: Categorize the biomedical signals and their inference

TEXT BOOKS:

1. Allan V. Oppenheim, Alan S.Willsky with S.HamidNawab, "Signals and Systems", 2nd edition. Pearson Education, 2015.
2. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, 3rd Edition TMH 2018.
3. Rangaraj M. Rangayyan, "Biomedical Signal Analysis", 2nd Edition, John Wiley & Sons, 2015.

REFERENCE BOOKS:

1. Lathi B.P, Signals Systems & Communications, B S Publications, Hyderabad, 2008.
2. Simon Haykin and Barry Van Veen, "Signals and Systems", John Willey, 2007
3. K.Lindner, "Signals and Systems", McGraw Hill International, 1999
4. Michael J Roberts, "Fundamentals of Signals and Systems" Tata McGraw Hill, 2007.
5. Moman H. Hays, "Digital Signal Processing", Schaum's outlines, Tata McGraw Hill Co Ltd., 2004.

COURSE OUTCOMES		P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2	PS O3
CO1	Categorize the properties and representation of discrete and continuous time signals.	3	3	2	2									1	3	1
CO2	Analyze the continuous time signal using Fourier and Laplace transform	3	3	2	2									1	3	1
CO3	Determine total response, impulse response and frequency response of LTI-CT systems	3	3	2	2									1	3	1
CO4	Analyze the discrete time signals and systems using Discrete Time Fourier Transforms and Z transform	3	3	2	2									1	3	1
CO5	Categorize the biomedical signals and their inference		3	2	2		2	1	2					1	3	1

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322BMT06	COMMUNICATION ENGINEERING	3	0	0	3

Category: Professional Core

Pre-requisites: Nil

COURSE OBJECTIVES:

The student should be made to:

- Understand the various analog modulation and demodulation techniques
- Study the various analog techniques
- Study the different coding techniques
- Study the recent trends in wireless technology

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – Angle modulation – PM and FM – Modulators and Demodulators

UNIT II RECEIVER CHARACTERISTICS 9

Coherent receivers – Costas receiver – Single tuned receivers – Super heterodyne receivers, Noise sources and types.

UNIT III INFORMATION SOURCE CODING 9

Measure of information – Entropy – Source coding theorem – Discrete memory less channels – lossless, deterministic, noiseless, - Channel capacity – Shannon Fano coding, Huffman Coding, run length coding.

UNIT IV BANDPASS SIGNALING 9

Geometric representation of signals – Correlator and matched filter – BPSK, BFSK, QPSK – Principles of QAM — BFSK, DPSK

UNIT V WIRELESS COMMUNICATION SYSTEMS 9

Commercial Cellular / 3G networks, Overview of SATCOM, SOTM, wireless sensor networks, wireless personal area networks : Body LAN-Bluetooth, Zigbee-Wireless LANs, Internet-Wifi-WiMax, 4G,5G networks.

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

CO1: Classify the modulation and demodulation techniques.

CO2: Illustrate the receiver characteristics.

CO3: Examine coding and decoding methods.

CO4: Analyze different phase shift keying techniques.

CO5: Summarize the recent trends in wireless technology.

TEXT BOOKS

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" Fourth Edition, Tata McGraw Hill, India, 2017
2. S. Haykin "Digital Communication Systems", Fourth Edition, John Wiley, 2022
3. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2012

REFERENCES

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", Oxford University Press, 5th Edition, 2019
2. H P Hsu, Schaum "Analog and Digital Communications, Outlines", TMH, 2017
3. B.Sklar, "Digital Communications Fundamentals and Applications", Pearson Education, 2nd Edition, 2021.

COURSE OUTCOMES		P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2	PS O3
CO1	Classify the modulation and demodulation techniques	3	2	2	2	1						1				1
CO2	Illustrate the receiver characteristics	3	2	2	2	1						1				1
CO3	Examine coding and decoding methods	3	3	2	2	1										1
CO4	Analyze different phase shift keying techniques	3	2	2	2	1										1
CO5	Elaborate the recent trends in wireless technology	3		2	2	1						2				1

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322CSP07	C PROGRAMMING AND DATA STRUCTURES LAB	0	0	2	1

Category: Engineering Science

Pre-requisites: Nil

COURSE OBJECTIVES:

- Understand and implement basic data structures using C
- Apply linear and non-linear data structures in problem solving
- Learn to implement functions and recursive functions by means of data structures
- Implement searching and sorting algorithms.

LIST OF EXERCISES:

1. Basic C Programs – Looping, Decision- Making
2. Programming using Arrays and String functions
3. Programming using Functions and Recursion
4. Programs using Structures and Union
5. Program using Pointers
6. Program using Memory Management Functions
7. Linked list implementation of List, Stacks and Queues
8. Implementation of Tree Traversals
9. Implementation of Binary Search trees
10. Implementation of Graph Traversals
11. Implementation of Shortest Path Algorithm
12. Implementation of Linear search and binary search
13. Implementation of Insertion sort, Quick sort and Merge Sort

TOTAL HOURS: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Implement basic and advanced programs in C

CO2: Implement functions and recursive functions in C

CO3: Apply the different Linear Data Structures for Implementing Solutions to Practical Problems.

CO4: Apply and implement Graph Data Structures for Real Time Applications.

CO5: Implement various Searching, Sorting and hashing Algorithms.

LIST OF EQUIPMENTS AND SOFTWARE FOR A BATCH OF 30 STUDENTS

Hardware:

LAN System with 30 Nodes (OR) Stand-alone PCs -30 No's.

Printer – 3 No's.

Software:

OS: Windows

Turbo C

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322BMP08	BIOCHEMISTRY LABORATORY	0	0	2	1

Category: Professional Core

Pre-requisites: Engineering Chemistry Laboratory

COURSE OBJECTIVES:

- To learn the laboratory analysis of carbohydrates, lipids and proteins qualitatively and quantitatively
- To provide basic training in biochemical techniques such as chromatography

LIST OF EXPERIMENTS:

1. Qualitative analysis of Glucose
2. Qualitative analysis of Fructose
3. Qualitative analysis of Lactose
4. Qualitative analysis of Sucrose
5. Qualitative analysis of Casein
6. Qualitative analysis of Albumin
7. Qualitative analysis of lipids
8. Preparation of serum and plasma from blood.
9. Estimation of blood glucose.
10. Separation of amino acids using paper chromatography.

TOTAL HOURS: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Demonstrate a qualitative and quantitative understanding of major biomolecules such as carbohydrates, lipids and proteins

CO2: Prepare serum and plasma from blood.

CO3: Estimate the blood glucose, serum cholesterol, serum protein and creatinine

CO4: Recognize and explain the basic features of chromatography.

COURSE OUTCOMES		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Demonstrate a qualitative and quantitative understanding of major biomolecules such as carbohydrates, lipids and proteins.	3	3	2					3					2	2	3
CO2	Prepare serum and plasma from blood.	3	3	2					3					2	2	3
CO3	Estimate the blood glucose, serum cholesterol, serum protein and creatinine	3	3	2					3					2	2	3
CO4	Recognize and explain the basic features of chromatography	3	3	2	3				3					2	1	3

Course Code	Course Title	Hours/week			Credits
		L	T	P	C
322MEP09	PROFESSIONAL DEVELOPMENT	0	0	2	1

Category: Employability Enhancement Course

Pre-requisites: Nil

COURSE OBJECTIVES:

To be proficient in important Microsoft Office tools: MS WORD, EXCEL, POWERPOINT.

- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD:

10 Hours

1. Create and format a document Working with tables
2. Working with Bullets and Lists
3. Working with styles, shapes, smart art, charts
4. Inserting objects, charts and importing objects from other office tools
5. Creating and Using document templates
6. Inserting equations, symbols and special characters
7. Working with Table of contents and References, citations Insert and review comments
8. Create bookmarks, hyperlinks, endnotes footnote Viewing document in different modes
9. Working with document protection and security
10. Inspect document for accessibility

MS EXCEL:

10 Hours

1. Create worksheets, insert and format data
2. Work with different types of data: text, currency, date, numeric etc.
3. Split, validate, consolidate, Convert data
4. Sort and filter data
5. Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,)
6. Work with Lookup and reference formulae

7. Create and Work with different types of charts Use pivot tables to summarize and analyse data
8. Perform data analysis using own formulae and functions
9. Combine data from multiple worksheets using own formulae and built- in functions to generate results
10. Export data and sheets to other file formats
11. Working with macros
12. Protecting data and Securing the workbook

MS POWERPOINT:

10 Hours

1. Select slide templates, layout and themes
2. Formatting slide content and using bullets and numbering Insert and format images, smart art, tables, charts
- 3 Using slide master, notes and handout master
4. Working with animation and transitions Organize and Group slides
5. Import or create and use media objects: audio, video, animation
6. Perform slideshow recording and record narration and create presentable videos

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- CO1: Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
- CO2: Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
- CO3: Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.