



LOKMANYA TILAK JANKALYAN SHIKSHAN SANSTHA'S

PRIYADARSHINI COLLEGE OF ENGINEERING

(Recognised by A.I.C.T.E. New Delhi & Govt. of Maharashtra Affiliated to R.T.M. Nagpur University)

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AICTE ID No. 5435581; DTE CODE No. 4123; UNIVERSITY CODE No. 278

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AN AUTONOMOUS INSTITUTE



FIRST YEAR ENGINEERING

CURRICULUM

UNDER GRADUATE PROGRAMME

B.Tech First Year

(Artificial Intelligence & Data Science/ Industrial IOT/Robotics & AI/ Electronics & Telecommunication/ Electronics & Communication)

WITH EFFECT FROM THE ACADEMIC YEAR 2024-2025.

LOKMANYA TILAK JANKALYAN SHIKSHAN SANSTHA

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SCHEME OF EXAMINATION w.e.f. 2024-25 onwards
FIRST SEMESTER B. TECH. (AI &DS/ IIOT/RAI/ET/EC)

Sr. No.	Course Code	Course Category	BOS/ Dept	Course	Contact Hours				Marks				Total Marks
					L	T	P	Credits	Theory		Practical		
									CE	ESE	CE	ESE	
1	24UFY1A1T	BSC	ASH	Basic calculus & differential equations	3	1	0	4	40	60	--	--	100
2	24UFY1A2T	BSC	ASH	Engg. Chemistry	3	0	0	3	40	60	--	--	100
3	24UFY1A2P	BSC	ASH	Lab: Engg. Chemistry	0	0	2	1	--	--	25	25	50
4	24UFY1A3T	ESC	CT	Programming for Problem Solving	3	0	0	3	40	60	--	--	100
5	24UFY1A3P	ESC	CT	Lab: Programming for Problem Solving	0	0	2	1	--	--	25	25	50
6	24UFY1A4T	ESC	EE	Basics of Electrical & Electronics Engg	3	0	0	3	40	60	--	--	100
7	24UFY1A4P	ESC	EE	Lab: Basics of Electrical & Electronics Engg	0	0	2	1	--	--	25	25	50
8	24UFY1A5T	IKS	ASH	Indian Traditional knowledge	2	0	-	2	20	30	--	--	50
9	24UFY1A6P	SEC1	ASH	Skill Enhancement in Instrumental Techniques	0	1	2	2	--	--	25	25	50
10	24UFY111P	CC1	ASH	Liberal Learning Course: Yoga	--	--	--	2	--	--	50	--	50
	24UFY112P			Liberal Learning Course: Physical Education									
	24UFY113P			Liberal Learning Course: Music									
	24UFY114P			Liberal Learning Course: NSS									
					14	2	8	22	180	270	150	100	700

SECOND SEMESTER B. TECH. (AI &DS/ IIOT/RAI/ET/EC)

Sr. No.	Course Code	Course Category	BOS/ Dept	Course	Contact Hours				Marks				Total Marks
					L	T	P	Credits	Theory		Practical		
									CE	ESE	CE	ESE	
1	24UFY2B1T	BSC	ASH	Integral Vector Calculus & statistics	3	1	0	4	40	60	--	--	100
2	24UFY2B2T	BSC	ASH	Engg. Physics	3	0	0	3	40	60	--	--	100
3	24UFY2B2P	BSC	ASH	Lab: Engg. Physics	0	0	2	1	--	--	25	25	50
4	24UFY2C3T	ESC	ET	Digital Circuits & Logic Design	3	0	0	3	40	60	--	--	100
5	24UFY2C3P	ESC	ET	Lab: Digital Circuits & Logic Design	0	0	2	1	--	--	25	25	50
6	24UFY2B4T	ESC	ME	Computer Aided Graphics	1	0	0	1	20	30	--	--	50
7	24UFY2B4P	ESC	ME	Lab: Computer Aided Graphics	0	0	2	1	--	--	25	25	50
8	24UFY223T	PCC	AI&DS	Elements of Artificial Intelligence (AI&DS/IIOT/RAI)	2	0	0	2	20	30	--	--	50
	24UFY224T		EC	Electronics Components and Microprocessor (EC/ET)									
9	24UFY2B6T	AEC	ASH	Communication Skill	1	0	0	1	20	30	--	--	50
10	24UFY2B6P	AEC	ASH	Lab: Communication Skill	0	0	2	1	--	--	25	25	50
11	24UFY2B7P	SEC2	ASH	Skill Enhancement in Analytical Techniques	0	1	2	2	--	--	25	25	50
12	24UFY211P	CC2	ASH	Liberal Learning Course:Creative Arts	--	--	--	2	--	--	50	--	50
	24UFY212P			Liberal Learning Course:Professional Skills									
	24UFY213P			Liberal Learning Course:Photography & Film Making									
	24UFY214P			Liberal Learning Course:Foreign Language (German or French)									
					13	2	10	22	180	270	175	125	750


 Principal
 Priyadarshini College
 of Engineering, Nagpur

Principal


 DEAN ACADEMICS
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 NAGPUR

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FIRST SEMESTER B. TECH. (AI &DS/ IIOT/RAI/ET/EC)

Course Title- Basic Calculus and Differential Equations

Semester -I

Course Code- 24UFY1A1T
Teaching Scheme: L-T-P

Course Category: BSC
Total Credits: 3+13 -1- 0

Prerequisites: Basic knowledge of fundamentals of mathematical concepts, matrices, differentiation, Integration.

Course Objectives:

- The objective of this course is to familiarize the budding engineers with techniques in linear Algebra, Calculus and Differential Equations.
- It aims to equip the students with standard concept and tools, that will serve them well towards tackling more advance level of mathematics and applications that they would find useful in their disciplines.

Course Outcome:

On successful completion of the course, the students will learn:

CO1: To apply knowledge of matrices and linear algebra in a comprehensive manner.

CO2: To solve engineering problem by using knowledge of differentiation.

CO3: Determine the derivatives of functions of several variables and develop the mathematical equation.

CO4: To analyse sequence and series on basis of types and their convergence

CO5: To distinguish and solve differential equation that model physical process

CO6: To evaluate higher order differential equation used in various engineering field.

COURSE CONTENT:

UNIT I: MATRICES

Inverse of a matrix by Partitioning method, Rank of a matrix, Consistency of linear system of non-homogeneous equations, Homogeneous system of Linear equations, Symmetric, Skew-symmetric and Orthogonal matrices, Linear and Orthogonal transformations, Cayley-Hamilton theorem.

[6 Hours]

UNIT II: DIFFERENTIAL CALCULUS

Successive differentiation: Leibnitz's Rule, Taylor's and Maclaurin's series for function of one variable, Indeterminate forms and L'Hospital's Rule, Maxima and Minima for function of one variable. **[8**

Hours]

UNIT III: MULTIVARIABLE CALCULUS

Functions of several variables, First and Higher order partial derivatives, Euler's theorem, Chain rule and Total differential coefficient, Jacobians, Maxima and Minima for function of two variables.

[8 Hours]

UNIT IV: SEQUENCE AND SERIES

Sequence, types of sequence, test of convergence of sequences, Cauchy sequence, infinite series, power series, Alternating series, tests of convergence and absolute convergence of series.

[6 Hours]

UNIT V: FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS

Exact differential equations, Linear, Bernoulli's differential equations, Equations not of first degree: equation Solvable for p, Solvable for y, Solvable for x and Clairaut's type.

[6 Hours]

UNIT VI: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy-Euler equation, Cauchy-Legendre equation and its application.[8 Hours]

Text Books:

- (1) P. N. Wartikar and J. N. Wartikar, Applied Mathematics, Volume I and II.
- (2) H.K Dass, Rama Verma, Rajnish Verma, V.J. Dagwal, Sajid Anwar and D.F. Shastrakar, Mathematics-I, Mathematics-II, S. Chand.
- (3) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

Reference Books:

- (1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- (2) Ramana B.V., Higher Engineering Mathematics, Tata Mc-Graw Hill, New Delhi, 11th Reprint, 2010.
- (3) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

Course Title: Engineering Chemistry

Course Code: 24UFY1A2T

Teaching Scheme: L – T – P

3 – 0 – 0

Semester I

Course Category: BSC

Total Credits:3

Prerequisites: Students are expected to know the fundamental principles of theoretical and experimental chemistry of HSC level.

Course Objectives:

1. To provide engineering students with a solid foundation in the principles and concepts of chemistry, enabling them to understand the chemical processes underlying various engineering applications.
2. To cultivate the ability of engineering students to apply chemical knowledge to solve real-world engineering challenges.
3. Students should be prepared to contribute to advancements in engineering through innovative chemical solutions and technologies.

Course outcomes: After completion of the course the students will be able to,

- CO1** Apply knowledge of science, mathematics and engineering techniques for assessing the energy of various sources for sustainable uses.
- CO2** Enable the students to upgrade the knowledge of water technologies and to enhance the thinking capabilities in line with the modern trends in engineering and technology
- CO3** Demonstrate the knowledge of alternative combinations of materials and design improvements to complex engineering problems.
- CO4** Know the contribution to advanced materials in engineering through innovative chemical solutions and technologies.
- CO5** Apply fundamental theories of molecular structures in analytical tools.
- CO6** Apply the knowledge of green chemistry in providing solution to impact of existing technologies on environment.

COURSE CONTENTS:

UNIT I ADVANCEMENT IN ENERGY TECHNOLOGIES

a) Introduction to conventional sources of Energy and its classification. Introduction and significance of ultimate analysis of coal. Cracking of heavy oil, Fluid bed Catalytic racking. Use of gasoline and diesel in IC and CI engines. Knocking and chemical constitution of fuel, Octane and Cetane number, doping agents. Combustion Calculations. Nonconventional Sources of Energy, and its modern applications, synthetic gasoline by Fischer-

Tropsch process. Biodiesel synthesis, advantages and limitations, Syngas, Nuclear fuel and Hydrogen fuel, Blue & Green Hydrogen. **(Current Issues Related to topic).**

[8 Hours]

UNIT II ANALYTICAL ASPECTS OF WATER

Water Treatment for Domestic purpose: Introduction of all steps of Municipal water treatment with emphasis on Coagulation and Sterilization; Breakpoint chlorination, only.

Water Treatment for Industrial purpose: Hardness, Types, Boiler troubles (Scale and Sludge, Boiler Corrosion, Caustic Embrittlement) External Treatment of Boiler feed water through Ion Exchange method: Zeolite process, Numericals & Demineralization.

Treatment of Sea water:RO and Electro dialysis methods. **(Current Issues Related to topic)**

[6 Hours]

UNIT III ELECTRO CHEMISTRY AND SCIENCE OF CORROSION

Basics of Electrochemistry: Electrode potential, Electrochemical series, Galvanic Series, Galvanic cell, Concentration Cell

Corrosion: Introduction and consequences of corrosion, Chemical, Electrochemical and Differential aeration theories, Numerical on Pilling Bedworth rule. Types of corrosion: Waterline, Pitting, Intergranular and stress corrosion. Prevention of corrosion through Material selection, design and Cathodic protection, protective Coatings, Tinning & Galvanizing. **(Current Issues Related to topic)**

[6 Hours]

UNIT IV ADVANCED MATERIALS

Conducting polymers: Synthesis, Properties and Applications of Polypyrrole, Poly acetylene; Biodegradable polymers: Synthesis, Properties and Applications of PLA, Poly Caprolactone; LCP:Phases, General properties and application.

Properties and applications of Nano Quantum Dots & Silicon Chips, Smart materials: Shape Memory alloys, Piezoelectric materials, Chromo active materials and magnetorheological materials. **(Current Issues Related to topic)**

[8 Hours]

UNIT V MOLECULAR STRUCTURE AND ELECTRONIC SPECTROSCOPY

Molecular Structure: Introduction of molecular orbitals on the basis of MOT. Energy level Diagrams of Homo (H to F) and Hetero-nuclear molecules (HF & NO).

Electronic Spectroscopy: Introduction of Electromagnetic Rays, Electronic Vibrations, Absorption and Emission Spectra, Beer-Lambert Rule, Numerical, Electronic Transitions, Fluorescence, Phosphorescence, Jablonski Diagram, Woodward-Fieser rule. **(Current Issues Related to topic)**

[8 Hours]

UNIT VI GREEN CHEMISTRY AND E-WASTE MANAGEMENT

Introduction of Green chemistry ,12 Principles, Carbon Sequestering and Carbon Credit, Green Solvents (Super critical CO₂, DMC), Bio enzymes, sustainable Energy Storage Devices-Principal, working advantages and limitations of H₂-O₂ fuel cell.

E-waste Management: Introduction of E-waste, impact on environment, rules of e-waste generation, management and recycling, Battery e-waste management, modern techniques of e waste recycling. **(Current Issues Related to topic)**

[8Hours]

Suggested Self Readings

Text Books

- 1 A textbook of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
- 2 Engineering Chemistry by Jain and Jain; Dhanpat Rai Publication Co.

- 3 C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", Wiley India, 5th Edition, 2013.
- 4 Applied Chemistry by H.D. Gesser, Springer Publishers
- 5 Applied Chemistry Das Ganu Prakashan ISBN-978-93-84336-67-7
- 6 Energy and Environment Das Ganu Prakashan ISBN-978-93-84336-66-0
- 7 Materials Chemistry S. Chands & Company, ISBN: 81-219-4185-7
- 8 A text book of Engineering Chemistry, S. Chands & Company: ISBN: 81-219-0539-9

Course Title: Lab-Engineering Chemistry

Course Code: 24UFY1A2P

Teaching Scheme: L – T – P

0– 0 – 2

Semester I

Course Category: BSC

Total Credits:1

Outcome: After completion of this course, the students will develop competencies in

1. Practical knowledge of handling chemical methods in skilled way.
2. Estimation of soluble impurities present in water sample.
3. Strengthening their theoretical knowledge while performing virtual lab experiments.

LIST OF EXPERIMENTS: (PERFORM MINIMUM 8 EXPERIMENTS)

1. Preparation of different solutions; molar solution, Normal solution, percent solution
2. Determination of Hardness by complexometry of given water sample.
3. Determination of type and extent of alkalinity of water sample.
4. Determination of Dissolved Oxygen in water sample.
5. Determination of capacity of cation exchange resins
6. Determination of free chlorine in given water sample.
7. Proximate Analysis of coal sample.
8. Determination of cell constant and conductance of given solution
9. Virtual Demonstration of UV-Visible Spectrophotometer and FTIR
10. Virtual Demonstration of Lambert-Beer's Law.
11. Synthesis of Urea Formaldehyde Resin.
12. Virtual Demonstration of determination of calorific values of Solid/Liquid.

Beyond Syllabus Experiments

1. Preparation of a sample of nanomaterial.
2. Testing and Comparison of water quality parameters of samples collected from different sources of city.
3. Testing of Industrial oil samples.

Text Books

- 1 Experimental Chemistry by S. S. Dara
- 2 Laboratory manual on Engineering Chemistry, by S. K. Bhasin & Sudha Rani

Course Title: Programming for Problem Solving Lab

Course Code: 24UFY1A3T

Teaching Scheme:

L T P
3 0 0

Semester: I

Course Category: ESC

Total Credits: 03

Course Objectives:

1. To learn the fundamentals of Problem Solving

2. To understand the various steps in program development and learn the syntax and semantics of C programming language
3. To learn the usage of structured programming approach in solving problems.
4. To understated and formulate and implement programs to illustrate the applications of different elements such as arrays, pointers, functions and files.

Course Outcomes: On Completion of the course students will be able to

- CO1** Formulate simple algorithms for arithmetic and logical problems, translate the algorithms to programs (in C language), test and execute the programs and correct syntax and logical errors.
- CO2** Implement programs using Arrays and Strings using C
- CO3** Develop C programs to solve simple mathematical and decision-making problems and to Control the sequence of execution using Iterative statements.
- CO4** Apply procedure-oriented concept and illustrate Modularity features of ‘c’ using functions
- CO5** Explain significance of pointers and Develop c programs using structures and Pointers
- CO6** To create files and perform input /output operations on files

Course Content:

UNIT I INTRODUCTION TO PROBLEM SOLVING APPROACHES

Introduction, Components of a computer system. Representation of Algorithm, Flowchart/Pseudocodewith examples.

Overview of C: History and importance of C, Basic structure of C program, Compilation and Execution steps

Constants, Variable and Data Types: Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants, Operators and Expressions

Managing Input and Output Operations: Reading a Character, Writing a Character, Formatted Input, Formatted Output. **[8 Hours]**

UNIT II ARRAYS

One-dimensional Arrays: Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs- Linear search, Binary search,

Two-dimensional Arrays: Declaration of Two-dimensional Arrays, Initialization of Two- dimensional Arrays, Example programs – Matrix Multiplication, Transpose of a matrix. **Character Arrays and Strings:** Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings

UNIT III CONDITIONAL BRANCHING AND ITERATIONS:

to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions) **[8 Hours]**

Decision Making and Branching:The if-else statements, The switch statements, The ? : Operator, The goto statement

Iterative Statements: The for() Loop, The while(), The do-while(), statements.

Implementation and evaluation of conditionals and consequent branching. **[6 Hours]**

UNIT IV FUNCTIONS

Built-in and User-defined Functions: Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns a Value, Passing Arrays to Functions.

Recursion, significance of Recursion over Iteration in a problem solving approach. **[8 Hours]**

UNIT V POINTERS

Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessing a Variable through its Pointer, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and 1-D Arrays, Calling function by Reference. Structures : definition, Input, Output. **[6 Hours]**

UNIT VI FILES IN C

Buffer and streams, working with text files and Binary Files, Defining and opening a file, closing a file, Input/output and Error Handling on Files. Random Access Files, Dynamic Memory Allocation, Command-line Arguments. **[6 Hours]**

Textbooks:

Programming in ANSI C, E Balaguruswamy, Tata McGraw Hill

Let us C, Yashavant P. Kanetkar, BPP Publications, Delhi

Reference books:

The C programming language (ANSI C version), Kerningham Dennis Ritchie ,2ndEdition, PHI India

Problem solving and program design in C , Jeri R Hanly Elliot B Koffman PersonAddison Wesley

Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing

C & Data Structures,P. S. Deshpande, O. G. Kakde, Charles River Media Computer

Engineering,Electrical and computer engineering series ITPro collection

Course Title: Programming for Problem Solving Lab.

Semester: I

Course Code: 24UFY1A3P

Course Category: ESC

Teaching Scheme:

L	T	P
0	0	2

Total Credits: 01

Course Outcomes: On Completion of the course students will be able to

- CO1** Study computer system, its components and Develop simple 'c' program
- CO2** Demonstrate programs using 1-D and 2-D Arrays and strings using C
- CO3** Demonstrate execution of C programs to Control the sequence of execution using conditional and iterative statements.
- CO4** Implement Modularity features of 'c' using functions
- CO5** Demonstrate use of pointers and Develop c programs using structures and Pointers
- CO6** implement programs for creation of files and perform input /output operations on files

List of Experiments: (Minimum 8 – 10 Experiments based on following topics)

Experiment - 1: Fundamentals of Computers and Operating System

To Study the internal structure of Computer, its assembly, use of each I/O device and ports, use of System Software like: Windows, Linux

To Demonstrate all types of operators (Arithmetic, Logical and Relational) , different data types and the use of “printf” and “scanf” with all possible options.

Experiment - 2: 1-D and 2-D Arrays

To demonstrate the creation of array, addition of an element and displaying the elements

from one dimensional array.

To demonstrate 2 D Array declaration, Input and output array elements for displaying multiplication table.

Experiment - 3: Conditional Branching

To demonstrate the use of if - else structure

To demonstrate the use of switch case construct.

Experiment - 4: Loop Control or Iterations

To demonstrate the use of “while” or “do-while” control structure.

To demonstrate the use of “for” loop with “break” or “continue” construct

Experiment - 5 Searching techniques

To demonstrate the implementation of linear search

To demonstrate the implementation of Binary search.

Experiment 6 : Pointers

To demonstrate the pointer declaration and its use

To demonstrate the implementation of pointer on array

Experiment - 7: Structures and Dynamic memory allocation

To demonstrate the creation structures and reading and writing of records using structures

To demonstrate the use of malloc() and calloc()

Experiment - 8 Strings

To demonstrate the basic operations on string like “length”, “copy”, “reverse”, truncate”.

To demonstrate the implementation of two dimensional array of characters.

Experiment t - 9 Functions

To demonstrate the call by value parameter passing method.

To demonstrate the call by reference parameter passing method.

Experiment - 10 Files

To demonstrate the creation of files and reading and writing files

Beyond/Additional Syllabus Experiments

Programs on Computer Graphics

Reference Books:

1. Programming in ANSI in C, E Balaguruswamy, Tata McGraw Hill
2. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing
3. Let us C, Yashavant P. Kanetkar, BPP Publication

Course Title: Basics of Electrical & Electronics Engineering.

Course Code: 24UFY1A4T

**Teaching Scheme: L – T – P
3 – 0 – 0**

Semester: I

Course Category: ESC

Total Credits: 03

Course Objectives:

1. To introduce basic ideas and principles of Electrical Engineering
2. To study construction and operation of electrical devices- transformers, generators and motors.
3. To acquire knowledge on fundamentals of semiconducting devices and Digital electronics.

Course Outcomes:

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

1. Acquire basic concepts of electric and magnetic circuit.
2. Analyze ac series circuits
3. Explain construction, working and applications of single-phase transformers and electric machines.
4. Discuss 3-phase power generation and basic power system.
5. Explain operation and applications of semiconducting devices – diode and BJT.
6. Comprehend with number system and logic gates.

Course Content:

UNIT I

Basics of electrical circuits. Equivalent resistance. Kirchoff's Laws. Current and Voltage division rule. Electrical Sources, Source Transformation.

Basics of Magnetic circuits and parameters, Right hand grip rule. Magnetomotive Force. Fleming's Left-hand Rule. Reluctance. Magnetic hysteresis and hysteresis loss. Faraday's laws of electromagnetic induction, Lenz's Law. Fleming's Right-hand rule. Comparison of Electric and Magnetic Circuits. **[6 Hours]**

UNIT II

Generation of alternating voltage. Values of alternating quantity, Form factor and peak factor. Concept of phasor and its mathematical representation. Concept of phasor diagram. Power in a.c. circuit. Concept of power factor, reactive power and apparent power with power triangle. Analysis of purely resistive (R), inductive (L), and capacitive (C) circuits. Concept of inductive and capacitive reactance. Analysis of series R – L, R – C, and R – L – C circuits for voltages and current, their waveforms, phasor diagram, impedance triangle, power factor. Series resonance. **[8 Hours]**

UNIT III

Transformer: - Introduction, Basic Principles, Construction, Phasor Diagram for Transformer under No Load Condition, Transformer on Load, Basic idea of Losses in transformer, Voltage Regulation and Efficiency. Introduction to Generator and Motors, Introduction, Working, Construction and applications of - 1) DC Motors 2) Induction Motors (3- phase) **[8 Hours]**

UNIT IV

Three phase AC generation, voltage and current relations in star and delta connections. Introduction to Power system- Introduction to Power Generation (Thermal, Hydro, Nuclear and Solar) with block schematic presentation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels. **[6 Hours]**

UNIT V

Application of semiconductor diodes: - Rectifier, Clipping and clamping circuits. Introduction to BJT- NPN and PNP, Modes of operation, Configuration and its Characteristics, BJT as switch and amplifier. **[8 Hours]**

UNIT VI

Number systems-binary, binary arithmetic, one's and two's complements arithmetic, decimal, octal and hexadecimal number system. Number system conversion, Basic gates, NAND and NOR operations, Exclusive – OR and Exclusive NOR operations, Examples of IC gates. **[6 Hours]**

Text Books:

1. D. C. Kulshretha, "Basic Electrical Engineering", Tata Mcgraw Hill, 2012.
2. S.K. Bhattacharya , "Basic Electrical and Electronics Engineering", Pearson Education, 2012.
3. Millman Halkias , "Electronic Devices and Circuits", Tata McGraw Hill, 2000

Reference Books:

1. Kothari D.P. and Nagrath I.J., "Theory And Problems of Basic Electrical Engineering," Prentice Hall
2. Edward Hughes, "Electrical Technology", Pearson Education , 2008
3. Basic Electrical Engineering A Web course of NPTEL by Day, Bhattacharya & Roy, Available:- www.nptel.ac.in
4. Anand Kumar, "Fundamentals of Digital Circuits", Second Edition, 2009, PHI
5. Malvino, Leach, "Digital Principles and Applications", Sixth Edition, 2006, McGraw Hill.

Course Title: Lab Basics of Electrical & Electronics Engineering.

Course Code: 24UFY1A4P

**Teaching Scheme: L – T – P
0 – 0 – 2**

Semester: I

Course Category: ESC

Total Credits: 01

List of Experiments:

- 1 To verify Kirchoff's laws for electric circuit.
- 2 To plot the B-H curve of transformer to study the behaviour of magnetic material
- 3 To study behavior of Resistance, Inductor and Capacitor
- 4 To study of AC Series circuits.
- 5 To determine Voltage regulation and efficiency of a single phase transformer by direct loading.
- 6 To Study of BJT as amplifier.
- 7 To study basic Gates and verify truth table
- 8 To study Universal gates and verify truth table.
9. To study operation of half wave and full wave rectifier.
10. To determine performance characteristics of transistor through virtual lab.
11. To determine performance characteristics of BJT and MOSFET through virtual lab.

Innovative Experiments:

Demonstration of cut out sections of transformer and machines.
Classify resistance and capacitors.

Course Title: Indian Traditional Knowledge

Course Code: 24UFY1A5T

Teaching Scheme: L – T – P

Semester: I

Course Category: IKS

Total Credits: 22 – 0 – 0

Prerequisites: Basic knowledge of Indian culture, tradition, art and science

Course Objectives: Students would be able to acquire basic understanding of rich heritage of Indian Knowledge System .

Course Outcomes: On completion of the course, students will be able to-

CO1 Interpret basics of Indian Knowledge system.

CO2 Integrate the teaching of Indian culture and civilization

CO3 Appreciate Indian artistic tradition.

CO4 Analyze Indian architectural system

Course Content:

UNIT I INTRODUCTION TO INDIAN KNOWLEDGE SYSTEM

Introduction & overview of Indian Knowledge system, The Vedic Corpus -Vedas, Types of Vedas, Upavedas, Types of Upavedas [8 Hours]

UNIT II INDIAN CULTURE AND CIVILIZATION

Indian culture and its characteristics, Indus valley civilization, Vedic civilization. [6 Hours]

UNIT III INDIAN ARTISTIC TRADITION

Indian Artistic tradition, Chitrakala- Indian style painting, Sangeet- Carnatic music & Hindustani music, Nritya: Indian dance forms [8 Hours]

UNIT IV INDIAN ARCHITECTURE AND TOWN PLANNING

The Importance of Sathapatya-veda, The ancient cities of the Indian Saraswati region - Harappa and Mohenjodaro civilization, Town planning and drainage system [6 Hours]

Suggested Self Readings

Text Books

- 1 Introduction to Indian Knowledge System by Mahadevan, B, Bhat, Vinayak Rajat, Nagendra Pavana R.N., Prentice Hall India Pvt., Limited, 2022.
- 2 Indian knowledge Systems, Kapil Kapoor, Avadhesh Kumar Singh, D.K, Printworld.
- 3 Traditional Knowledge System in India by Amit Jha, Atlantic Publishers, 2002
- 4 Indian Art & Culture (E), By Anurag Kumar, Arihant Publication India Limited, 2016
- 5 Indian Architecture by Percy Brown, D. B. Taraporevala sons & co. Pvt. Ltd., Bombay, 1959.
- 6 <https://prepp.in/news/e-492-indian-architecture-art-and-culture-notes>

Course Title: Skill Enhancement in Instrumental Techniques

Semester: I

Course Code: 24UFY1A6P

Course Category:SEC1

Teaching Scheme: L – T – P

Total Credits: 2-0 – 1– 2

OBJECTIVES: Vocational courses aims to:

1. Incorporate vocational education with mainstream education where students can study vocational courses along with their regular academic courses.
2. Combine theoretical knowledge with development of practical skills, to make student job ready and be ready to face life challenges.
3. Assist the students in selecting, preparing and acquire training for, entering and making rapid progress in the career or occupation of their choice.
4. It intends to provide students with opportunities to acquire various skills to meet the

needs of the industries and to improve the quality of education.

COURSE OUTCOMES: Students will be able -

- 1] To strengthen the skill by hands-on experimentation using concepts and ideas in Physics to explain world around us.
- 2] To execute Experimental Physics which has the most striking impact on the industry and research because of its vast applications.
- 3] To craft Physics goals for students that boost natural curiosity for ease in real life.

LIST OF EXPERIMENTS:

1. Testing of smoothness of Fiber/glass/lenses surfaces used in optical industry to ensure high quality as any imperfections or in distortion, aberrations and reduced optical performance.
2. Basic study of crystal structure using models of Bravais lattices (applicable for study of material) to determine the properties of a material by Crystal structure using models of Bravais lattices.
3. Testing of various circuit components using C.R.O. in industries for various purposes, including electronic testing, troubleshooting, waveform analysis, and signal visualization, enabling engineers and technicians to diagnose and monitor electrical signals and circuits with precision and accuracy.
4. Determination of thickness of thin films for the application of Anti-Reflection Coating in industries, such as optics, eyewear, camera lenses, and solar panels, to minimize light reflections, increase light transmission, and improve overall optical performance and efficiency of the products.
5. Hands on training of Soldering and Desoldering techniques in Electronics and other industries.
6. Practical use of Vernier Calliper and Screw Gauge for precise measurements of length, diameter, and thickness, ensuring accurate manufacturing processes and quality control.
7. Testing of magnetic properties of material using B-H curve in industries for designing and optimizing magnetic components and devices, such as transformers, inductors, and motors, to ensure efficient energy transfer and performance.
8. Determination of electrical conductivity using Hall effect in industries for various applications, such as non-contact sensing, flow measurement, and current measurement in electronic devices, enabling precise monitoring and control of processes and equipment.
9. Application of Optical Fiber in Photonic communication to transmit data as light pulses over long distances with minimal signal loss, enabling high-speed and reliable communication in telecommunications networks.
10. Inverse square law using Photovoltaic cell in industries that use photovoltaic cells to understand the relationship between solar irradiance and distance, ensuring proper placement and orientation of solar panels for maximum energy absorption and efficiency, which is the need of an era so as to save(water) and use(sunlight) the natural resources.
11. Find resolving power and dispersive power of plane diffraction grating in industries, such as spectroscopy, telecommunications, and laser technologies, where they are used to disperse and analyse light spectra, control light wavelengths, and improve optical signal processing.
12. Study of characteristics of photo- diode in industries for light detection and sensing applications, such as in optical communication, automotive sensors, barcode scanners, and medical devices, due to their fast response, high sensitivity, and low power consumption.
13. To determine the thickness of mica sheets used in aerospace, cosmetics, marine and other industries by biprism.

14. Study of Newton's law of cooling, specific heat of kerosene oil in Chemical industries for optimizing heat transfer processes, such as cooling systems and thermal management, ensuring efficient and cost-effective operations.
15. Use of Ultrasonic distance meter to measure the distance between the sensor and an object without physical contact in various industries by sending and receiving ultrasonic waves, finding applications in construction, manufacturing, and automation for accurate and non-contact distance measurements.
16. Determination of wavelength of light using Laser diffraction method in industries, including particle size analysis of powders and suspensions, characterization of aerosols, and monitoring of crystallization processes, enabling efficient quality control, formulation, and research in pharmaceuticals, food and beverages, mining, and materials manufacturing industries.

SECOND SEMESTER B. TECH. (AI & DS/ IIOT/RAI/ET/EC)

Course Title- Integral, Vector Calculus & Statistics

Course Code- 24UFY2B1T

Teaching Scheme: L-T-P

3 -1- 0

Semester -II

Course Category: BSC

Total Credits: 3+1

Prerequisites: Basic knowledge of integration, vectors and fundamental of statistics

Course Objectives:

The objective of this course is to provide solid mathematical foundation to the engineering students.

It aims to impart mathematical thinking to apply its concept in their respective disciplines.

Course Outcome:

On successful completion of the course, the students will learn:

CO1: To analyse length area volume using knowledge of curve tracing.

CO2: To solve multiple integral problems and apply it to various engineering problem.

CO3: Apply the process of vector differential in real world.

CO4: To demonstrate various applications using vector integral theorem.

CO5: To interpret and analyse the statistical data.

CO6: To relate various difference operator for evaluation of difference equation.

Course Content:

UNIT I: INTEGRAL CALCULUS

Beta and Gamma functions and their properties. Curve Tracing: Tracing of curves (Cartesian), Applications of definite integrals to find length of the curve, area, volume.

[8 Hours]

UNIT II: MULTIPLE INTEGRALS

Double integrals (Cartesian and Polar), Change of order of integration in double integrals, Change of variables (Cartesian to Polar). Applications: Area, Mass, Volume and Elementary triple integrals.

[8 Hours]

UNIT III: VECTOR CALCULUS - I

Vector triple product, Product of four vectors, Scalar point function, Vector point function, Vector differentiation, Gradient, Divergence and Curl, Directional derivatives, Solenoidal and Irrotational motions

[6 Hours]

UNIT IV: VECTOR CALCULUS II

Line integrals and Work done, Line, surface and volume integrals, Statement of Stoke's theorem, Gauss divergence theorem and Green's theorem (without proof), Simple applications of these theorems.

[6 Hours]

UNIT V: CORRELATION AND REGRESSION

Fitting of a Curve by Method of Least Squares: Straight line $y = a+bx$, Second degree parabola $y =$

$a+bx+cx^2$ and curves of the type $y = ae^{bx}$, $y = ab^x$ and $y = ax^b$, Coefficient of correlation and Lines of regression, Rank correlation. **[8 Hours]**

UNIT VI: FINITE DIFFERENCES

Operators E & Delta, Factorial polynomial, Lagrange's interpolation formula for unequal intervals of arguments. **[6 Hours]**

Text Books:

- (1) H.K Dass, Rama Verma, Rajnish Verma, V.J. Dagwal, Sajid Anwar and D.F. Shastrakar, Mathematics-I, Mathematics-II, S. Chand.
- (2) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- (3) P. N. Wartikar and J. N. Wartikar, Applied Mathematics, Volume I and II.
- (4) Chandrika Prasad, Advanced Mathematics for Engineers.

Reference Books:

- (1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
- (2) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. (2) Ramana B.V., Higher Engineering Mathematics, Tata Mc-Graw Hill, NewDelhi, 11th Reprint, 2010.
- (3) M. Spiegel, John Schiller, R.A. Srinivasan, Probability and Statistics (Schaum's Outline Series)

Course Title: Engineering Physics
Course Code: 24UFY2B2T
Teaching Scheme: L – T – P
3 – 0 – 0

Semester II
Course Category: BSC
Total Credits: 3

Prerequisites: Students should have basic knowledge of optics, laws of mechanics, electric and magnetic fields.

Course Objectives:

1. To introduce phenomena and applications of Modern Physics .
2. To demonstrate working and applications of various optoelectronic devices.
3. To provide a strong foundation in mathematical derivation and numerical problems.

Course Outcomes:

Students will be able to

- CO1.** Apply concepts in interference and diffraction to relevant engineering applications.
- CO2.** Apply the concepts of Quantum Mechanics and analyze relevant phenomena.
- CO3.** Classify solids on the basis of band theory and study of semiconductor devices. along with their applications.
- CO4.** Describe quantum transitions and apply it to the working of lasers.
- CO5.** Apply the basic concepts of motion of charged particles in electric and magnetic fields with its applications in electron optic devices and CRO.
- CO6.** Describe optical fibre structure, different modes, types and its engineering applications.

COURSE CONTENT:

UNIT I: WAVE OPTICS

Interference in thin films, Plane parallel thin film, Wedged shape thin film, Newton's rings, Anti-reflection coating, Advanced Applications. Fraunhofer diffraction & Fresnel diffraction, Diffraction grating, resolving power of grating and its expression. **[6 Hours]**

UNIT II QUANTUM MECHANICS

Planck's Hypothesis, Einstein's extension, Properties of Photons, Compton Effect, Wave-particle duality, de-Broglie Hypothesis. Wave function Ψ and normalization condition, concept of wave packets, Heisenberg Uncertainty Principle. Schrodinger wave equation (time dependent and time independent), Application to one dimensional infinite potential well. Quantum Computing: Operators, Eigen value and Eigen Function, Bra and Ket notations, Bits and Qubits. **[8 Hours]**

UNIT III SEMICONDUCTOR PHYSICS

Basic idea of free electron theory of metals, expression of conductivity of a metal. Formation of energy bands in Solids. Classification of solids on the basis of energy band diagram, concept of Fermi energy, Fermi level and Fermi Dirac Distribution function. Types of Semiconductor, P-N junction Diode- Energy band diagram in Forward bias and Reverse bias, V-I Characteristics of P-N junction

UNIT IV LASERS

Three quantum mechanical processes, Conditions for light amplification, Metastable state, Population inversion, Pumping and its types, Pumping schemes: Three level and Four level. Optical resonator, Laser beam characteristics, Coherence and its types, Ruby laser and He-Ne laser, Applications.

[6 Hours]**UNIT V ELECTRON OPTICS**

Motion of charged particle in uniform electric and magnetic fields, Velocity selector, Bethe's law of electron refraction, Electrostatic lens. Electro-optic devices: Cathode Ray Oscilloscope: Block Diagram, Function & working of each block, applications, Bainbridge Mass Spectrograph

[8 Hours]**UNIT VI OPTICAL FIBER**

Optical fibers: Structure and Propagation by total internal reflection, Acceptance angle, Numerical Aperture, Modes of propagation in fiber, classification of Optical Fiber based on Modes of propagation, refractive index and material. Attenuation and dispersion, Applications of optical fiber as Sensors and Fiber optic communication system. **[6 Hours]**

Text books:

1.A Textbook of Engineering Physics, Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar, S. Chand Publication.

Reference books:

1. P. M. Mathews and K. Venkatesan, A Textbook of Quantum Mechanics, Tata Mc Graw Hill(1977).
- 2.J. L. Powell and B. Crasemann, Quantum Mechanics, Narosa Publishing House (1993).
- 3.Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition, (1983).
- 4.A. J. Dekker, Solid State Physics, Prentice Hall of India (1971).
5. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles by R. Eisberg and R. Resnick, Wiley and Sons.
6. Engineering Physics, second edition, Sanjay Jain, G. Sahasrabudhe, University's Press(India) Pvt. Ltd.(2016).
7. D. J. Griffiths, Quantum mechanics, Prentice Hall of India Private Limited, New Delhi
8. L.I. Schiff, Quantum Mechanics, TMH Publications.
9. David Halliday, Robert Resnick, Jearl Walker, Principles of Physics, 10th Edition, JohnWiley and Sons (2017).
10. Quantum Mechanics, Theory and Applications, 3rd Edition, A.K. Ghatak and S. Lokanathan, Macmillan India Ltd. (1984).
11. Quantum computing for Computer Scientists, N. S. Yanofsky and M. A. Mannucci., Cambridge University Press. (2008).

Course Title: Lab-Engineering Physics
Course Code: 24UFY2B2P
Teaching Scheme: L – T – P
0 – 0 – 2

Semester II
Course Category: BSC
Total Credits: 1

LIST OF EXPERIMENTS: (PERFORM MINIMUM 8 EXPERIMENTS)

1. Determination of Radius of curvature of a plano convex lens by Newton's Rings.
2. Determination of Planck's constant by using LEDs.
3. Determination of Energy gap of semiconductor / thermistor.
4. Study of V-I characteristics of PN junction diode.
5. Study of Diode rectifier.
6. Study of V-I characteristics of Zener diode.
7. Study of V-I Characteristics of Light Emitting Diodes.
8. Study of V-I characteristics of PNP/NPN transistor in CB and CE mode.
9. Calibration of Time Base circuit of C.R.O. and determination of frequency of electrical signals.
10. Determination of phase of electrical signals using C.R.O..
11. Determination of AC and DC voltage using C.R.O.
12. Demonstration Experiment : Determination of wavelength of monochromatic light by diffraction grating using Laser source.
13. Virtual Lab Experiment

Innovative Experiments

1. To determine refractive indices of Quartz Prism using Sodium Vapour lamp by Birefringence method.
2. To determine refractive index of ordinary Glass prism using Mercury vapour lamp.

Text books:

1.A Textbook of Engineering Physics, Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar, S. Chand Publication.

Reference books:

1. P. M. Mathews and K. Venkatesan, A Textbook of Quantum Mechanics, Tata Mc Graw Hill(1977).
- 2.J. L. Powell and B. Crasemann, Quantum Mechanics, Narosa Publishing House (1993).
- 3.Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition, (1983).
- 4.A. J. Dekker, Solid State Physics, Prentice Hall of India (1971).
5. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles by R. Eisberg and R. Resnick, Wiley and Sons.
6. Engineering Physics, second edition, Sanjay Jain, G. Sahasrabudhe, University's Press(India) Pvt. Ltd.(2016).
7. D. J. Griffiths, Quantum mechanics, Prentice Hall of India Private Limited, New Delhi

8. L.I. Schiff, Quantum Mechanics, TMH Publications.
9. David Halliday, Robert Resnick, Jearl Walker, Principles of Physics, 10th Edition, JohnWiley and Sons (2017).
10. Quantum Mechanics, Theory and Applications, 3rd Edition, A.K. Ghatak and S. Lokanathan, Macmillan India Ltd. (1984).
11. Quantum computing for Computer Scientists, N. S. Yanofsky and M. A. Mannucci., Cambridge University Press. (2008).

CourseTitle: Digital Circuits and Logic Design
Course Code :24UFY2C3T
Teaching Scheme: L–T–P
3– 0– 0

Semester - II
Course Category:ESC
Total Credits: 3

Prerequisites: Students should have knowledge of number system and boolean algebra

Course Objectives:

Students will be able to

1. Study various logic gates and apply various optimization techniques to minimize digital circuits.
2. Study and design basic combinational logic circuits.
3. Study and design applications of combinational logic circuits.
4. Study and design basic sequential logic circuits.
5. Study and design applications of sequential logic circuits
6. Study of 8 bit microcontroller ATMEGA328P.

COURSEOUTCOMES:

Upon completion of this course, students will demonstrate the ability to:

- CO1: Describe the logic gates and apply various optimization techniques to minimize digital circuits.
- CO2: Design basic combinational logic circuits.
- CO3: Design applications of combinational logic circuits.
- CO4: Design basic sequential logic circuits.
- CO5: Design applications of sequential logic circuits.
- CO6: Describe 8 bit microcontroller ATMEGA328P

COURSECONTENT:

UNIT I LOGIC GATES & SIMPLIFICATION OF LOGIC FUNCTION

Analog Vs Digital system, Logic Gates and their truth tables, Basic gates implementation using universal gates. Representation of logic functions in SOP & POS forms. Simplification of logic functions using boolean algebra and K-Map (upto 4 variables). **[8 Hours]**

UNIT II COMBINATIONAL LOGIC DESIGN-I

Arithmetic Circuits, Design of Adder(Half and full), Subtractor (Half and full), Code converters, Comparator, Parity generators/checkers, unsigned multiplier. [8 Hours]

UNIT III COMBINATIONAL CIRCUIT DESIGN- II

Decoders, BCD - to - 7 segment decoder, Encoders, Priority Encoder, Multiplexer, demultiplexer, Multiplexer/Demultiplexer tree [6 Hours]

UNIT IV SEQUENTIAL CIRCUIT DESIGN-I

Latches, triggering circuits, Flip- Flops, Types of Flip-Flops as S-R , J-K, Master-Slave JK, D-type and T- type Flip-flops, Excitation table of flip-flops, Conversion of flip-flops. [6 Hours]

UNIT V SEQUENTIAL CIRCUIT DESIGN-II

Counters, Modulus of Counter, Types- Synchronous Counter and Asynchronous (Ripple) counter. Registers and shift registers. Applications of shift registers [8 Hours]

UNIT VI ATMEGA328P

Features, block diagram, flag register, general purpose registers, simple programming of ATMEGA328P and its applications (6 Hours)

Textbooks:

1. Morris Mano : “An approach to digital Design”, Pearson Publications.
2. R. P. Jain : “Modern digital electronics” , TMH Publications.

Reference books:

1. Wakerly Pearson : “Digital Design: Principles and Practices”, Pearson Education Publications.
2. Mark Bach : “Complete Digital Design”, Tata MCGraw Hill Publications.
3. W. Fletcher : “Engg. Approach to Digital Design”, PHI Publications.

Course Title: Digital Circuits and Logic Design Lab

Course Code :24UFY2C3P

Teaching Scheme: L–T–P

0– 0– 2

Semester - II

Course Category:ESC

Total Credits: 1

Course Objectives:

Students will be able to

1. Study various logic gates and apply various optimization techniques to minimize digital circuits.
2. Study and design combinational logic circuits.
3. Study and design sequential logic circuits.
4. Study and write program for 8 bit microcontroller (ATMEGA328P).

COURSE OUTCOMES:

Upon completion of this course, students will demonstrate the ability to:

CO1: Describe the logic gates and apply various optimization techniques to minimize digital circuits.

CO2: Design combinational logic circuits.

CO3: Design sequential logic circuits.

CO6: Execute 8 bit microcontroller (ATMEGA328P) programming

Sr. No.	Name of Experiments
1	To study basic gates and verify their truth tables
2	To realize Basic gates (AND,OR,NOT) From Universal Gates(NAND & NOR)
3	To Implement Logic function using K-map.
4	To Implement Half/full adder/Subtractor
5	To implement logic function using Multiplexer
6	To implement logic function using De-Multiplexer
7	To verify the truth table of one bit and two bit Comparators using logic Gates
8	To design a 3 bit Binary to Gray code Converter
9	To study BCD to Seven Segment display
10	To design Binary to Excess-3 code Converter
11	To design and verify the Truth tables of S-R , J-K, D-type and T- type Flip-flops
12	To design mod counter
13	Write a program for blinking of LED using arduino uno.
14	Write a program for generating different tones of buzzer using arduino uno.
15	Write a program to output temperature on serial port of arduino uno.

Beyond/Additional Syllabus Experiments:**1. Experiments on Virtual Lab****Reference Books:**

- 1) WakerlyPearon : "Digital Design: Principles and Practices", PearsonEducationPublications.
- 2) Mark Bach : "Complete Digital Design", Tata MCGraw Hill Publications.
- 3) W. Fletcher : "Engg. Approach to Digital Design", PHI Publications

Course Title: Computer Aided Graphics
Course Code: 24UFY2B4T
Teaching Scheme: L – T – P
1 – 0 – 0

Semester: II
Course Category: ESC
Total Credits:1

Prerequisites: Students must aware about drawing of geometrical entities.

Course Objectives: To acquire imagination and visualization skills to interpret data and convert it into technical drawings for effective communication and aware students about CAD software.

Course Outcomes: After the completion of the course the student will be able to

- CO1 **Construct** curves and draw the projections of points and straight lines located in first quadrant.
- CO2 **Interpret** multiview orthographic projections of different planes and solids by visualizing them in different positions and draw sectional views and develop surfaces of a given object.
- CO3 **Convert** pictorial view to orthographic views and prepare isometric drawings using the principles of isometric projection to visualize objects in three dimensions.
- CO4 **Practice** the use of CAD software tools to draw multiview orthographic projections and solid models of objects.

COURSE CONTENT

UNIT I

- a) Introduction to Engineering Drawing:* Definition, types of drawings, drawing instruments, sheet layouts, lettering, dimensioning, scales, geometric construction methods.
- b) Engineering Curves:* Classification and applications of Engineering Curves, Construction of Curves-I (Ellipse, Parabola) by Rectangle Method and Curves-II (Cycloids and Archimedean Spiral).
- c) Theory of Projection:* Projection system, types of projections, orthographic projection, principles of orthographic projection. (Only first angle projection method).
- d) Projections of a Point:* Different positions of a point w.r.t. to reference planes, projections of a point when it is placed in first quadrant.
- e) Projections of a Straight Line:* Different positions of a straight line w.r.t. to reference planes, projections of a straight line when it is inclined to both reference planes (Case-I and Case-II).

[3Hours]

UNIT II

- a) Projections of Planes:* Definition, types, different positions of a plane w.r.t. to reference planes, projections of a plane when its surface is incline to one R.P. and perpendicular to other R.P. (Two stages problems).
- b) Projections of Solids:* Definition, classification, different positions of a solid w.r.t. to reference planes, projections of a solid when its axis is incline to one R.P. and

parallel to the other R.P. (*Two stages problems*).

c) **Section of Solids:** Definition, types of section planes, types of section views, true shape of section, projections of different solids cut by different section planes. Section of solid when axis of a solid is perpendicular to one R.P. and parallel to the other R.P. (Excluding true shape of section) (*Single stage problems*).

d) **Development of surfaces of Solids:** Definition, need, applications, types of development, methods of development, development of surfaces of above cut solids. **[3Hours]**

UNIT III

a) **Orthographic Projection:** Conversion of Pictorial View(3D) into Orthographic (2D) views.

b) **Isometric View and Projection:** Definition, isometric and non-isometric lines, isometric planes and axes and isometric scale.

i) Construction of Isometric View from given orthographic views.

ii) Construction of Isometric Projection of assembly of two solids with concentric axes. **[4Hours]**

UNIT IV

1) **Introduction to Computer Aided Drawing:**

Definition of CAD, Role of CAD in design and development of new products, advantages and applications of CAD, CAD Softwares.

2) **Overview of CAD Software:**

b) Demonstrating knowledge of the theory of CAD software such as software screen, layout of the software, standard tool bar, shortcut menu, co-ordinate system and reference planes of 2D/3D environment.

b) Selection of drawing sheet sizes and scale; setting up drawing page and the printer including scale settings, setting up of units and drawing limits; printing of documents using the print command.

c) Basic commands for 2D drawings, applying dimensions to objects and applying annotations to drawings.

d) Creating two dimensional drawings with dimensions using suitable software.

e) Introduction to Solid Modeling: Basic commands for 3D drawings and creating 3D models of various components using suitable modeling software. **[4 Hours]**

Textbooks:

- 1) Engineering Drawing - with an Introduction to AutoCAD, Dhananjay A. Jolhe, Tata MacGraw Hills Publishing Company Ltd., 2nd Edition, 2008.
- 2) Engineering Drawing, N. D. Bhatt, V. M. Panchal and P. R. Ingle, Charotar Publishing House Pvt. Ltd., 53rd Edition, 2014.
- 3) A Textbook of Engineering Drawing, Dr. R. K. Dhawan, S. Chand and Company Pvt. Ltd., 2015.

Reference Books:

- 1) Engineering Graphics with An Introduction to AutoCAD, A. R. Bapat, Allied Publishers Pvt. Ltd., Revised Edition, 2013.
- 2) Engineering Graphics-I, Prof. M. L. Dabhade, Vision Publication, 9th Edition.
- 3) Engineering Graphics, Arunoday Kumar, Tech Mac Publication

Course Title: Lab: Computer Aided Graphics**Course Code: 24UFY2B4P****Category:ESC****Teaching Scheme: L- T- P
0- 0- 2****Semester: II
Course****Total Credit: 1**

LIST OF PRACTICALS:

Sheet No.	Title of Sheet	Hours
1	Engineering Curves	2
2	Projections of Straight Lines and Planes	2
3	Projections of Solids	4
4	Section of Solids and development of surfaces of Solids.	4
5	Orthographic Projection	4
6	Isometric View	4
7	Isometric Projection	4
8	Solid Modeling	6
	Total	30

Beyond/Additional Syllabus Practicals:

- 1) Applications of Straight Lines
- 2) Missing View using CAD Software

Reference Books:

- 1) Engineering Graphics with AutoCAD, D. M. Kulkarni, A. P. Rustogi and A. K. Sarkar, PHI learning Pvt. Ltd, Revised Edition, 2014.
- 2) Engineering Graphics with Auto CAD, Dr. H. G. Phakatkar, Nirali Prakashan, 3rd Edition, 2016.

Course Title: Elements of Artificial Intelligence
Course Code: 24UFY223T
Teaching Scheme: L-T-P
2-0-0

Semester: II
Course Category: PCC
Total Credits: 02

Prerequisite: Basic knowledge of computers and mathematics.

Course Objectives:

- 1 To understand the achievements of AI and the theory underlying those achievements
- 2 To make familiar with principles of AI toward problem solving, inference, perception, knowledge representation, and learning.

Course Outcomes:

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

- CO1** Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent. Agents.
- CO2** Analyze Different Uninformed search techniques
- CO3** Analyze Different Informed search techniques
- CO4** Demonstrate the basics of knowledge representation.

UNIT I INTRODUCTION TO AI

What is AI? ,The Turing test, Branches of AI, Brief history of AI, Applications of AI Challenges for the future, State space representation, Introduction to Intelligent Agents, structure of agents **[6 Hours]**

UNIT II

Basics of problem solving, Types of problems, Example on problems solving (toy problems and real world problems) , Basic idea behind search algorithms, Uninformed Search techniques, Depth first Search , Breadth First Search **[8 Hours]**

UNIT III

Heuristic Based Search, Greedy Best First Search, A* Search, AO* Algorithm

Local Search algorithms: Hill-climbing, Simulated Annealing, Genetic Algorithms. **[8 Hours]**

UNIT IV

Propositional Logic, Predicate Logic, Resolution, Forward and Backward Chaining, First Order Logic: Syntax and Semantics of FOL, Fuzzy logic, Introduction to Expert System

[6 Hours]

Text Books:

- 1) E.Rich and K. Knight, Artificial Intelligence, Tata McGraw Hill, 2008.
- 2) 2. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2015.
- 3) Artificial intelligence and soft computing for beginners by Anandita Das Bhattacharjee, Shroff Publishers
- 4) Artificial Intelligence – A Practical Approach : Patterson , Tata McGraw Hill, 3rd Edition

Reference Books:

- 1) Introduction to Artificial Intelligence – Charniak (Pearson Education)

Course Title: Electronics Components and Microprocessor
Course Code: 24UFY224T

Semester II
Course Category: PCC

Teaching Scheme: L – T – P
2 – 0 – 0

Total Credits: 02

Prerequisites : Basics of Digital Electronics: Binary, Hexadecimal Number system, Multiplexer/Demultiplexer, Encoder/Decoder, Latches, Buffers etc.

Course Objectives:

1. Differentiate active & passive components by observation, specification & application.
2. This course will make students aware of basic microprocessor architecture.
3. This course will give a base for microprocessor based application development.

Course Outcomes: At the end of this course students will be able to

1. Use various Active & passive components as per requirements and applications.
2. Explain the architecture and instructions of 8085.
3. Demonstrate assembly language programming for microprocessor.
4. Design 8085 based Interface of basic I/O devices.

Course Content:

UNIT I INTRODUCTION TO ELECTRONIC COMPONENTS

Registers: Fixed, Variable, DIP resistor, SIP Capacitors: Fixed, Variable, Electrolytic, Inductor: Wire wound, air-core, Diode: PN junction, Zener, LED, Transistor: NPN, PNP, Transformer: Stepup, Stepdown, Fuse, Electromechanical switches, electronic switches, Heat sink, Integrated Circuits(IC): 555, 741, 723, 7805, 7812, 7905, 7912 **[8 Hours]**

UNIT II INTRODUCTION TO 8085 MICROPROCESSOR

Architecture, Addressing Modes: Implicit, Immediate Addressing , Register Addressing, Direct Addressing, Register Indirect Addressing , PIN configuration, Timing Diagrams: Opcode Fetch, Memory Read/Write, I/O Read/Write, Flags and Status Registers. **[6 Hours]**

UNIT III 8085 INSTRUCTION SET

Data Transfer Instructions, Arithmetic group, Logical and Compare Group, Branch Control group, CALL, Stack, I/O and Machine Control Group. Basic assembly language programming concept and Practising Examples. Interrupts: Hardware/Software Interrupt concept, Interrupt Structure. **[8 Hours]**

UNIT IV INTERFACING OF MEMORY & I/O WITH 8085 MICROPROCESSOR

Memory mapped I/O and I/O mapped I/O. Address decoding, and interfacing of memory chips with 8085. Interfacing of I/O devices with 8085, LED & Switch interfacing using latches & buffer **[6 Hours]**

Suggested Self Readings

Text Books

- 1 Electronic Components And Materials, By Madhuri Joshi, Shroff Publisher & Distributer (SPD), Third Edition
- 2 Microprocessor Architecture, Programming and Applications with the 8085 By Ramesh Gaonkar, Penram International Publications

3 8 bit Microprocessor by V. J. Vibhute and Borole, Tech Max publication, Fifth Revised Edition.

Reference Books

- 1 An Introduction to microprocessor 8085 by D. K. Kaushik, Dhanpatrai Publishing Company.
- 2 Intel 8085 Family Microcontrollers Data Sheets.
- 3 Microprocessor and Interfacing-Programming and Hardware Tata McGraw-Hill Publishing Company Limited By Hall D. V
- 4 Microprocessor & Interfacing by A. P. Godse & Dr. D.A. Godse, Technical Publicatio, Pune

Course Title: Communication Skills

Course Code: 24UFY2B6T

Teaching Scheme: L – T – P

1 – 0 – 0

Semester II

Course Category: AEC

Total Credits: 1

Prerequisites: Basic knowledge of English language

Course Objectives: Students would be able to enhance their communication skills.

Course Outcomes: On completion of the course, students will be able to-

1. Construct grammatically correct sentences
2. Identify and overcome barriers of communication.
3. Demonstrate public speaking and presentation skills.
4. Prepare effective presentations.

COURSE CONTENT:

UNIT I INTEGRATED GRAMMAR

Types of tenses, change the voice, completion of sentences, transformation of sentences (assertive, affirmative, negative, interrogative, exclamatory) **[4 Hours]**

UNIT II VERBAL AND NON-VERBAL COMMUNICATIONS

Introduction to Communication, Types of Communication (Verbal and Non-verbal - Kinesics, Vocalics, Chronemics, Haptics, Proxemics), Barriers to communication and methods to overcome them. **[4 Hours]**

UNIT III SPEAKING SKILLS

Importance of public speaking, Essential steps for public speaking, Do's and Don'ts of Public speaking, Debating Skills. **[3 Hours]**

UNIT IV PRESENTATION SKILLS

Importance of effective presentation, Effective presentation Strategies, Preparation of Power Point Presentation **[3 Hours]**

Reference books:

1. Technical Communication by Meenakshi Raman and Sangeeta Sharma, OUP
2. Public Speaking and Influencing Men in Business by Dale Carnegie
3. Professional Communication Skills by Bhatia and Sheikh, S. Chand Publications
4. Communication Skills by Sanjeev Kumar and Pushpalata, OUP

5. Communication Skills by Lalita Bisen, Bhumika Agrawal, N.Thejo Kalyani, Himalaya Publishing House
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Course Title: Communication Skills Practical

Course Code: 24UFY2B6P

Teaching Scheme: L – T – P

0 – 0 – 2

Semester II

Course Category: AEC

Total Credits: 1

LIST OF EXPERIMENTS:

1. Barriers to Communication
2. Non-verbal Communication
3. Listening Skills
4. Reading Skills
5. Speaking Skills
6. Presentation Skills
7. Group Discussion
8. Interview Techniques

Beyond/Additional Syllabus Experiments

1. Development of Word Power

Suggested Self Readings

Suggested Text Books/Reference Books/ Web page (URL)/Research paper, etc.

- 1) Technical Communication by Meenakshi Raman and Sangeeta Sharma, OUP
- 2) Public Speaking and Influencing Men in Business by Dale Carnegie
- 3) Professional Communication Skills by Bhatia and Sheikh, S. Chand Publications
- 4) Communication Skills by Lalita Bisen, Bhumika Agrawal, N.Thejo Kalyani, Himalaya Publishing House

Course Title: Skill Enhancement in Analytical Techniques Semester II

Course Code: 24UFY2A7P

Course Category: SEC1

Teaching Scheme: L – T – P

Total Credits: 20 – 1 – 2

Objective:

- To promote the possibility of self-employment
- To eliminate the gap between knowledge-based education and market based demands.
- To develop the knowledge of chemistry useful for industries through experimental training
- To improve the attitude of Job responsibility, maintaining Social and environmental awareness.

The Course proposed, aims the engineers with the scope of employability in testing and analysis techniques to establish a linkage with mainstream disciplines, market and Industries. This hands-on practical course will provide the sound technical skills to the students in the direction of setting their own start-ups as medium or small scale Industries. This course focuses on training students on how laboratory techniques are carried out in industrial practices.

Proposed Course, which concentrate on experimental practices, includes the basics of characterization, training of standard testing methods and synthesis of technologically important materials, along with handling major and minor equipment and safety measures.

1. Analysis & Gradation of Coal samples found in the region (Moisture, Volatile matter, Fix Carbon & Ash)
2. Testing of lubricating oils used in Automobiles and Machines (Flash Point, Fire Point, Kinematic Viscosities, Acid Values))
3. Testing and analysis of chemical Bath (Electroplating Industries)
4. Testing of Adulteration in Oils (Saponification values)
5. Ore Analysis: Iron, Nickle and Copper ores by approved standard methods.
6. Analysis of water parameters (COD, pH, Alkalinity, Acidity, Conductivity etc. Dissolved Oxygen)
7. Synthesis of important compounds used in Electrical, Computer hardware, Pharmaceutical and other industries.
8. Testing of milk adulteration.
9. Soil Testing for farming and other applications, (pH, Acidity, Nutrients, Moisture)
10. Testing of common Drugs i.e., Paracetamol, Aspirin, Antacids etc.

