



Jawaharlal Nehru Technological University Anantapur

(Established by Govt. of A.P., Act. No. 30 of 2008)

Ananthapuramu-515 002 (A.P) India

First Year B.Tech Course Structures and Syllabi under R20 Regulations



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTAPUR – 515 002 (A.P) INDIA

Semester-0

Induction Program: 3 weeks
(Common for All Branches of Engineering)

| S.No | Course No | Course Name | Category | L-T-P-C |
|-------------|------------------|---|-----------------|----------------|
| 1 | | Physical Activities -- Sports, Yoga and Meditation, Plantation | MC | 0-0-6-0 |
| 2 | | Career Counselling | MC | 2-0-2-0 |
| 3 | | Orientation to all branches -- career options, tools, etc. | MC | 3-0-0-0 |
| 4 | | Orientation on admitted Branch -- corresponding labs, tools and platforms | EC | 2-0-3-0 |
| 5 | | Proficiency Modules & Productivity Tools | ES | 2-1-2-0 |
| 6 | | Assessment on basic aptitude and mathematical skills | MC | 2-0-3-0 |
| 7 | | Remedial Training in Foundation Courses | MC | 2-1-2-0 |
| 8 | | Human Values & Professional Ethics | MC | 3-0-0-0 |
| 9 | | Communication Skills -- focus on Listening, Speaking, Reading, Writing skills | BS | 2-1-2-0 |
| 10 | | Concepts of Programming | ES | 2-0-2-0 |



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Food Technology

Semester - 1 (Theory - 5, Lab - 4)

| S.No | Course No | Course Name | Category | L-T-P | Credits |
|--------------|------------------|--|-----------------|--------------|----------------|
| 1. | 20A54101 | Linear Algebra and Calculus | BS | 3-0-0 | 3 |
| 2. | 20A51102T | Fundamental Chemistry | BS | 3-0-0 | 3 |
| 3. | 20A05201T | C-Programming & Data Structures | ES | 3-0-0 | 3 |
| 4. | 20A02101T | Basic Electrical & Electronics Engineering | ES | 3-0-0 | 3 |
| 5. | 20A03202 | Engineering Workshop | ES | 0-0-3 | 1.5 |
| 6. | 20A05202 | IT Workshop | ES | 0-0-3 | 1.5 |
| 7. | 20A51102P | Fundamental Chemistry Lab | BS | 0-0-3 | 1.5 |
| 8. | 20A05201P | C-Programming & Data Structures Lab | ES | 0-0-3 | 1.5 |
| 9. | 20A02101P | Basic Electrical & Electronics Engineering Lab | ES | 0-0-2 | 1.5 |
| Total | | | | | 19.5 |

Semester – 2 (Theory – 5, Lab – 5)

| S.No | Course No | Course Name | Category | L-T-P/D | Credits |
|--------------|------------------|--|-----------------|----------------|----------------|
| 1. | 20A54201 | Differential Equations and Vector Calculus | BS | 3-0-0 | 3 |
| 2. | 20A56101T | Engineering Physics | BS | 3-0-0 | 3 |
| 3. | 20A52101T | Communicative English | HS | 3-0-0 | 3 |
| 4. | 20A01101T | Basics of Civil & Mechanical Engineering | ES | 3-0-0 | 3 |
| 5. | 20A03101T | Engineering Drawing | ES | 1-0-0/2 | 2 |
| 6. | 20A03101P | Engineering Graphics Lab | ES | 0-0-2 | 1 |
| 7. | 20A52101P | Communicative English Lab | HS | 0-0-3 | 1.5 |
| 8. | 20A56101P | Engineering Physics Lab | BS | 0-0-3 | 1.5 |
| 9. | 20A01101P | Basics of Civil & Mechanical Engineering Lab | ES | 0-0-3 | 1.5 |
| 10 | 20A52201 | Universal Human Values | MC | 3-0-0 | 0.0 |
| Total | | | | | 19.5 |

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (FT)– I Sem

L T P C
3 0 0 3

(20A54101) LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT -1

Matrices

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

Learning Outcomes:

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

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

UNIT -2

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

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

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

UNIT -3

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

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

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT -4

Multiple Integrals

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Learning Outcomes:

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

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

UNIT -5

Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

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

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press
6. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
8. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education

9. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

(20A51102T) FUNDAMENTAL CHEMISTRY

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

Unit 1:

Structure and Bonding Models:

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2 , applications to hydrogen, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO , etc. π -molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes:

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

- Apply Schrodinger wave equation to hydrogen atom (L3)
- Illustrate the molecular orbital energy level diagram of different molecular species (L2)
- Explain the calculation of bond order of O_2 and CO molecules (L2)
- Discuss the basic concept of molecular orbital theory (L3).

Unit 2:

Electrochemistry and Applications:

Electrodes – concepts, reference electrodes (Calomel electrode, $Ag/AgCl$ electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, concept of pH, pH meter and applications of pH metry (acid-base titrations), potentiometry–potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium ion batteries-working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Learning Outcomes:

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

- Apply Nernst equation for calculating electrode and cell potentials (L3)
- Differentiate between pH metry, potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)
- Solve problems based on cell potential (L3)

Unit 3:

Polymer Chemistry:

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of -PVC, Bakelite, Nylon-6,6, carbon fibres.

Elastomers-Buna-S, Buna-N-preparation, properties and applications.

Conducting polymers - polyacetylene, polyaniline, polypyrroles - mechanism of conduction and applications.

Learning Outcomes:

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

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of PVC, Bakelite, Nylon-66, and carbon fibres (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N elastomers and their applications (L2)

Unit 4:

Instrumental Methods and Applications (10 hrs)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible, IR spectroscopies. Solid-Liquid Chromatography- TLC- Buffer solution-retention time.

Learning outcomes:

After completion of unit.IV, students will be able to

- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles of solid liquid chromatography (L2)
- Explain the different applications of analytical instruments (L2)

Unit 5:

Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm, BET equation (no derivation) applications of colloids and nanomaterials - catalysis, medicine, sensors, etc.

Learning Outcomes:

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

- Summarize the concept adsorption and its applications (L2)
- Explain the synthesis of colloids with examples (L2)
- Outline the preparation of nanomaterials and metal oxides (L2)
- Identify the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.

Course Outcomes:

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

- Compare the materials of construction for battery and electrochemical sensors (L2)
- Explain the preparation, properties, and applications of thermoplastics &thermosetting, elastomers & conducting polymers. (L2)
- Explain the principles of spectrometry, solid liquid chromatography in separation of solids and liquid mixtures (L2)
- Apply the principle of Band diagrams in application of conductors and semiconductors (L3)

(20A05201T) C-PROGRAMMING & DATA STRUCTURES
(Common to All Branches of Engineering)

Course Objectives:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiarize with Stack, Queue and Linked lists data structures.
- To explain the concepts of non-linear data structures like graphs and trees.
- To learn different types of searching and sorting techniques.

UNIT-1

Introduction to C Language - C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, arrays.

Learning outcomes:

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

- Use C basic concepts to write simple C programs. (L3)
- Use iterative statements for writing the C programs (L3)
- Use arrays to process multiple homogeneous data. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Translate algorithms into programs. (L4)
- Implement conditional branching, iteration and recursion. (L2)

UNIT – 2

Functions, types of functions, Recursion and argument passing, pointers, storage allocation, pointers to functions, expressions involving pointers, Storage classes – auto, register, static, extern, Structures, Unions, Strings, string handling functions, and Command line arguments.

Learning outcomes:

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

- Writing structured programs using C Functions. (L5)
- Writing C programs using various storage classes to control variable access. (L5)
- Apply String handling functions and pointers. (L3)
- Use arrays, pointers and structures to formulate algorithms and write programs.(L3)

UNIT-3

Data Structures, Overview of data structures, stacks and queues, representation of a stack, stack related terms, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

Learning outcomes:

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

- Describe the operations of Stack. (L2)
- Explain the different notations of arithmetic expression. (L5)
- Develop various operations on Queues. (L6)

UNIT – 4

Linked Lists – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

Learning outcomes:

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

- Analyze various operations on singly linked list. (L4)
- Interpret operations of doubly linked lists. (L2)
- Apply various operations on Circular linked lists. (L6)

UNIT-5

Trees - Tree terminology, representation, Binary trees, representation, binary tree traversals. binary tree operations, **Graphs** - graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees. **Searching and Sorting** – sequential search, binary search, exchange (bubble) sort, selection sort, insertion sort.

Learning outcomes:

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

- Develop the representation of Tress. (L3)
- Identify the various Binary tree traversals. (L3)
- Illustrate different Graph traversals like BFS and DFS. (L2)
- Design the different sorting techniques (L6)
- Apply programming to solve searching and sorting problems. (L3)

Text Books:

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
4. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E. Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T. Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Course Outcomes:

- Analyse the basic concepts of C Programming language. (L4)
- Design applications in C, using functions, arrays, pointers and structures. (L6)
- Apply the concepts of Stacks and Queues in solving the problems. (L3)
- Explore various operations on Linked lists. (L5)
- Demonstrate various tree traversals and graph traversal techniques. (L2)
- Design searching and sorting methods (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (FT)– I Sem

L T P C

3 0 0 3

(20A02101T) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Civil, Mechanical, CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT and Food Technology)

Part A: Basic Electrical Engineering

Course Objectives:

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on Power system generation, transmission and distribution

UNIT -1

DC & AC Circuits:

Electrical circuit elements (R - L and C) - Kirchoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.

Learning Outcomes

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

- Recall Kirchoff laws
- Analyze simple electric circuits with DC excitation
- Apply network theorems to simple circuits
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations

UNIT -2

DC & AC Machines:

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC tests on transformer - Principle and operation of 3-phase AC machines [Elementary treatment only]

Learning Outcomes

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

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor
- Explain operation of transformer and induction motor.
- Explain construction & working of induction motor - DC motor

UNIT -3

Basics of Power Systems:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Learning Outcomes

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

- Understand working operation of various generating stations
- Explain the types of Transmission and Distribution systems

Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

References:

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

Course Outcomes:

The student should be able to

- Apply concepts of KVL/KCL in solving DC circuits
- Understand and choose correct rating of a transformer for a specific application
- Illustrate working principles of DC Motor
- Identify type of electrical machine based on their operation
- Understand the basics of Power generation, Transmission and Distribution

Part ‘B’- Electronics Engineering

Course Objectives

- Understand principles and terminology of electronics.
- Familiar with the theory, construction, and operation of electronic devices.
- Learn about biasing of BJTs and FETs.
- Design and construct amplifiers.
- Understand the concept & principles of logic devices.

Unit-1:

Diodes and Applications: Semiconductor Diode, Diode as a Switch & Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Operation and Applications of Zener Diode, LED, Photo Diode.

Transistor Characteristics: Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Biasing of Transistor Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Concepts of Small Signal Amplifiers –CE & CC Amplifiers.

Learning outcomes:

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

- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

Unit-2:

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

Learning outcomes:

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

- Describe operation of Op-Amp based linear application circuits, converters, amplifiers and non-linear circuits. (L2)
- Analyze Op-Amp based comparator, differentiator and integrator circuits. (L3)

Unit-3:

Digital Electronics: Logic Gates, Simple combinational circuits – Half and Full Adders, BCD Adder, Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters. Introduction to Microcontrollers and their applications (Block diagram approach only).

Learning outcomes:

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

- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)
- Distinguish between 8085 & 8086 microprocessors also summarize features of a microprocessor. (L5)

Text Books:

1. R.L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2007.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4th Edition, Pearson, 2017.

3. R. P. Jain, Modern Digital Electronics, 3rd Edition, Tata Mcgraw Hill, 2003.
4. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd Edition, Pearson, 2012.

Reference Books:

1. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
2. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand & Co, 2010.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Course Outcomes:

After the completion of the course students will be able to

- Explain the theory, construction, and operation of electronic devices.
- Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and to solve the simple problems based on the applications
- Analyze small signal amplifier circuits to find the amplifier parameters
- Design small signal amplifiers using proper biasing circuits to fix up proper Q point.
- Distinguish features of different active devices including Microprocessors.

(20A03202) ENGINEERING WORKSHOP
(Common to All Branches of Engineering)

Course Objective:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

List of Topics

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

- a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

- a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

- a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

- a) Parallel and series b) Two way switch c) Godown lighting
d) Tube light e) Three phase motor f) Soldering of wires

Course Outcomes:

After completion of this lab the student will be able to

- Apply wood working skills in real world applications. (13)
- Build different objects with metal sheets in real world applications. (13)
- Apply fitting operations in various applications. (13)
- Apply different types of basic electric circuit connections. (13)
- Use soldering and brazing techniques. (12)

Note: In each section a minimum of three exercises are to be carried out.

(20A05202) IT WORKSHOP
(Common to All Branches of Engineering)

Course Objectives:

- To make the students know about the internal parts of a computer, assembling and disassembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LAtEX
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Preparing your Computer

Task 1:

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2:

Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods

Task 3:

Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4:

Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimping activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 6:

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7:

Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools**Task 8:**

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered, Image Manipulation tools.

Task 9:

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 10:

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet

Task 11:

LateX: Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic

tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors and Prepare spread sheets for calculations .using excel and also the documents using LAtEX.
- Prepare Slide presentations using the presentation tool.
- Interconnect two or more computers for information sharing.
- Access the Internet and Browse it to obtain the required information.

Note: Use open source tools for implementation of the above exercises.

(19A51102P) FUNDAMENTAL CHEMISTRY LAB

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Models of potential energy surfaces
3. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite and its properties.
8. Determination of viscosity of polymer solution using survismeter
9. Verify Lambert-Beer's law
10. Thin layer chromatography
11. Identification of simple organic compounds by IR
12. Preparation of nanomaterials by precipitation.
13. Adsorption of acetic acid by charcoal

Course Outcomes:

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

- Determine the cell constant and conductance of solutions (L3)
- Prepare advanced polymer materials (L2)
- Measure the strength of an acid present in secondary batteries (L3)
- Analyse the IR spectra of some organic compounds (L3)

(20A05201P) C-PROGRAMMING & DATA STRUCTURES LAB
(Common to All Branches of Engineering)

Course Objectives:

- To get familiar with the basic concepts of C programming.
- To design programs using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To apply different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.
- To design searching and sorting techniques.

Week 1

Write C programs that use both recursive and non-recursive functions

- To find the factorial of a given integer.
- To find the GCD (greatest common divisor) of two given integers.
- To solve Towers of Hanoi problem.

Week 2

- Write a C program to find both the largest and smallest number in a list of integers.
- Write a C program that uses functions to perform the following:
 - Addition of Two Matrices
 - Multiplication of Two Matrices

Week 3

- Write a C program that uses functions to perform the following operations:
 - To insert a sub-string in to a given main string from a given position.
 - To delete n characters from a given position in a given string.

Week 4

- Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
- Write a C program to count the lines, words and characters in a given text.

Week 5

- Write a C Program to perform various arithmetic operations on pointer variables.
- Write a C Program to demonstrate the following parameter passing mechanisms:
 - call-by-value
 - call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

- i) Converting infix expression into postfix expression
- ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

- i) Creating a Binary Tree of integers
- ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

- i) Linear search
- ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort
- ii) Selection sort
- iii) Insertion sort

Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Course Outcomes

- Demonstrate basic concepts of C programming language. (L2)
- Develop C programs using functions, arrays, structures and pointers. (L6)
- Illustrate the concepts Stacks and Queues. (L2)
- Design operations on Linked lists. (L6)
- Apply various Binary tree traversal techniques. (L3)
- Develop searching and sorting methods. (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B.Tech (FT)– I Sem

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(20A02101P) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB
(Civil, Mechanical, CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT and Food Technology)

Part A: Electrical Engineering Lab

Course Objectives:

- To Verify Kirchoff's laws and Superposition theorem
- To learn performance characteristics of DC Machines.
- To perform various tests on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

List of experiments: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Load test on 1-Phase Transformer.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

Course Outcomes:

After completing the course, the student will be able to

- Understand Kirchoff's Laws & Superposition theorem.
- Analyze the various characteristics on DC Machines by conducting various tests.
- Analyze I – V Characteristics of PV Cell
- Apply the knowledge to perform various tests on 1-phase transformer

Part B: Electronics Engineering Lab

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- Exposed to linear and digital integrated circuits.

List Of Experiments:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator.

3. Full Wave Rectifier with & without filter.
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-AMPs.
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course outcomes:

- Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.
- Construct the given circuit in the lab
- Analyze the application of diode as rectifiers, clippers and clampers and other circuits.
- Design simple electronic circuits and verify its functioning.

Note: Minimum Six Experiments to be performed in each section.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B.Tech (FT)– II Sem **L T P C**
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(20A54201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to Civil, EEE, Mechanical, ECE and Food Technology)

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT -1

Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

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

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)
- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT 2:

Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

Learning Outcomes:

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

- Apply a range of techniques to find solutions of standard pdes (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT -3

Applications of Partial Differential Equations

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation, One dimensional Heat equation.

Learning Outcomes:

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

- Classify the PDE (L3)

- Learn the applications of PDEs (L2)

UNIT-4

Vector differentiation

Scalar and vector point functions, vector operator ∇ , ∇ applies to scalar point functions-Gradient, ∇ applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

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

- Apply ∇ to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT -5

Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

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

- Find the work done in moving a particle along the path over a force field (L4)
- Evaluate the rates of fluid flow along and across curves (L4)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
7. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
8. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
9. R.L. GargNishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
10. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
11. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
12. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

(20A56101T) ENGINEERING PHYSICS
(Common to Civil, Mechanical and Food Technology)

Course Objectives

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications
- To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.

Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano materials, their properties and applications in modern emerging technologies are elicited.

- To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.

UNIT-I

Wave Optics

Interference- Principle of superposition – Interference of light – Conditions for sustained interference – Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings- Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction – Nicol's Prism – Half wave and Quarter wave plates with applications.

Learning Outcomes:

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

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary polarized light and extraordinary polarized light (L2)

UNIT-II

Lasers and Fiber optics

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (Qualitative) – Applications.

Learning Outcomes:

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

- Understand the basic concepts of LASER light Sources (L2)
- Apply the concepts to learn the types of lasers (L3)
- Identifies the Engineering applications of lasers (L2)
- Explain the working principle of optical fibers (L2)
- Classify optical fibers based on refractive index profile and mode of propagation (L2)
- Identify the applications of optical fibers in various fields (L2)

UNIT III

Engineering Materials

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarization (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Learning Outcomes:

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

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius-Mosotti relation in dielectrics(L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)
- Apply the concept of magnetism to magnetic devices (L3)
- Identify the nano size dependent properties of nanomaterials (L2)
- Illustrate the methods for the synthesis and characterization of nanomaterials (L2)
- Apply the basic properties of nanomaterials in various Engineering branches (L3).

UNIT-IV

Acoustics and Ultrasonics

Acoustics- Introduction – Requirements of acoustically good hall – Reverberation – Reverberation time – Sabine’s formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.

Learning Outcomes:

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

- Explain how sound is propagated in buildings (L2)
- Analyze acoustic properties of typically used materials in buildings (L4)
- Recognize sound level disruptors and their use in architectural acoustics (L2)
- Identify the use of ultrasonics in different fields (L3)

UNIT-V

Crystallography and X-ray diffraction

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-Ray Diffraction- Bragg’s law – Bragg’s X-ray diffractometer – Crystal structure determination by Powder method.

Learning Outcomes:

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

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by Bragg’s X-ray diffractometer (L4)
- Apply powder method to measure the crystallinity of a solid (L4)

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
4. Engineering Physics – M.R. Srinivasan, New Age Publications

Course Outcomes

- Study the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2)
- Identify the wave properties of light and the interaction of energy with the matter (L3).
- Asses the electromagnetic wave propagation and its power in different media (L5).
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3)
- Elucidates the importance of nano materials along with their engineering applications. (L5)
- Explain the basic concepts of acoustics and ultrasonics. (L2)
- Apply the concept of NDT to material testing. (L3)
- Study the important properties of crystals like the presence of long-range order, periodicity and structure determination using X-ray diffraction technique. (L5)

(20A52101T) COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

UNIT -1

Lesson: On the Conduct of Life: William Hazlitt

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

Learning Outcomes

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

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- Ask and answer general questions on familiar topics and introduce oneself/others
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- Form sentences using proper grammatical structures and correct word forms

UNIT -2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas

in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

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

- Comprehend short talks on general topics
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- Understand the use of cohesive devices for better reading comprehension
- Write well structured paragraphs on specific topics
- Identify basic errors of grammar/ usage and make necessary corrections in short texts

UNIT -3

Lesson: The Death Trap: Saki

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

Learning Outcomes

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

- Comprehend short talks and summarize the content with clarity and precision
- Participate in informal discussions and report what is discussed
- Infer meanings of unfamiliar words using contextual clues
- Write summaries based on global comprehension of reading/listening texts
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

UNIT-4

Lesson: Innovation: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Letter Writing: Official Letters/Report Writing **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes

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

- Infer and predict about content of spoken discourse
- Understand verbal and non-verbal features of communication and hold formal/informal conversations
- Interpret graphic elements used in academic texts
- Produce a coherent paragraph interpreting a figure/graph/chart/table
- Use language appropriate for description and interpretation of graphical elements

UNIT -5

Lesson: Politics and the English Language: George Orwell

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

Learning Outcomes

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

- Take notes while listening to a talk/lecture and make use of them to answer questions
- Make formal oral presentations using effective strategies
- Comprehend, discuss and respond to academic texts orally and in writing
- Produce a well-organized essay with adequate support and detail
- Edit short texts by correcting common errors

Text Book:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books:

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

Course Outcomes

- Retrieve the knowledge of basic grammatical concepts
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

Web links

www.englishclub.com

www.easyworldofenglish.com

www.languageguide.org/english/

www.bbc.co.uk/learningenglish

www.eslpod.com/index.html

www.myenglishpages.com

(20A01101T) BASIC CIVIL & MECHANICAL ENGINEERING

Course Objectives:

- Impart basic principles of stress, strain, shear force, bending moment and torsion.
- To teach principles of strain measurement using electrical strain gauges
- Describe technical details of power plants, gas turbines, hydro power plants and non-conventional energy sources.
- Teach different types of drives for power transmission
- Impart concepts of CAD, CAM & CIM

PART – A: Civil Engineering

UNIT – I:

Basic Definitions of Force – Stress – Strain – Elasticity. Shear force – Bending Moment – Torsion . Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

Learning Outcomes:

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

- Understand principles of Stress and Strain.
- Able to draw SFD & BMD for simply supported beams and cantilever beams.

UNIT – II:

Measurement of Strain - Electrical Capacitance and Resistance Strain gauges – multi channel strain indicators. Rosette analysis – Rectangular and Triangular strain rosettes – Wheatstone bridge.

Learning Outcomes:

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

- Understand basic principles of Strain Measurement.
- Apply the concepts of Strain Rosettes for strain measurement .

UNIT – III:

Characteristics of common building materials – Brick – Types – Testing; Timber – Classification – Seasoning – Defects in Timber ; Glass – Classification – uses; steel and its applications in construction industry.

Learning Outcomes:

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

- Understand common building materials used in construction.
- Analyze characteristics of common building materials .

Text Books:

1. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi.
2. Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd.

Reference Books:

1. S.Trymbaka Murthy., “Computer Aided Engineering Drawing” , Universities Press
2. Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies.
3. Venugopal K. and Prahu Raja V., “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam.
4. Er. R. Vaishnavi, Basic Civil and Mechanical Engineering, 2/e, S.Chand Publications.

Course Outcomes:

At the end of the course, student is able to

- Draw SFD and BMD for cantilever and Simply supported beams. *(L.1)*
- Understand the working principles of electrical resistors and capacitors. *(L.2)*
- Apply concepts of Rosetta analysis for strain measurements. *(L.3)*

PART – B: Mechanical Engineering**Course Objectives**

- Familiarize the sources of energy, power plant economics and environmental aspects.
- Outline the working components of different power plant.
- To teach working principle of hydraulic machinery.
- To familiarize the developments in IC engines.
- To teach combustion process in SI and CI engines.
- Explain the principles of refrigeration and air conditioning.

UNIT – 1

Power Plant Engineering: Introduction – Energy Renewable and Non – Renewable Energy, Sources – Classification of Power Plants based on Sources of Energy – Thermal Power Plant or Steam Power Plant – Hydro Electric Power – Nuclear Fission, Chain Reaction, Layout of Nuclear Power Plant – Diesel Power Plant – Gas Turbine Power Plant – Open Cycle Gas Turbine, Closed Cycle Gas Turbine Power Plant, Comparison of Diesel Power Plant with Gas Turbine Power Plant – Pumps – Classification of Pumps, Centrifugal Pump, Applications of Centrifugal Pump, Priming, Reciprocating Pumps, Single Acting Reciprocating Pump, Working of a Double acting Reciprocating Pump, Comparison of Reciprocating Pump with Centrifugal Pump –Hydraulic Turbine – Classification of Hydraulic Turbines, Impulse Turbine, Reaction Turbine, Difference between Impulse and Reaction Turbine.

Learning Outcomes

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

- Outline sources of energy, compare and selection of types of power plants (L2).
- Explain working principle and compare types of diesel power plant (L2).
- Explain construction and operation of different pumps (L2).
- Classify pumps based on principle of operation (L1).
- Classify turbines based on principle of operation (L1).

UNIT – 2

I.C Engine: Heat Engine – Types of Heat Engine – External Combustion Engine, IC Engine (Internal Combustion), Classification of I.C. Engine, Two Stroke Petrol Engine, Four Stroke Engine, Valve Timing Diagram, Port Timing Diagram, Comparison of Two Stroke and Four Stroke Engines, Comparison of Petrol Engine and Diesel Engine, Fuel System of a Petrol Engine, Ignition Systems.

Boilers: Classification of Boilers – Simple Vertical Boiler – Cochran Boiler – Babcock and Wilcox Boiler – Benson Boiler – Difference between Fire Tube and Water Tube Boilers – Boiler Mountings – Boiler Accessories – Difference between Boiler Mountings and Accessories.

Learning outcomes:

After completion of this unit, students will be able to

- Understand classification and working of IC engines (L1).
- Compare 2 stroke and 4 stroke, petrol and diesel engines (L3).
- Understand classification and construction of boilers (L1).
- Compare boiler mountings and accessories (L3).

UNIT – 3

Refrigeration and Air Conditioning: Introduction – Terminology of Refrigeration and Air Conditioning – Properties of Refrigerants – List of Commonly used Refrigerants – Types of Refrigerating System – Vapour Compression Refrigeration System – Vapour Absorption Refrigerator – Domestic Refrigerator – Air Conditioning – Application of Air Conditioning – Psychrometry – Window Air Conditioning.

Learning outcomes:

After completion of this unit, students will be able to

1. Analyze the basics cycles of Refrigeration and Air Conditioning Systems (L4).
2. Outline the operation of refrigerators (L2).
3. Identify different refrigerants and applications (L1).

Text Books:

1. Basic Civil and Mechanical Engineering, by Prof.V.Vijayan, Prof.M.Prabhakaran and Er.R.Viashnavi, S.Chand Publication.
2. Elements of Mechanical Engineering Fourth Edition S Trymbaka Murthy, University Press.

Course Outcomes:

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

- Outline sources of energy, power plant economics, and environmental aspects (L2).
- Describe working components of a steam power plant (L2).
- Illustrate the working mechanism of Diesel and Gas turbine power plants (L2).
- Explain different types of pumps and their application (L2).
- Explain working of IC engines with combustion process (L2).
- Possess the knowledge of system components of refrigeration and air conditioning (L3)

(20A03101T) ENGINEERING DRAWING
(Common to All Branches of Engineering)

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Unit: I

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance- Conventions in drawing-lettering - BIS conventions.

- a) Conic sections including the rectangular hyperbola- general method only,
- b) Cycloid, epicycloids and hypocycloid c) Involute

Learning Outcomes:

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

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

Unit: II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

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

- Understand the meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

Unit: III

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Learning Outcomes:

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

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxillary view method.
- Draw the projection of solid inclined to one plain
- Draw the projection of solids inclined to both the plains

Unit: IV

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:

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

- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

Unit: V

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

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

- Understand the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- Draw various curves applied in engineering. (12)
- Show projections of solids and sections graphically. (12)
- Draw the development of surfaces of solids. (13)

Additional Sources

Youtube: [http://sewor,Carleton.ca/g,kardos/88403/drawings.html](http://sewor.Carleton.ca/g,kardos/88403/drawings.html) conic sections-online, red woods.edu

(20A03101P) ENGINEERING GRAPHICS LAB
(Common to All Branches of Engineering)

Course Objectives:

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Computer Aided Drafting:

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Text Books:

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

Reference Books:

1. T. Jayapooan, Engineering Graphics using Auto Cad, Vikas Publishing House
2. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3. Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages. (L3)

Additional Sources

1. Youtube: <http://sewor,Carleton.ca, kardos/88403/drawings.html> conic sections-online, red woods.edu

(20A52101P) COMMUNICATIVE ENGLISH LAB
(Common to All Branches of Engineering)

Course Objectives

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

List of Topics

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. JAM
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions-1
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills-1

Suggested Software

Orel, Walden Infotech, Young India Films

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

www.esl-lab.com
www.englishmedialab.com
www.englishinteractive.net

Course Outcomes

After completing the course, the student will be able to

- Listening and repeating the sounds of English Language
- Understand the different aspects of the English language
- proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable
- Division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to
- Improve fluency in spoken English.

(20A56101P) ENGINEERING PHYSICS LAB
(Common to Civil, Mechanical and Food Technology)

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

List of Topics

1. Determine the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
10. Measurement of magnetic susceptibility by Gouy's method
11. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
12. Determination of ultrasonic velocity in liquid (Acoustic grating)
13. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
14. Sonometer: Verification of the three laws of stretched strings
15. Determination of spring constant of springs using Coupled Oscillator

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

Course Outcomes:

After completing the course, the student will be able to

- Operate various optical instruments (L2)
- estimate wavelength of laser and particles size using laser(L2)
- evaluate the acceptance angle of an optical fiber and numerical aperture (L3)
- estimate the susceptibility and related magnetic parameters of magnetic materials (L2)
- plot the intensity of the magnetic field of circular coil carrying current with distance (L3)
- determine magnetic susceptibility of the material and its losses by B-H curve (L3)
- apply the concepts of ultrasonics by acoustic grating (L2)

Note Out of 15 experiments any 12 experiments (minimum 10) must be performed in a semester.

(20A01101P) BASIC CIVIL & MECHANICAL ENGINEERING LAB

Part A: Civil Engineering

Laboratory Experiments:

1. Bending test on (Steel/Wood) Cantilever beam.
2. Bending test on (Steel/Wood) simply supported beam.
3. Use of electrical resistance strain gauges.
4. Compression test on Bricks
5. Water absorption test on Bricks
6. Torsion test.
7. Tests on closed coiled and open coiled helical springs

Part B: Mechanical Engineering

Course Objectives:

- Understand the functioning and performance of I.C. Engines
- To find heat losses in various engines

List of Experiments:

1. Load test on four stroke Diesel Engine with mechanical loading.
2. Load test on four stroke Diesel Engine with DC Generator loading.
3. Heat balance test on Four Stroke Diesel Engine.
4. Load test on two stroke petrol engine.
5. A) Study of Valve & Port diagram.
B) Study of boilers.
6. Performance test on vapour compression refrigeration system.
7. Performance test on vapour absorption refrigeration system.

Course Outcomes:

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

- Explain different working cycles of engine.
- Illustrate the working of refrigeration systems
- Evaluate heat balance sheet of IC engine.

(20A52201) UNIVERSAL HUMAN VALUES
(Common to all branches)

Course Objective:

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

COURSE TOPICS:

The course has 28 lectures and 14 practice sessions in 5 modules:

Unit 1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Unit 2:

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
- Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility

- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Unit 3:

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit 4:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit 5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Book

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. F.Schumacher. "Small is Beautiful"
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa "Economy of Permanence"
8. Pandit Sunderlal "Bharat Mein Angreji Raj"
9. Dharampal, "Rediscovering India"
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

MOE OF CONDUCT (L-T-P-C 2-1-0-2)

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practicals are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignments and/or activities are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

OUTCOME OF THE COURSE:

By the end of the course,

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.