Shirpur Education Society's

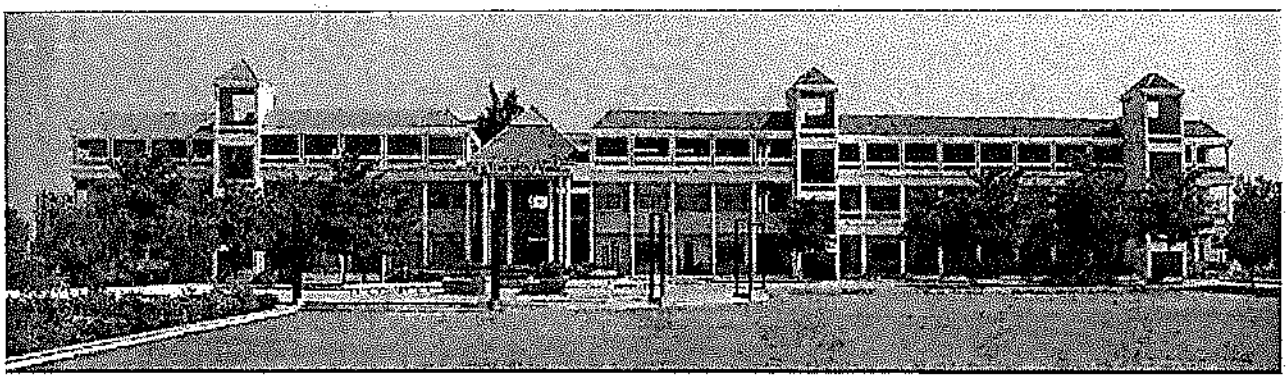
R. C. Patel Institute of Technology, Shirpur

(An Autonomous Institute)

Course Structure

First Year B.Tech (All Branches)

with efffect from Year 2022-23



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
Ph: 02563 259 802, Web: www.rcpit.ac.in

Semester-I		Group A					(Computer Engineering, Data Science , AI&ML)						
Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment				ESE	Total	
				L	T	P	TA [A]	Term Test 1 (TT1)	Term Test 2 (TT2)	Best of (TT1 & TT2) [B]	[C]	[A+B+C]	
1	BS	22BSFY1010T	Engineering Mathematics-I	4	1		20	15	15	15	65	100	5
2	ES	22ESFY1020T	Structured Programming using C	2			20	15	15	15	65	100	2
3	ES	22ESFY1020L	Structured Programming using C Laboratory			2	25					25	1
4	BS	22BSFY1030T/ 22BSFY2030T	Engineering Physics	3	1		20	15	15	15	65	100	4
5	BS	22BSFY1030L/ 22BSFY2030L	Engineering Physics Laboratory			2	25					25	1
6	ES	22ESFY1040T/ 22ESFY2040T	Computational Engineering Mechanics	3			20	15	15	15	65	100	3
7	ES	22ESFY1040L/ 22ESFY2040L	Computational Engineering Mechanics Laboratory			2	25					25	1
8	ES	22ESFY1050T/ 22ESFY2050T	Basic Electrical Engineering & Digital Electronics	3			20	15	15	15	65	100	3
9	ES	22ESFY1050L/ 22ESFY2050L	Basic Electrical Engineering & Digital Electronics Laboratory			2	25					25	1
			Total	15	2	8	200			75	325	600	21

Checked by

Head of the Department
HOD, Applied Science
R. C. Patel Institute of Technology
Shirpur, Dist: Dhule (MS)

COE
Controller of Examination
R. C. Patel Institute of Technology
Shirpur, Dist: Dhule (MS)

Dy. Director
DEPUTY DIRECTOR
R. C. Patel Institute of Technology
Shirpur Dist. Dhule (MS)

Director
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Shirpur Dist. Dhule (MS)

Semester-I	Group B			(E&TC, Electrical, Civil, Mechanical Engineering)									
Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment				ESE	Total	
				L	T	P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Best of (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	22BSFY1010T	Engineering Mathematics-I	4	1		20	15	15	15	65	100	5
2	ES	22ESFY1020T	Structured Programming using C	2			20	15	15	15	65	100	2
3	ES	22ESFY1020L	Structured Programming using C Laboratory			2	25					25	1
4	BS	22BSFY1060T/ 22BSFY2060T	Engineering Chemistry	3	1		20	15	15	15	65	100	4
5	BS	22BSFY1060L/ 22BSFY2060L	Engineering Chemistry Laboratory			2	25					25	1
6	ES	22ESFY1070T/ 22ESFY2070T	Engineering Graphics	3			20	15	15	15	65	100	3
7	ES	22ESFY1070L/ 22ESFY2070L	Engineering Graphics Laboratory			2	25					25	1
8	HM	22HMFY1080T/ 22HMFY2080T	Effective Communication Skills	2			20	15	15	15	65	100	2
9	HM	22HMFY1080L/ 22HMFY2080L	Effective Communication Skills Laboratory			2	25					25	1
10	ES	22ESFY1090L/ 22ESFY2090L	Workshop Practices			2	25					25	1
11	AU	22AUFY1100/ 22AUFY2100	Indian Knowledge Tradition (Non Credit)	1									0
			Total	15	2	10	225			75	325	625	21

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Semester-II		Group A						(Computer Engineering, Data Science , AI&ML)						
Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment				ESE		
				L	T	P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Best of (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	22BSFY2010T	Engineering Mathematics-II	4	1		20	15	15	15	65	100	5
2	ES	22ESFY2020T	Object Oriented Programming using Java	2			20	15	15	15	65	100	2
3	ES	22ESFY2020L	Object Oriented Programming using Java Laboratory			2	25					25	1
4	BS	22BSFY1060T/ 22BSFY2060T	Engineering Chemistry	3	1		20	15	15	15	65	100	4
5	BS	22BSFY1060L/ 22BSFY2060L	Engineering Chemistry Laboratory			2	25					25	1
6	ES	22ESFY1070T/ 22ESFY2070T	Engineering Graphics	3			20	15	15	15	65	100	3
7	ES	22ESFY1070L/ 22ESFY2070L	Engineering Graphics Laboratory			2	25					25	1
8	HM	22HMFY1080T/ 22HMFY2080T	Effective Communication Skills	2			20	15	15	15	65	100	2
9	HM	22HMFY1080L/ 22HMFY2080L	Effective Communication Skills Laboratory			2	25					25	1
10	ES	22ESFY1090L/ 22ESFY2090L	Workshop Practices			2	25					25	1
11	AU	22AUFY1100/ 22AUFY2100	Indian Knowledge Tradition (Non Credit)	1									0
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Semester-II		Group B					(E&TC, Electrical, Civil, Mechanical Engineering)						
Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment				ESE	Total	
				L	T	P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Best of (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	22BSFY2010T	Engineering Mathematics-II	4	1		20	15	15	15	65	100	5
2	ES	22ESFY2020T	Object Oriented Programming using Java	2			20	15	15	15	65	100	2
3	ES	22ESFY2020L	Object Oriented Programming using Java Laboratory			2	25					25	1
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5	BS	22BSFY1030L/ 22BSFY2030L	Engineering Physics Laboratory			2	25					25	1
6	ES	22ESFY1040T/ 22ESFY2040T	Computational Engineering Mechanics	3			20	15	15	15	65	100	3
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Engineering Mathematics - I (22BSFY1010T)

Semester-I

Teaching Scheme
Lectures : 04 Hrs./week
Practical : - - - -
Tutorial : 01 Hr/week
Credit : 05

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite Knowledge of

1. Inverse of a matrix, addition, multiplication and transpose of a matrix.
2. Algebra of Complex Numbers, Cartesian, polar and exponential form of complex number.

Course Objectives

1. To develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience using SciLab software to handle real life problems.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply principles of basic operations of matrices to find rank and echelon form of matrices to solve system of simultaneous equations.	L3	Apply
CO2	Illustrate the basic concepts of Complex numbers and apply the knowledge of complex numbers to solve problems in hyperbolic functions and logarithmic functions.	L4	Analyze
CO3	Illustrate the knowledge of Successive differentiation and Expansion of function.	L4	Analyze
CO4	Illustrate the basic principles of Partial differentiation and application to find maxima, minima, error and approximation.	L4	Analyze
CO5	Illustrate SciLab programming techniques to the solution of linear, non-linear and simultaneous algebraic equations.	L4	Analyze

Course Contents

Unit-I Matrices 07 Hrs.

Prerequisite: *Inverse of a matrix, addition, multiplication and transpose of a matrix*

Types of Matrices (Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, Unitary,Orthogonal Matrices), Rank of a matrix using Echelon forms,System of homogeneous and non – homogeneous equations, their consistency and solutions, Linear dependent and independent vectors.

Unit-II Complex Numbers, Hyperbolic function and Logarithm of Complex Numbers 11 Hrs.

Prerequisite: *Definition, algebra, polar and exponential form of complex numbers*

Review statement of D'Moivre's Theorem,Application of D'Moivre's Theorem:Find Expansion of $\sin^n\theta$, $\cos^n\theta$ in terms of sines and cosines of multiples of θ and Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$ and $\cos\theta$ and to find sum of the trigonometric series,Roots of complex number.

Circular functions of complex number and Hyperbolic functions,Inverse Circular and Inverse Hyperbolic functions, Separation of real and imaginary parts of all types of functions.

Logarithmic functions, Separation of real and Imaginary parts of Logarithmic functions.

Unit-III Successive differentiation and Expansion of Function 08 Hrs

Prerequisite: *Derivative*

Successive differentiation: n^{th} derivative of standard functions. Leibnitz's theorem (without proof) and problems.

Taylor's Theorem (Statement only), Taylor's series and Maclaurin's series (Statement only),Expansion of standard functions.

Unit-IV Partial Differentiation 10 Hrs

Prerequisite: *Derivative*

Partial Differentiation: Function of several variables, Partial derivatives of first and higher order, Differentiation of composite function, Total differentials and Implicit functions.

Euler's Theorem on Homogeneous functions with two and three independent variables (with proof). Deductions from Euler's theorem.

Unit-V Applications of Partial Differentiation 06 Hrs.

Prerequisite: *Maxima and Minima of single variable function, Partial derivatives*

Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint.

Introduction of errors and approximations.

Jacobian's of two and three independent variables,

Unit-VI Numerical Solutions of Transcendental Equations, System of Linear and Non-Linear Equations, Curve fitting 10 Hrs.

Prerequisite: *Solution of system of equations*

Solution of Algebraic and Transcendental Equations: Solution by (i) Newton Raphson Method. (ii) Regula –Falsi Method.(iii) Chebyshev Method

Solution of system of linear algebraic equations by Gauss Seidal Iteration Method.

Newton Raphson Method for system of Non-Linear equations

Curve fitting: Fitting a straight line, Quadratic curve, Exponential curve by Least-Squares Method.

Tutorials (including SciLab programs)

- Matrices.
- Complex Numbers.
- Hyperbolic and Logarithm of complex no.
- Successive Differentiation and Expansion of Function.
- Partial Differentiation.
- Application of Partial Differentiation.
- Solution of Transcendental Equations by Regula –Falsi Method.
- Solution of Transcendental Equations by Newton Raphson Method.
- Solution of Transcendental Equations by Chebyshev Method.
- Solution of system of linear algebraic equations by Gauss Seidal Iteration Method.
- Solution of system of non-linear algebraic equations by Newton Raphson Method.
- Curve Fitting.

Minimum eight tutorials batchwise (including SciLab programs) from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Reference Books

1. Foundations of Complex Analysis, S. Ponnusamy, Narosa Publications.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
3. Advanced Engineering Mathematics by H. K. Dass, 28th edition, S. Chand 2010.

4. Introductory Methods of Numerical Analysis, S.S. Sastry. Eastern Economy Edition.

5. Numerical Methods, M. K. Jain, R. K. Jain, S. R. K. Iyengar. New Age International Publishers.

6. Matrices. Shanti Narayan. S. Chand publication.

7. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill.

8. Elementary Linear Algebra with Application by Howard Anton and Christ Rorres, 6th edition, John Wiley and Sons, INC.

Text Books

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication.

2. Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright

Structured Programming using C (22ESFY1020T)

Semester-I

Teaching Scheme
Lectures : 02 Hrs./week
Credits : 02
Tutorial : - - - -
Practical : - - - -

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. None

Course Objectives

1. To familiarize with the logic of Computer Programming.
2. To provide exposure in developing algorithm, flowchart and thereby writing efficient codes for user defined problem.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Implement the programs in C language.	L3	Apply
CO2	Debug the C language programs.	L3	Apply

Course Contents

Unit-I Introduction to Computer, Algorithm and Flowchart 03 Hrs.

The Turing Machine architecture. The Von Neumann architecture. Number system.

Introduction to Operating System Components.

System and application software.

Basic constructs of Algorithm and flowchart: Sequence, Decision (Selection) and Repetition.

Compilation process: Syntax and semantic errors. ASCII.

Unit-II Fundamentals of C-Programming 04 Hrs.

Character Set, Identifiers and keywords, Data types, Constants, Variables.

Operators- Arithmetic, Relational and logical, Assignment, Unary, Conditional, Bitwise, Comma, and other operators. Expression, statements, Library Functions, Preprocessor.

Data Input and Output: getchar (), putchar (), scanf (), printf (), gets (), puts (), Structure of C program.

Unit-III Control Structures 05 Hrs.

Decision making with Branching: If statement, If-else Statement, Switch case statement.

Looping: while, do-while, for.

Nested control structure.

Continue statement, Break statement, goto statement.

Unit-IV Functions and Parameter 03 Hrs.

Function -Introduction of Function, defining a Function, accessing a Function, Function Prototype, Passing Arguments to a Function, Designing Recursive function.

Storage Classes –Auto, Extern, Static, Register.

Unit-V Arrays, String, Structure 07 Hrs.

Array- Concepts, Declaration, Definition, accessing array element, One-dimensional and Multidimensional array, Passing Arrays to Function.

String- Basics of String, Functions in string.h, user defined function for String handling.

Structure- Declaration, Initialization, structure within structure, Operation on structures, Array of Structure, Structure padding.

Unit-VI Pointers 04 Hrs.

Introduction, Definition and uses of Pointers, Address Operator, Pointer Variables, Double pointer. Pointer Arithmetic. Call by value, call by Reference. Pointer to Array and Pointer to Structure.

Reference Books

1. Behrouz Forouzan, "Basics of Computer Science" , Cengage Learning.
2. M. G. Venkateshmurthy, "Programming Techniques through C", Pearson Publication.
3. E. Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education.
4. Pradeep Day and Manas Gosh, "Programming in C", Oxford University Press.
5. Yashwant Kanetkar, "Let Us C", BPB Publication.

Text Books

1. K. R. Venugopal and Sudeep R. Prasad, "MASTERING C", Tata McGraw-Hill Publications.
2. Behrouz Forouzan, "A Computer Science –Structure Programming Approaches using C", Cengage Learning.
3. Byron S. Gottfried, "Programming with C", Schaum's Outline Series, 2nd Edition, Tata McGraw-Hill, 2006.

Structured Programming using C Laboratory (22ESFY1020L)

Semester-I

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
Total : 25 Marks

Course Objectives

1. To familiarize with the logic of Computer Programming.
2. To provide exposure in developing algorithm, flowchart and thereby writing efficient codes for user defined problem.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Implement the programs in C language.	L3	Apply
CO2	Debug the C language programs.	L3	Apply

List of Practicals/ Experiments/ Assignments

1. Write a program to swap two variables values with and without using third variable. Write algorithm and draw flowchart for the same.

2. Write a program to check odd or even number: (a) using modulus operator (b) using conditional operator.

3. Design and develop a C program to read a year as an input and find whether it is leap year or not. Also consider the end of the centuries. Write algorithm and draw flowchart for the same.

4. Write a C program to find the sum of individual digits of a 3-digit number.

5. Design and develop a flowchart or an algorithm that takes three coefficients (a, b, and c) of a Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.

6. Write a program to count the number of digits in a given integer.

7. Write a menu driven program to perform simple arithmetic operations based on the user's choice. The user will indicate the operation to be performed using the signs e.g. + for addition, etc. Write an algorithm and draw flowchart for same.

8. Write a program to read a number of more than one digit, reverse the number and display the sum of digits of numbers. Write algorithm and draw flowchart for the same.

9. Write programs to display each of the following patterns. Write algorithm and draw flowchart for the same.

A)
```
1
2 1
3 2 1
4 3 2 1
5 4 3 2 1
```

B)
```
        A
      A B A
    A B C B A
  A B C D C B A
A B C D E D C B A
```

10. Write a C program to find maximum and minimum between two numbers using functions. Write algorithm and draw flowchart for the same.

11. Write a C program to find GCD of two integers by using recursive function. Write algorithm and draw flowchart for the same.

12. Write a C program to find both the largest and smallest number in a list of integers. Write algorithm and draw flowchart for the same.

13. Develop, implement and execute a C program that reads two matrices A (m x n) and B (p x q) and Compute product of matrices A and B. Read matrix A and matrix B in row major order and in column major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only.

14. Write a program for deletion of an element from the specified location from Array.

15. Write a C program using user defined functions to determine whether the given string is palindrome or not.

16. Write C program to count the number of lines, words and characters in a given text.

17. Write a program to swap two numbers using a function. Pass the values to be swapped to this function using the call-by-value method and call-by-reference method. Write algorithm and draw flowchart for the same.

18. Write a C program to find the length of the string using Pointer.

19. Write a program to copy one array to another using pointer.

20. Write a program to compare two strings using pointers.

The distribution of marks for Teacher Assessment shall be as follows:
Laboratory work (Performance in practical sessions and submission of practical journals): **25 Marks**

The final certification and acceptance of Teacher Assessment will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher Assessment.

Reference Books

1. M. G. Venkateshmurthy, "Programming Techniques through C", Pearson Publication.
2. E. Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education.
3. Pradeep Day and Manas Gosh, "Programming in C", Oxford University Press.
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2. Behrouz Forouzan, "A Computer Science –Structure Programming Approaches using C", Cengage Learning.
3. Byron S. Gottfried, "Programming with C", Schaum's Outline Series, 2nd Edition, Tata McGraw-Hill, 2006.

Engineering Physics (22BSFY1020T)

Semester-I/II

Teaching Scheme
Lectures : 02 Hrs./week
Practical : - - - -
Tutorial : 01 Hr/week
Credit : 04

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Foundations of physics and mathematics till HSc or equivalent is necessary to comprehend engineering physics curriculum effectively.

Course Objectives

1. Identify and understand the fundamental physical principles underlying engineering technologies a prerequisite to become successful engineer.
2. To provide inclusive knowledge of fundamental physical principles encouraging engineering students to venture in research field.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Relate the scope and foundation of quantum mechanics and quantum computing and its role in development of modern technology	L2	Understand
CO2	Apply the foundations of Optics and Photonics in precision measurements indispensable for the development of modern communication technology	L3	Apply
CO3	Relate and interpret the basics of Electrodynamics, which are prerequisite in modern developments for signal communications, Antenna Theory etc.	L2	Understand
CO4	Assimilate the wide scope of the essential properties of Superconductors in current and futuristic frontier applications and explore basic sensing techniques for physical measurements in modern instrumentation.	L2,L4	Understand, Analyze

Course Contents

Unit-I QUANTUM PHYSICS AND COMPUTING 09 Hrs.

Prerequisite: *Origin of Quantum mechanics and its comparison with classical mechanics. Dual nature of radiation. Photoelectric effect. Davisson-Germer experiment. single slit experiment*

Introduction (Plane waves. wave equation. interaction of matter with radiation. Concept of refractive index. Matter waves, De Broglie hypothesis. Wave Packet), Concept of Phase velocity and group velocity and relation with particle velocity. Heisenberg Uncertainty Principle, Wave function; Physical interpretation of wave function. Schrodinger's time dependent wave equation; time independent wave equation; Particle trapped in one dimensional infinite potential well.

Fundamentals of Quantum Computing (Difference between classical computing and quantum computing, Qubits, Quantum Superposition theorem, Quantum Entanglement theorem, Quantum cryptography).

Unit-II OPTICS FOR ENGINEERS 11 Hrs.

Prerequisite: *Wave front and Huygens's principle, reflection and refraction. interference. Constructive and destructive interference. Young's double slit experiment. diffraction, comparison of Fresnel diffraction and Fraunhofer diffraction*

Introduction to linear and nonlinear optics, Thin Film Interference:Introduction (division of amplitude), Stoke's relation, Interference in thin film of constant thickness in reflected light, Formation of colors in thin film (point source and extended source); Interference in Wedge shaped film: Formation of Newton's rings; Applications.

Diffraction: Introduction (distinguish between interference and diffraction), Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at single slit, Double slit, Diffraction Grating, Absent spectra, Resolving power of a grating, Dispersive power of a grating, Applications. Non-linear Optics: Principle, Classification of nonlinear materials, Properties and Applications.

Unit-III PHOTONICS AND FIBRE OPTICS 06 Hrs

Prerequisite: *absorption, recombination, energy bands of p-n junction, refractive index of a material, Snell's law. Total internal reflection*

Laser: Spontaneous emission and Stimulated emission; Einstein's coefficients, Metastable state, Resonant cavity, Population inversion, three and four level lasers, types of pumping, Helium Neon laser; Nd:YAG laser, CO2 laser, Pulsed lasers, Applications.

Fiber optics: Structure of an optical fiber, Types: Single mode and Multimode. Step index and Graded index, Numerical Aperture for step index fiber, Modes of propagation, V number Attenuation and Dispersion, Applications.

Unit-IV ELECTRODYNAMICS 05 Hrs

Prerequisite: *Coulomb's law-force between two-point charges, electric field due to a point charge, electric field due to a dipole, Cartesian cylindrical and Spherical co-ordinate system, Gauss's law for electrostatics and magnetostatics Faraday's Law, Ampere's circuital law*

Scalar and Vector fields, Physical significance of gradient, curl and divergence in Cartesian co-ordinate system, Divergence theorem, Stokes theorem, Maxwell's equations (Free space and time varying fields) and Applications.

Unit-V SUPERCONDUCTORS 04 Hrs.

Prerequisite: *Scattering of electrons, Tunnelling effect, Electrical resistivity and conductivity, Temperature dependence of resistance.*

Properties (Superconductivity, Critical temperature, Critical magnetic field, Critical Current, BCS theory, Meissner's effect, AC and DC Josephson Junctions), Type I and Type II and high Tc superconductors, Applications (MAGLEV, SQUIDS).

Unit-VI PHYSICS OF SENSORS 04 Hrs.

Prerequisite: *Transducer concept, meaning of calibration, piezoelectric effect, drift velocity, carrier concentration, mobility, IR waves*

Ultrasonic sensors: Concept of inverse piezoelectricity, use of piezoelectric transducer as ultrasonic generator, Applications.

Light sensors: (Photodiode, LDR, Phototransistor, Solar Cell), Hall sensor: (Principle of Hall effect, Applications), IR sensor: (Principle and Applications).

Tutorials:

Batchwise tutorial sessions are to be conducted on topics covering entire syllabus for effective interactive sessions focusing on better understanding of the subject. Students must be encouraged to perform minimum 8 tutorials (conducted as Problem solving sessions, Assignments, Power point presentations, Mini Project presentations, Report writing etc.) and submit the same. A Mini project in a group of maximum 5 students, relevant to the subject may be included, which would help the learner to apply the concept learnt.

Reference Books

1. Introduction to Quantum Mechanics- David. J. Griffiths, Cambridge university Press.
2. An Introduction to Quantum Computing Phillip Kaye Oxford Press.
3. Quantum Computing for everyone Chris Bernhardt the MIT Press.
4. Fundamentals of optics by Jenkins and White, McGraw Hill

5. Concepts of Modern Physics- Arther Beiser, Tata McGraw Hill.

6. Introduction to Electrodynamics- D. J. Griffiths, Pearson publication.

7. Instrumentation and Measurement Techniques by Albert D. Helfrick and William D. Cooper (PHI) Edition.

8. MHandbook of Modern Sensors Physics design and application- Jacob Fraden, Springer, AIP press.

Text Books

1. A textbook of Engineering Physics-Avadhanulu and Kshirsagar, S. Chand.

2. Problems in Engineering Physics- Avadhanulu and Kshirsagar, S. Chand.

3. A textbook of Engineering Physics, S. O. Pillai, New Age International Publishers.

4. A textbook of Optics - N. Subramanyam and Brijlal, S. Chand.

5. Fundamentals of nonlinear optics- Peter E. Powers and Joseph W. Haus CRC Press.

6. Quantum Mechanics: Theory and Applications-Ajoy Ghotak and S. Lokanathan.

7. Modern Engineering Physics – Vasudeva, S. Chand.

8. Engineering Physics- Wiley.

9. Engineering Physics – R K Gaur and S L Gupta, Dhanpat Rai Publications.

10. Engineering Physics – Shatendra Sharma and Jyotsna Sharma, Pearson publications.

11. Engineering Physics – D. K. Bhattacharya and Poonam Tandon, Oxford publications.

12. Engineering Physics – V Rajendran, McGraw Hill Educations.

13. Optics - Ajay Ghatak, Tata Mc Graw Hill.

14. Electronic Instrumentation –H.S. Kalsi, Tata Mc Graw-Hill Education.

Engineering Physics Lab (22BSFY2010L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To provide hands-on experience of basic physics instruments.
2. To introduce students to the modern equipments, precision techniques and experimental methods for observing, understanding and verifying laws optics.
3. To provide students with a basic understanding of the Physics concept through experiments that may be required by engineers in the course of their careers.
4. To introduce the learners with the basics of light wave and electron conduction in semiconductor to facilitate his learning of the concepts in modern physics.
5. This course will cultivate skills for formulating and solving physics problems.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Develop skill to impart practical knowldge in real time solution	L6	Create
CO2	Ability to state and verify various laws which they have studied, through experiments	L3	Apply
CO3	Understand principle, concept, working and application of new tehnology and comparision of results with theoretical calculations	L2	Understand
CO4	Gain knowldge of new concept in the solution of pratical oriented problem and to understand more deep knowldge about the solution to therotical knowldge	L2	Understand

List of Practical /Experiments/Assignments:

Students are must perform minimum eight experiments from given list.

1. Determination of Planck's constant using LED.
2. Determination of wavelength using Diffraction grating and Hg source.
3. Determination of wavelength using Diffraction grating and Na source.
4. Determination of width of a slit using single slit diffraction experiment (laser source).
5. Determination of width of a double slit using (laser source).
6. Study of I-V characteristics of Photo diode.
7. Study of ultrasonic distance meter/interferometer.
8. Determination of radius of curvature of a lens using Newton's ring set up.
9. Determination of grating element & no. of lines/cm using Ruler.
10. Simulation experiments on sensors.
11. Determination of grating element or wavelength using Diffraction grating (Laser source).
12. Study of divergence of laser beam.
13. Determination of diameter of wire/hair or thickness of paper using Wedge shape film method.
14. Determination of grating element & no. of lines/cm using CD.
15. Determination of Numerical Aperture of an optical fiber.

Reference Books

1. Introduction to Quantum Mechanics- David. J. Griffiths, Cambridge university Press.
2. An Introduction to Quantum Computing Phillip Kaye Oxford Press.
3. Quantum Computing for everyone Chris Bernhardt the MIT Press.
4. Fundamentals of optics by Jenkins and White, McGraw Hill
5. Concepts of Modern Physics- Arther Beiser, Tata McGraw Hill.
6. Introduction to Electrodynamics- D. J. Griffiths, Pearson publication.
7. Instrumentation and Measurement Techniques by Albert D. Helfrick and William D. Cooper (PHI) Edition.
8. MHandbook of Modern Sensors Physics design and application- Jacob Fraden, Springer, AIP press.

Text Books

1. A textbook of Engineering Physics-Avadhanulu and Kshirsagar, S. Chand.
2. Problems in Engineering Physics- Avadhanulu and Kshirsagar, S. Chand.

3. A textbook of Engineering Physics, S. O. Pillai, New Age International Publishers.

4. A textbook of Optics - N. Subramanyam and Brijlal, S. Chand.

5. Fundamentals of nonlinear optics- Peter E. Powers and Joseph W. Haus CRC Press.

6. Quantum Mechanics: Theory and Applications-Ajoy Ghotak and S. Lokanathan.

7. Modern Engineering Physics – Vasudeva, S. Chand.

8. Engineering Physics- Wiley.

9. Engineering Physics – R K Gaur and S L Gupta, Dhanpat Rai Publications.

10. Engineering Physics – Shatendra Sharma and Jyotsna Sharma, Pearson publications.

11. Engineering Physics – D. K. Bhattacharya and Poonam Tandon, Oxford publications.

12. Engineering Physics – V Rajendran, McGraw Hill Educations.

13. Optics - Ajay Ghatak, Tata Mc Graw Hill.

14. Electronic Instrumentation –H.S. Kalsi, Tata Mc Graw-Hill Education.

Computational Engineering Mechanics (22ESFY1040T/22ESFY2040T)

Semester-I/II

Teaching Scheme
Lectures : 03 Hrs./week
Practical : - - - -
Tutorial : - - - -
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Basics of Trigonometry and Matrices.
2. Newton's Laws of motion.

Course Objectives

1. To acquaint learners with the concept of equilibrium.
2. To familiarize learners to analyze the motion of moving particles/bodies.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Illustrate the effect of force and moment and apply the same along with the concept of equilibrium systems with the help of FBD.	L3	Apply
CO2	Correlate real life application to specific type of friction and estimate required force to overcome friction.	L4	Analyze
CO3	Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the relation.	L6	Create
CO4	Understand the concept of geometric transformations of an element/object.	L2	.Understand
CO5	Analyze general plane motion of rigid bodies.	L4	Analyze
CO6	Analyze problems on statics and dynamics using software packages.	L4	Analyze

Course Contents

Unit-I Computation and analysis of System of Forces (Co-planar) 07 Hrs

Prerequisite: *Basics of Physics*

Concept of force. Principle of transmissibility. Composition and resolution of forces. Moment of force about a point. Varignon's Theorem. Various systems of forces. Couples. Force couple system. Resultant of coplanar force system.

Unit-II Computation and analysis of Equilibrium Systems 07 Hrs.

Prerequisite: *Basics of Physics*

Conditions of static equilibrium. Free body diagram. Various types of supports and support reactions. Equilibrium of Connected Bodies.

Types of Beams and various types of loads. Determination of reactions at supports for beams.

Unit-III Computation and analysis of Frictional Forces: 07 Hrs.

Prerequisite: *Basics of Physics*

Concept of Static Friction and Dynamic/ Kinetic Friction, Laws of dry friction, Coefficient of Friction, Angle of Friction, Concept of Cone of friction. Angle of Repose.(Wedge and Ladder friction excluded.), Belt friction, Power transmitted by flat belt drives.

Unit-IV Kinematics of Particle: 07 Hrs.

Prerequisite: *Basics of Physics*

Rectilinear motion. Motion curves (a-t, v-t, s-t curves). Curvilinear Motion including projectile motion.

Unit-V Robot Kinematics (Part-I) Geometric Transformations 05 Hrs

Prerequisite: *Basics of Physics & Matrices*

2D transformations: Translation, Scaling, Rotation; Matrix representation and Homogeneous Coordinates; Composite transformation; Other transformations: Reflection and Shear; Raster method for transformation.

3D Transformations: Translation, Rotation, Scaling and Reflection.

Unit-VI Robot Kinematics (part-II) 06 Hrs.

Prerequisite: *Basics of Physics*

General Plane motion of Rigid body. The concept of Instantaneous center of rotation (ICR) for the

velocity. Velocity analysis of rigid body using ICR.

Forward Kinematics and Inverse Kinematics. Applications of Mechanics in Robotics. Machine Learning and AI.

Reference Books

1. R. C. Hibbeler. Enginering Mechanics. Pearson education, 12th Edn., 2010.
2. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics". 3rd Edn., Vikas Publishing House Pvt. Ltd., 2005.
3. Beer, F. P. and Johnston, E. R., Vector Mechanics for Engineers - Statics and Dynamics, 3rd Edn., Tata McGraw Hill Publishing Company, 2001.
4. Bhattacharya B., Engineering Mechanics, 3rd Edn., Oxford University press, 2008.
5. Ramkumar Agarwal, Engineering Mechanics, 1st Edn., Agarwal Education Centre: Self Publication, 2021.
6. Nelson and Mc Lean, Engineering Mechanics, 5th Edn., Tata McGraw Hill, 1997.
7. Harsh Bhasin, Python For Beginners, 1st Edn., New Age International Publishers, 2018.
8. M. Groover, CAD/CAM: Computer-Aided Design and Manufacturing, 1st Edn., Pearson Education India, 2013.
9. Rudra Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, 1st Edn., Oxford University Press, 2010.

Text Books

1. A. K. Tayal, Engineering Mechanics, 14th Edn., Umesh Publication, 2011.
2. S. Ramamrutham, Engineering Mechanics, Dhanpat Rai Publishing company, 2016.

Computational Engineering Mechanics Laboratory (22ESFY1040L/22ESFY2040L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To study basic laws of engineering mechanics and its applications to solve the problems.
2. To introduce concept of friction and to find coefficient of friction.
3. Introduction of programming software packages for solving engineering mechanics problem.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand basic principles of mechanics	L2	Understand
CO2	Analyze the law's of forces for coplaner, concurrent force systems	L5	Evaluate
CO3	Analyze the characteristics of coplaner, non concurrent force systems	L5	Evaluate
CO4	Determine coefficients of friction and coefficients of restitution	L5	Evaluate
CO5	Use software programming packages for solving Engineering Mechanics problems	L3	Apply

List of Practicals/Experiments:

Part I- List of Lab experiments

1. Verification of Polygon law of coplanar forces.
2. Verification of law of Moment using Bell crank lever.
3. Determination of Support reaction for beam.
4. Determination of coefficient of friction using Inclined plane.
5. Verification of Lami's theorem using Jib crane.
6. Resultant of non-concurrent non-parallel coplanar force system.
7. Determination of coefficient of restitution for Collision of elastic bodies (Law of conservation of momentum).

Part II- List of Programming Exercises

Introduction to programming software packages (Python/Matlab/Scilab or any other suitable software),

8. Programming exercises on determination of Resultant of Coplanar Force System. (Application of software packages for determination of Resultant.)
9. Programming exercises on determination of Support Reaction. (Application of software packages for analysis of bodies in equilibrium.)
10. Programming exercises on Friction. (Application of software packages for computation of friction forces.)
11. Plotting of Motion Curves. (Application of software packages for plotting of motion curves.)
12. Programming exercises on transformations of basic geometric 2D elements. (Programming for transformations of basic geometric 2D elements.)
13. Simulating Kinematics of Rigid Body. (Application of software packages for simulating Kinematics of Rigid Body.)

Laboratory work should contain total 8 experiments/exercises (Any six from 1 to 7 and any two from 8 to 13).

Reference Books

1. R. C. Hibbeler, Enginering Mechanics, Pearson education, 12th Edn., 2010.

2. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edn., Vikas Publishing House Pvt. Ltd., 2005.

3. Beer, F. P. and Johnston, E. R., Vector Mechanics for Engineers - Statics and Dynamics, 3rd Edn., Tata McGraw Hill Publishing Company, 2001.

4. Bhattacharya B., Engineering Mechanics, 3rd Edn., Oxford University press, 2008.

5. Ramkumar Agarwal, Engineering Mechanics, 1st Edn., Agarwal Education Centre: Self Publication, 2021.

6. Nelson and Mc Lean, Engineering Mechanics, 5th Edn., Tata McGraw Hill, 1997.

7. Harsh Bhasin, Python For Beginners, 1st Edn., New Age International Publishers, 2018.

8. M. Groover, CAD/CAM: Computer-Aided Design and Manufacturing, 1st Edn., Pearson Education India, 2013.

9. Rudra Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, 1st Edn., Oxford University Press, 2010.

Text Books

1. A. K. Tayal, Engineering Mechanics, 14th Edn., Umesh Publication, 2011.

2. S. Ramamrutham, Engineering Mechanics, Dhanpat Rai Publishing company, 2016.

Basic Electrical Engineering & Digital Electronics (22ESFY1050T/22ESFY2050T)

Semester-I/II

Teaching Scheme
Lectures : 03 Hrs./week
Practical : 02 Hrs./week
Tutorial : - - - -
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Knowledge of basic physics.
2. Knowledge of basic mathematics.

Course Objectives

1. To develop basic understanding of concepts of DC and AC circuits, and analyse their operations using various methods and techniques.
2. To get an insight of various digital electronics.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the knowledge of theorems/laws to analyse the DC circuits.	L3	Apply
CO2	Analyse single phase AC circuits.	L4	Analyse
CO3	Demonstrate knowledge of basic number system, logic gates and sequential circuits.	L3	Apply
CO4	Illustrate the working principle behind the electronic components used to build a drone.	L2	Understand

Course Contents

Unit-I DC Circuits 05 Hrs.

Prerequisite: *Basic terminologies of Electrical and Electronic circuit , Crammer's rule for matrix*

- Introduction to ideal and practical voltage and current sources
- Kirchhoff's current and voltage laws
- Mesh and nodal analysis
- Supernode and supermesh analysis

Unit-II DC Network Theorems 06 Hrs.

Prerequisite: *Series / parallel combination of resistances and power sources*

- Source transformation and star – delta connections
- Superposition Theorem
- Thevenin's Theorem and Norton's Theorem
- Maximum Power Transfer Theorem

Unit-III AC Circuits 11 Hrs

Prerequisite: *Basic terminologies of Electrical engineering, Electromagnetic Induction*

- Generation and representation of alternating voltage and currents
- RMS and Average value
- Phasor representation
- AC through resistance, inductance and capacitance
- R-L-C series, parallel circuits
- Series resonance
- Calculation of power and power factor

Unit-IV Number Systems and Logic Gates 06 Hrs

Prerequisite: *Base and Base value of number system*

- Review of number system
- Binary code, Binary coded decimal, Octal code, Hexadecimal code and conversions
- Basic gates

- Universal gates
- Boolean algebra
- De Morgan's theorem

Unit-V Latches and Flip flops 06 Hrs.

Prerequisite: *Truth Table*

- Introduction to latches and flip-flops: RS, JK, T, D flip-flops
- Introduction to counters: design of 2-bit asynchronous counter
- Introduction to registers

Unit-VI Introduction to drones 05 Hrs.

Prerequisite: *Basic terminologies of Drones*

- Introductions to drones
- Sensors
- Controllers
- Actuators
- Electronic assembly
- Applications of drones

Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. R.R. Singh, "Basic Electrical Engineering", Tata McGraw Hill, 2019.
4. E. Hughes, "and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
6. M. Morris Mano, "Digital design", Prentice Hall India.
7. Garg, P. K, "Unmanned Aerial Vehicles: An Introduction". Stylus Publishing, LLC, 2021.
8. Kimon P. Valavanis, "Handbook of Unmanned Aerial Vehicles", Volume 4, Springer Netherlands, 2014.

Text Books

1. B. R. Patil, "Basic Electrical Engineering", Oxford Higher Education, 2016.

2. R. S. Sedha. "A textbook of Electronic Devices and Circuits". S. Chand. 2002.

3. R. P. Jain. "Modern Digital Electronics". McGraw Hill. 2011.

4. Noam Nisan and Shimon Schocken. "Elements of Computing Systems". MIT Press. 2012.

5. Syed Omar Faruk Towaha. "Building Smart Drones with ESP8266 and Arduino". Packt Publishing. 2018.

6. Barnhart. R. Kurt. Douglas M. Marshall. and Eric Shappee. eds. "Introduction to unmanned aircraft systems". CRC Press. 2021.

Basic Electrical Engineering & Digital Electronics Laboratory (22ESFY1050L/22ESFY2050L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To analyzing the given DC network and verify different DC network theorems.
2. To understand the concepts of logic gates, universal gates and design the combinational circuits.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the knowledge of DC theorems/laws to analyse the DC circuits.	L3	Apply
CO2	Verify the different DC theorem	L3	Apply
CO3	Verify and analyze the truth table of different logic gate and circuits.	L3	Apply
CO4	Design and implement combinational logic circuits.	L6	Create

List of Practical /Experiments/Assignments:

Laboratory: Suggested experiments

1. Study of basic laboratory instruments. (compulsory)
2. Mesh and Nodal analysis.
3. Verification of Superposition Theorem.
4. Verification of Thevenin / Norton / Maximum Power Transfer Theorem.
5. Study of R-L and R-C series circuits.
6. R-L-C series resonance circuit.
7. Verification of truth table for gates.
8. Implementing a given logic function using basic gates/SSI ICs.
9. Implementing a given half adder / full adder using basic gates/SSI ICs.
10. Implementing 'X' bit asynchronous counter using JK / T flip-flops.

NOTE: Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. R.R. Singh, "Basic Electrical Engineering", Tata McGraw Hill, 2019.
4. E. Hughes, "and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
6. M. Morris Mano, "Digital design", Prentice Hall India.
7. Garg, P. K, "Unmanned Aerial Vehicles: An Introduction". Stylus Publishing, LLC, 2021.
8. Kimon P. Valavanis, "Handbook of Unmanned Aerial Vehicles", Volume 4, Springer Netherlands, 2014.

Text Books

1. B. R. Patil. "Basic Electrical Engineering". Oxford Higher Education. 2016.

2. R. S. Sedha. "A textbook of Electronic Devices and Circuits". S. Chand. 2002.

3. R. P. Jain. "Modern Digital Electronics". McGraw Hill. 2011.

4. Noam Nisan and Shimon Schocken. "Elements of Computing Systems". MIT Press. 2012.

5. Syed Omar Faruk Towaha. "Building Smart Drones with ESP8266 and Arduino". Packt Publishing. 2018.

6. Barnhart, R. Kurt, Douglas M. Marshall, and Eric Shappee, eds. "Introduction to unmanned aircraft systems", CRC Press. 2021.

Engineering Chemistry
(22BSFY1060T/22BSFY2060T)

Semester-I/II

Teaching Scheme
Lectures : 03 Hrs./week
Practical : - - - -
Tutorial : 01 Hr/week
Credit : 04

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Properties of light and spectrum, wavelength and wave number.
2. Basic process of polymerization and its properties and types.

Course Objectives

1. To obtain a strong hold on basic concepts of Chemistry that form fundamental principles of technology.
2. To give exposure to recent material development in the field of engineering.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand new approaches of analysis, which are more convenient, less hazardous and sustainable to perform.	L2	Understand
CO2	Understand applications based on nanomaterials and modern polymers in engineering techniques.	L2	Understand
CO3	Rationalize properties of materials and alloys with phase transformation and analyze the quality of fuel for energy efficiency.	L5	Evaluate
CO4	Suggest suitable methods of water treatment and identify the parameters responsible for water pollution.	L2	Understand

Course Contents

Unit-I Spectroscopic Techniques and Applications 07 Hrs.

- Introduction: Electromagnetic spectrum, its origin, properties and applications. Numericals based on energy of photon.
- Spectroscopy: Principle, classification and types
- Relation between electromagnetic spectrum, spectroscopy types and energy changes.
- Flame Photometry: Principle, Instrumentation, working, applications, interferences, advantages and disadvantages.
- Jablonski diagram, Introduction to florescence and phosphorescence,
- Applications of fluorescence.

Unit-II Engineering Materials 07 Hrs.

Nanomaterials:

- Introduction to nanomaterials
- Fullerenes: Properties and applications
- Carbon nanotubes: Types, Properties, Method of preparation (Laser, CVD), Applications

Polymers:

- Compounding of plastic, Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding.
- Effect of heat on polymers (glass transition temperature), Viscoelasticity.
- Conducting Polymers and applications

Unit-III Green Chemistry 06 Hrs.

- Introduction: Definition, significance.
- Twelve Principles of green chemistry.
- Conventional and green synthesis of :(i) Carbaryl (ii) Indigo (iii) Adipic acid (iv) Disodium iminodiacetate (v) Acrylamide
- Percentage atom economy (Numericals).

- Green solvent: Supercritical CO_2

Unit-IV Fuels and Combustion 07 Hrs.

- Introduction: Definition, classification, characteristics of a good fuel.
- Calorific value: Definition, Units, Gross or Higher calorific value and Net or lower calorific value. Dulongs formula and numerical for calculations of Gross and Net calorific values.
- Analysis of coal- Proximate and Ultimate Analysis (theory and numericals).
- Combustion: Calculations for requirement of oxygen and air (by weight and by volume) for given fuels.
- Power alcohol
- Green fuel: Biodiesel (Synthesis and advantages)

Unit-V Phase Rule and Applications 06 Hrs.

- Phase Rule-Gibb¡¦s Phase Rule, Terms involved with examples.
- One Component System (Water).
- General characteristics of two component system.
- Reduced Phase Rule.
- Two Component System (Pb- Ag).
- Eutectic system: Applications and Numericals.
- Advantages and Limitations of Phase Rule.

Unit-VI Water Technology 06 Hrs.

- Introduction - Impurities in water.
- Hardness of water- units, types and numericals.
- Determination of hardness of water by EDTA method and numericals.
- Softening of water by Ion Exchange process and numericals.
- BOD, COD- Definition, significance and numericals.

Tutorials: Minimum eight tutorials based on syllabus will be conducted batchwise. Mini project relevant to the subject may be included, which would help the learner to apply the concept learnt.

Reference Books

1. Engineering Chemistry - Wiley India (ISBN - 9788126519880)
2. A Textbook of Engineering Chemistry - Shashi Chawla (DhanpatRai)
3. Concise Inorganic Chemistry - J D LEE
4. Essentials of Physical Chemistry - B S Bahl. Arun Bahl. G D Tuli.
5. Fundamentals of molecular spectroscopy - Colin N. Banwell (Tata McGraw-Hill Publications)
6. Green Chemistry - V.K. Ahluwalia (Narosa Publications)
7. Basic Atomic and Molecular Spectroscopy - J. Michael Hollas (Royal Society of Chemistry)
8. Nanotechnology: An Introduction to Synthesis, Properties and Applications of Nanomaterials - Thomas Varghese and K.M. Balakrishna (Atlantic)

Text Books

1. Engineering Chemistry - Jain and Jain (DhanpatRai)
2. Engineering Chemistry - Dara and Dara (S Chand)
3. Elementary Organic Spectroscopy - Y.R. Sharma (S Chand)
4. An introductory text on green chemistry: for undergraduate students - Indu Tucker Sidhwani, Rakesh Kumar Sharma (Wiley)
5. Nanomaterials - A.K. Bandyopadhyay (New Age Publishers)

Engineering Chemistry Laboratory (22BSFY1060L/22BSFY2060L)

Semester-I/II

Practical Scheme
Practical : 02 Hrs./week
Tutorial : - - - - -
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To learn basic laboratory concepts of Chemistry through experimental procedures.
2. To apply the knowledge of chemistry to understand the properties of engineering materials.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Measure some properties of water such as chloride content and hardness of water.	L1	Remember
CO2	Estimate the percentage value of moisture content of coal sample and Zn or Cu in brass.	L4	Analyze
CO3	Measure pH of different solutions and surface tension by specific instruments.	L1	Remember
CO4	Analyze the properties of oils such as saponification value and acid value.	L4	Analyze

Suggested Experiments:

1. To determine Chloride content of water by Mohr's Method.
2. To determine total, temporary and permanent hardness of water sample by EDTA method.
3. To determine pH of different solutions using pH meter.
4. Determination of percent of Zn/Cu in brass.
5. Molecular weight determination of polymers by Oswald Viscometer.
6. Synthesis of UF, PF, Nylon 66.
7. Determination of COD.
8. Determination of surface Tension of a given liquid at room temperature using Stalgmometer by drop number method.
9. Determination of percent of Fe in Plain carbon steel.
10. Determination of Moisture content of coal.
11. Determination of Ash content of coal.
12. Saponification value of oil.
13. Acid value of oil.
14. To estimate the emf of Cu-Zn system by Potentiometry.
15. To determine ëmax of a given solution by using UV Spectrophotometer.
16. To validate Beer-Lambert law using UV Spectrophotometer/ colorimeter.
17. To determine metal ion concentration using colorimeter.
18. Determination of strength of a given solution (Acid/Base) by using conductometric titration.
19. Construction of concentration cell and determination of emf by potentiometry.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included and the same will be conducted batchwise, which would help the learner to apply the concept learnt.

Reference Books

1. Engineering Chemistry - Wiley India (ISBN - 9788126519880)

2. A Textbook of Engineering Chemistry - Shashi Chawla (DhanpatRai)

3. Concise Inorganic Chemistry - J D LEE

4. Essentials of Physical Chemistry - B S Bahl. Arun Bahl. G D Tuli.

5. Fundamentals of molecular spectroscopy - Colin N. Banwell (Tata McGraw-Hill Publications)

6. Green Chemistry - V.K. Ahluwalia (Narosa Publications)

7. Basic Atomic and Molecular Spectroscopy - J. Michael Hollas (Royal Society of Chemistry)

8. Nanotechnology: An Introduction to Synthesis. Properties and Applications of Nanomaterials - Thomas Varghese and K.M. Balakrishna (Atlantic)

Text Books

1. Engineering Chemistry - Jain and Jain (DhanpatRai)

2. Engineering Chemistry - Dara and Dara (S Chand)

3. Elementary Organic Spectroscopy - Y.R. Sharma (S Chand)

4. An introductory text on green chemistry: for undergraduate students - Indu Tucker Sidhwani, Rakesh Kumar Sharma (Wiley)

5. Nanomaterials - A.K. Bandyopadhyay (New Age Publishers)

Engineering Graphics
(22ESFY1070T/22ESFY2070T)

Semester-I/II

Teaching Scheme
Lectures : 03 Hrs./week
Practical : - - - -
Tutorial : 01 Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Basics of geometrical constructions

Course Objectives

1. Students should be able to visualize the objects.
2. They should be able to understand and read drawing.
3. To impart and inculcate proper understanding of the theory of projection.
4. They should be able to present the same.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Recognize the value of engineering graphics, as a language of engineers.	L3	Apply
CO2	Construct orthographic views of lines, and basic shapes of solids.	L3	Apply
CO3	Interpret and sketch orthographic and sectional orthographic views of various machine components.	L3	Apply
CO4	Visualize objects, and draw isometric views.	L3	Apply
CO5	Build 2D sketches using Auto CAD.	L3	Apply

Course Contents

Unit-I — 09 Hrs.

Introduction to Engineering Drawing:

Types of Lines. Dimensioning Systems as per IS conventions.

Orthographic projections:

- Different views of simple machine parts as per the first angle projection method recommended by I.S.
- Full Sectional views of Simple Machine parts.

****Drawing of orthographic projections using Auto CAD**

****Introduction to Auto CAD:**

Basic Drawing and Editing Commands. Knowledge of setting up layers. Dimensioning, Hatching, plotting and Printing.

Unit-II — Isometric Views — 05 Hrs.

Isometric Views/Drawings of blocks (plain and cylindrical, excluding spheres).

****Drawing of Isometric Views using Auto CAD.**

Unit-III — @ Engineering Curves — 03 Hrs.

Involute of circle (problems on string only). Cycloid - Plane cycloid (circle rolling in one direction only).

Unit-IV — Projection of Points and Lines — 05 Hrs.

Lines inclined to both the Reference Planes. (Excluding Traces) First Quadrant only.

Unit-V — **Projection of Solids — 08 Hrs.

(Prism, Pyramid, Cylinder & Cone only) Projections of Solids with the axisinclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum). Use change of position or Auxiliary plane method.

Unit-VI — 09 Hrs.

@ Section of solids:

Sections of Prism, Pyramids, Cylinder & Cone, cut by plane perpendicular to at least one reference plane. (Exclude Curved Section Plane). Use change of position or Auxiliary plane method.

@ Development of Surfaces:

Lateral surface development of Prism, Pyramid, Cylinder, Cone with section plane inclined to HP or VP only. (Exclude Reverse Development)

** Should be covered during Auto CAD Practical.
@ Should be covered only in Term work. i.e. Questions will not be asked for the End Semester Examination.

Reference Books

1. K. Venugopal (2007), 'Engineering Drawing and Graphics + AutoCAD, New Age International Publishers.

2. M. L. Dabhade (2008), 'Engineering Drawing, Vision Publications.

3. Dhananjay A. Jolhe, 'Engineering Drawing with an Introduction to AutoCAD, Tata McGraw Hill Education Private Limited.

Text Books

1. N. D. Bhatt, 'Engineering Drawing', Charotar Publishing House.

2. M. B. Shah and B. C. Rana "Engineering Drawing', Pearson Education.

Engineering Graphics Lab
(22ESFY1070L/22ESFY2070L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. Students should be able to visualize the objects.
2. They should be able to understand and read drawing.
3. To impart and inculcate proper understanding of the theory of projection
4. They should be able to present the same

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Recognize the value of engineering graphics, as a language of engineers	L2	Remember
CO2	Construct orthographic views of lines, and basic shapes of solids	L3	Apply
CO3	Interpret and sketch orthographic and sectional orthographic views of various machine components	L3	Apply
CO4	Visualize objects, and draw isometric views	L4	Analyse
CO5	Build 2D sketches using Auto CAD	L4	Create

Suggested Exercises

1. Orthographic Projections model 1 Using Auto CAD.
2. Orthographic Projections model 2 Using Auto CAD.
3. Sectional Orthographic Projections model 1 Using Auto CAD.
4. Sectional Orthographic Projections model 2 Using Auto CAD.
5. Sectional Orthographic Projections model 3 Using Auto CAD.
6. Isometric Views model 1 Using Auto CAD.
7. Isometric Views model 2 Using Auto CAD.
8. Isometric Views model 3 Using Auto CAD.
9. Projection of solids (Prism and Pyramid only) model 1 Using Auto CAD.
10. Projection of solids (Prism and Pyramid only) model 2 Using Auto CAD.
11. Layout Planning using AutoCAD for PCB.
12. Layout Planning using AutoCAD for Motherboard.

Minimum eight exercises from the above suggested list covering all the topics or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Reference Books

1. K. Venugopal (2007), 'Engineering Drawing and Graphics + AutoCAD', New Age International Publishers.
2. M. L. Dabhade (2008), 'Engineering Drawing', Vision Publications.
3. Dhananjay A. Jolhe, 'Engineering Drawing with an Introduction to AutoCAD', Tata McGraw Hill Education Private Limited.

Text Books

1. N. D. Bhatt, 'Engineering Drawing', Charotar Publishing House.
2. M. B. Shah and B. C. Rana 'Engineering Drawing', Pearson Education.

Effective Communication Skills (22HMFY2060T)

Semester-I/II

Teaching Scheme
Lectures : 02 Hrs./week
Practical : - - - -
Tutorial : - - - -
Credit : 02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Basic proficiency in English Language

Course Objectives

1. To acquaint learners with the basics of communication with a focus on LSRW
2. To develop the learner's proficiency in public speaking skills
3. To enable learners to use the principles of business writing for effective communication
4. To impart strategies for personal development

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Use skills related to the various aspects of communication to express ideas with greater clarity	L3	Apply
CO2	Apply appropriate verbal/non-verbal cues in social and workplace situations and overcome the barriers to communication.	L3	Apply
CO3	Employ personal development strategies for self-assessment, goal setting and maintaining a professional persona online.	L6	Create

Course Contents

Unit-I FUNDAMENTALS OF COMMUNICATION 10 Hrs.

1.1 Introduction to theory of Communication

- Definition
- Objectives
- The Process of Communication

1.2 Methods of Communication

- Verbal Communication
- Non-verbal Communication

1.3 Barriers to Communication

- Physical/Environmental
- Mechanical
- Linguistic
- Psychological
- Socio-Cultural

1.4 Channels of communication in an organization

- Formal (Upward, Downward and Horizontal)
- Informal (Grapevine)

Unit-II SPEAKING SKILLS 02 Hrs.

2.1 Developing Verbal Aptitude

- Meaning of Words in Context
- Synonyms and Antonyms
- Identifying Common Errors
- Subject - Verb Agreement
- One Word Substitution
- Pairs of Confused Words

- Articles
- Prepositions

2.2 Public Speaking

- Planning your speech
- Delivery of speech (Vocalics and Body Language)
- Dealing with stage fear

Unit-III READING SKILLS 03 Hrs.

3.1 Mechanics of Reading

3.2 Undesirable Reading Habits

3.3 Types of Reading

3.4 Guidelines for Improving Reading Skills

3.5 Reading Comprehension

3.6 Summarization Techniques

Unit-IV LISTENING SKILLS 02 Hrs.

4.1 Purpose of Listening

4.2 Process of Listening

4.3 Barriers to Listening

4.4 Techniques for Improving Listening Skills

Unit-V WRITING SKILLS 06 Hrs.

5.1 Professional Letter Writing

- Seven Cs of Business Correspondence
- Parts of a Formal Letter
- Complete Block Format
- Types of Letters (Request, Grievance and Sales)

5.2 Email Communication

- Popularity of Email

- Problems in Email Communication
- Techniques for Writing Effective Emails
- Email etiquette

Unit-VI PERSONAL DEVELOPMENT PLANNING 03 Hrs.

6.1 Self- Assessment strategies (SWOT Analysis)

6.2 Digital Footprints-Maintaining a Professional Persona

6.3 Goal Setting

Books Recommended

1. Hemphill, P. D., McCormick, D. W., & Hemphill, R. D. (2001). Business Communication with Writing Improvement Exercises. Upper Saddle River, NJ: Prentice Hall.
2. Locker, Kitty O. Kaczmarek, Stephen Kyo. (2019). Business Communication: Building Critical Skills. Place of publication not identified: Mcgraw-hill.
3. Murphy, H. (1999). Effective Business Communication. Place of publication not identified: Mcgraw-Hill.
4. Raman, M., & Sharma, S. (2016). Technical Communication: Principles and Practice. New Delhi: Oxford University Press.
5. Kaul, A. (2015). Effective Business Communication. Place of publication not identified: Prentice-Hall of India.
6. Rizvi, A. M. (2010). Effective Technical Communication: A guide for scientists and engineers. New Delhi: Tata McGraw Hill.
7. Lewis, N. (2014). Word Power Made Easy. Random House USA.
8. Sanjay Kumar & Pushp Lata (2018). Communication skills with CD. New Delhi: Oxford University Press.
9. Mathew, Shirley (2019). Communication Skills. Technical Publication.
10. Koneru, A. (2018). Professional Communication. McGraw Hill.

Effective Communication Skills Laboratory (22HMFY2060L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To acquaint learners with the basics of communication with a focus on LSRW
2. To develop the learner's proficiency in public speaking skills
3. To enable learners to use the principles of business writing for effective communication
4. To impart strategies for personal development

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Use skills related to the various aspects of communication to express ideas with greater clarity	L3	Apply
CO2	Apply appropriate verbal/non-verbal cues in social and workplace situations and overcome the barriers to communication.	L3	Apply
CO3	Employ personal development strategies for self-assessment, goal setting and maintaining a professional persona online.	L6	Create

List of Practicals/Assignments:

1. Self Introduction
2. Group Discussion
3. Mock Press
4. Extempore
5. Expansion of an Idea
6. Technical Description of an Object

Any Five Practicals/assignments from above .

Books Recommended

1. Hemphill, P. D., McCormick, D. W., & Hemphill, R. D. (2001). Business Communication with Writing Improvement Exercises. Upper Saddle River, NJ: Prentice Hall.
2. Locker, Kitty O. Kaczmarek, Stephen Kyo. (2019). Business Communication: Building Critical Skills. Place of publication not identified: Mcgraw-hill.
3. Murphy, H. (1999). Effective Business Communication. Place of publication not identified: Mcgraw-Hill.
4. Raman, M., & Sharma, S. (2016). Technical Communication: Principles and Practice. New Delhi: Oxford University Press.
5. Kaul, A. (2015). Effective Business Communication. Place of publication not identified: Prentice-Hall of India.
6. Rizvi, A. M. (2010). Effective Technical Communication: A guide for scientists and engineers. New Delhi: Tata McGraw Hill.
7. Lewis, N. (2014). Word Power Made Easy. Random House USA.
8. Sanjay Kumar & Pushp Lata (2018). Communication skills with CD. New Delhi: Oxford University Press.
9. Mathew, Shirley (2019). Communication Skills. Technical Publication.
10. Koneru, A. (2018). Professional Communication. McGraw Hill.

Engineering Mathematics - II (22BSFY2010T)

Semester-II

Teaching Scheme
Lectures : 04 Hrs./week
Practical : - - - -
Tutorial : 01 Hr/week
Credit : 05

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite Knowledge of

1. Methods of integration.
2. Methods of differentiation.
3. Basics of differential equations.

Course Objectives

1. The course is aimed to develop the Mathematical and basic Statistical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience in using SciLab software to handle real life problems.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Illustrate the concepts of Beta and Gamma function, DUIS and rectification of plane curves.	L4	Analyze
CO2	Apply the concepts of Multiple Integrals.	L3	Apply
CO3	Solve various types of First Order and Higher Order differential equations.	L3	Apply
CO4	Apply the basic concepts of Descriptive Statistics.	L3	Apply
CO5	Apply the principles of Numerical Method for solving differential equation and numerical integration analytically and using SciLab.	L3	Apply

Course Contents

Unit-I Beta and Gamma Function, Differentiation under Integral sign and Rectification 10 Hrs.

Prerequisite: *Derivative,Integration*

Beta and Gamma functions and its properties.

Differentiation under integral sign with constant limits of integration.

Tracing of curves – Cardioid, Strophoid, Bernoulli's Lemniscate, Astroid, Cycloid, 3D Solids – Sphere, Cone, Cylinder, Paraboloid.

Rectification of plane curves in Cartesian form.

Rectification of curve in Parametric and Polar forms.

Unit-II Multiple Integrals 13 Hrs.

Prerequisite: *Integration*

Double Integration :

Introduction, Evaluation of Double Integrals. (Cartesian & Polar).

Evaluation of double integrals by changing the order of integration.

Evaluation of integrals over the given region. (Cartesian & Polar).

Evaluation of double integrals by changing to polar coordinates(using Jacobian).

Application of double integrals to compute Area and Mass.

Triple integration :

Introduction and evaluation of triple integral using Cartesian co – ordinate system.

Evaluation of triple integrals using cylindrical and spherical coordinate systems.

Application of triple integrals to compute volume.

Unit-III Differential Equations of First Order and First Degree 06 Hrs.

Prerequisite: *Differential Equations, Variable seperable form*

Exact differential Equations. Equations reducible to exact form by using four rules of integrating factors.

Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation.

Simple application of differential equation of first order and first degree to Engineering problem.

Unit-IV Higher Order Linear Differential Equations with Constant Coefficients and Variable Coefficients:

09 Hrs

Prerequisite: *Unit-II*

Linear Differential Equation with constant coefficient- complementary function, particular integral

of differential equation of the type $f(D)y = X$ where X is e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$, x^m, $x^m \sin ax$, $x^m \cos ax$, $e^{ax}V$, xV.

Method of variation of parameters (upto 3^{rd} order).

Cauchy's homogeneous linear differential equation and Legendre's differential equation

Applications of Higher order differential equation (upto 2^{nd} order).

Unit-V Descriptive Statistics 07 Hrs.

Prerequisite:

Measure of Central Tendency : Arithmetic Mean (simple and weighted), Median, Mode, Geometric Mean, Harmonic Mean.

Measure of Dispersion: Range, Semi-inter quartile range, Mean absolute deviation, Standard deviation, Variance, Coefficient of variation.

Moments: Raw and Central moments up to fourth order and relationships among them.

Measure of Skewness and Kurtosis based on moments.

Unit-VI Numerical solution of ordinary differential equations of first order and first degree, Numerical Integration 07 Hrs.

Prerequisite: *Solution of Differential Equation*

Numerical solution of ordinary differential equation using (a) Taylor series method (b) Euler method, (c) Modified Euler method (d) Runge-Kutta method of order four.

Numerical integration by (a) Trapezoidal rule (b) Simpson's $1/3^{rd}$ rule (c) Simpson's $3/8^{th}$ rule (all without proof).

Tutorials (including SciLab programs)

- Beta and Gamma Functions, DUIS and Rectification of plane curves.
- Double integration.
- Triple Integration.
- Application of multiple integrals.
- Differential Equation of First Order and First Degree.
- Higher Order Differential Equation.
- Descriptive Statistics.
- Curve Tracing.
- Numerical Integration by Trapezoidal rule.

- Numerical Integration by Simpson's 1/3rd rule.
- Numerical Integration by Simpson's 3/8th rule.
- Ordinary Differential Equation.
- Numerical Solution of Ordinary Differential Equations using Euler's method.
- Numerical Solution of Ordinary Differential Equations using Modified Euler's method.
- Numerical Solution of Ordinary Differential Equations using Runge-Kutta fourth order method.

Minimum eight tutorials batchwise (including SciLab programs) from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Reference Books

1. Calculus, Thomas and Finney, Pearson Education.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
3. Advanced Engineering Mathematics by H. K. Dass, 28th edition, S. Chand 2010.
4. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill.
5. A First Course in Differential Equations with Modelling Applications, Dennis G. Zill.

Text Books

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright.
3. Fundamental of Statistics, S.C. Gupta, Himalaya Publication.

Object Oriented Programming using Java (22ESFY2020T)

Semester-II

Teaching Scheme
Lectures : 02 Hrs./week
Credits : 02
Tutorial : - - - -
Credit : 02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Basics of Programming

Course Objectives

1. To make students familiar with basic and Object-Oriented features of Java.
2. To expose students to analyze a problem statement, develop suitable logic and implement it in Java.
3. To enable students to design and develop GUI applications.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Develop programs by applying Object-Oriented concepts of JAVA to solve real-world problems.	L3	Apply
CO2	Achieve Robustness and Concurrency while developing programs.	L3	Apply
CO3	Design Graphical User Interface using swing.	L3	Apply

Course Contents

Unit-I Introduction to Java as Object Oriented Programming Language 04 Hrs.

Fundamentals of Java Programming: Overview of procedure and object-oriented programming, Features of Java, Java Virtual Machine.

Principles of OOP: Object, Class, Encapsulation, Abstraction, Inheritance, Polymorphism.

Basic Constructs: Constants, variables and data types, Wrapper classes, Operators and Expressions.

Input & Output in Java: command line arguments, BufferedReader class and Scanner class.

Unit-II Branching and Looping 04 Hrs.

Branching and looping: if, if-else, nested if-else, if-else-if ladder, switch-case, break, continue, for loop, while loop, and do-while loop.

Arrays, Strings and Collection Types.

Arrays, Strings (String and StringBuffer classes)

Collections: ArrayList, Vectors

Unit-III Classes and Objects 06 Hrs.

Access specifiers, static and non-static members, Passing and returning variables and references, Method Overloading, Recursion, finalize method, Array of Objects.

Constructors: Default, Parameterized Constructors, copy constructor and Constructor overloading.

Unit-IV Inheritance, Interfaces and packages 06 Hrs.

Inheritance and its types, Role of Constructors in inheritance, Method Overriding, super keyword, abstract class and abstract method, final keyword, Static and dynamic binding in Java.

Interfaces: Implementing multiple inheritance and extending interfaces.

Packages: explore predefined packages, creating user defined packages and importing the same.

Unit-V Exception Handling and Multithreading (Robustness and Concurrency) 04 Hrs.

Error vs Exception, try, catch, finally, throw, throws, creating custom exceptions.

Multithreading: Need of Multithreading, Thread lifecycle, methods of Thread class, creating threads using Runnable interface and Thread class, Thread synchronization.

Unit-VI GUI programming in JAVA 02 Hrs.

SWING Programming: Swing Components and Containers, Swing Packages, A Simple Swing Application, Designing Swing GUI Application and Event handling.

Reference Books

1. D. T. Editorial Services, "Java 8 Programming Black Book", Dreamtech Press, 2015.
2. H. M. Deitel, P. J. Deitel, S. E. Santry, "Advanced Java 2 Platform How to Program", 11^{th} Edition, Prentice Hall, 2017.
3. ScriptDemics, "Learn to Master JAVA", from Star EDU solutions, 2017.
4. Ivor Horton, "Beginning JAVA", Wiley India.

Text Books

1. Herbert Schildt, "Java-The Complete Reference", 11^{th} Edition, Tata McGraw Hill Publication, 2018.
2. E. Balguruswamy, "Programming with Java: A Primer", 5^{th} edition, Tata McGraw Hill Publication, 2017.
3. Sachin Malhotra and Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2010.

Digital Material

1. www.nptelvideos.in
2. www.w3schools.com
3. http://spoken-tutorial.org
4. www.staredusolutions.org

Object Oriented Programming using Java Laboratory (22ESFY2020L)

Semester-II

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
Total : 25 Marks

Course Objectives

1. To make students familiar with basic and Object-Oriented features of Java.
2. To expose students to analyze a problem statement, develop suitable logic and implement it in Java.
3. To enable students to design and develop GUI applications.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Develop programs by applying Object-Oriented concepts of JAVA to solve real-world problems.	L3	Apply
CO2	Achieve Robustness and Concurrency while developing programs.	L3	Apply
CO3	Design Graphical User Interface using swing.	L3	Apply

List of Practicals/ Experiments/ Assignments

1. Program to demonstrate input using Scanner, BufferedReader and command line arguments.
2. Programs to demonstrate different decision-making statements.
3. Program to implement Arrays (1D, 2D).
4. Program to create class with members and methods.
5. Program on String and String Buffer.
6. Program on Collections (ArrayList/ Vectors)
7. Programs on static, non-static, recursive and overloaded methods.
8. Program on constructor and constructor overloading.
9. Program on passing and returning object as argument.
10. Program on creating user defined package.
11. Programs on single, multilevel and hierarchical inheritance (Use super keyword).
12. Program on abstract class
13. Program to demonstrate multiple inheritance using interfaces.
14. Program on dynamic method dispatch using base class and interface reference.
15. Program to demonstrate try, catch, throw, throws and finally.
16. Program to implement user defined exception.
17. Program to demonstrate concept of multithreading
18. Java programs to understand GUI designing and event handling.

Minimum 10-15 experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

The distribution of marks for Teacher Assessment shall be as follows:
Laboratory work (Performance in practical sessions and submission of practical journals): **25 Marks**

The final certification and acceptance of Teacher Assessment will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

Reference Books

1. D. T. Editorial Services, "Java 8 Programming Black Book", Dreamtech Press, 2015.
2. H. M. Deitel, P. J. Deitel, S. E. Santry, "Advanced Java 2 Platform How to Program", 11th Edition, Prentice Hall, 2017.
3. ScriptDemics, "Learn to Master JAVA", from Star EDU solutions, 2017.
4. Ivor Horton, "Beginning JAVA", Wiley India.

Text Books

1. Herbert Schildt, "Java-The Complete Reference", 11th Edition, Tata McGraw Hill Publication, 2018.
2. E. Balguruswamy, "Programming with Java: A Primer", 5th edition, Tata McGraw Hill Publication, 2017.
3. Sachin Malhotra and Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2010.

Digital Material

1. www.nptelvideos.in
2. www.w3schools.com
3. http://spoken-tutorial.org
4. www.staredusolutions.org

Workshop Practice
(22ESFY1090L/22ESFY2090L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To explain the concepts of industrial safety and important of working safely.
2. To identify tools, work material and measuring instruments useful for fitting, welding, carpentry, sheet metal, plumbing, PCB and house wiring practice.
3. To understand various fabrication processes and machine protocols.
4. To handle tools and instruments and use them to prepare joints/jobs of specific shape and size.
5. To understand the basic concept and structure of computer hardware and networking
6. To understand the basic work tools of house wiring and house wiring connection etc

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Get oriented to an engineering workshop environment and learn to conduct oneself adhering to safety norms and set procedures.	L2	Remember
CO2	Get familiarized with various methods of commonly used fabrication techniques and the type of hand tools /power tools required to perform such of these techniques	L3	Apply
CO3	Get familiarize with the production of simple jobs like joints, components of simple shape etc. as per components drawings with reasonable degree of tolerance in fitting, welding, carpentry, sheet metal, plumbing, welding, machining, 3D printing, electrical and electronics trades	L3	Apply

Course Contents

Group A

1 Fabrication Processes 12 Hrs.

Use of setting of fitting tools for chipping, cutting, filing, making, center punching, drilling, tapping and finishing.

Edge preparation for welding jobs, Arc welding for different job like, Lap welding of two plates, butt welding of plates with simple cover, are welding to join plates at right angles.

Use and setting of hand tools likes handsaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.

2 PCB 12 Hrs.

Design, Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique, Component mounting and circuit testing.

3 House Wiring 12 Hrs

Electrical safety in the workplace and safe work practices, Protection equipment, measures and tools. Introduction to house wiring, different types of cables, types of power supply, distribution of power supply, electrical wiring symbols. Wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for staircase lamp.

4 Computer Hardware and Networking 12 Hrs

Dismantling of a Personal computer (PC), Identification of components of a PC such as power supply, motherboard, processors, hard disk, memory (RAM, ROM), CMOS battery, CD Drive, monitor, keyboard, mouse, printers, disk drives etc. Assembling of PC, Installation of Operating System (any one), and Device drives, Boot-up sequence, Installation of Application software (at least one). Basic trouble shooting and maintenance. Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables. Basic networking and crimping

Group B

5 Sheet Metal 8 Hrs.

Introduction to primary technology processes involving bending, punching and drawing, various sheet metal joints, development of joints.

6 Pipe Fitting 8 Hrs.

Use of plumbing tools, spanners, wrenches, threading dies, demonstration of preparation of a domestic line involving fixing of a water tap and use of coupling, elbow, tee and union etc.

7	CNC Machines	8 Hrs.

Introduction of CNC Machine tools, working principle, classification, constructional features of CNC Machines, CNC controller, types of motion controls in CNC Machines, application of CNC Machines. Manual part programming for turning and milling.

8	3D Printing	8 Hrs.

Introduction to Additive Manufacturing Technologies for engineering applications, 3D printing of a simple custom object using FDM, SLA and SLS technologies.

9	Drone	8 Hrs.

Introduction to drone and its applications, Fabrication and testing of mini drone.

List of Laboratory Experiments

List of Laboratory Experiments:

1. To study various types of fitting tools and make a Square joint, V joint, T joint, half round joint, dovetail joint from the given two MS pieces (Any one joint)
2. To study various types of carpentry tools and prepare half-lap joint, T-lap joint, Middle lap joint, cross lap joint (Any one joint)
3. To study various welding techniques and make a V-butt joint or Lap-joint, using the given mild steel pieces by are welding.
4. To make printed circuit board as per the given circuit drawing.
5. To make connection to two lights control by one switch in series or one light control by two-way switches.
6. To study computer hardware and operating system.
7. To study various types of sheet metal tools and make square or rectangular tray.
8. To study various types of plumbing tools and make one job containing various pipe fitting.
9. To study various operations of a CNC machining center and make one simple job on CNC turning.
10. To study various 3D printing techniques and make a simple object using any of these technique.
11. To study, fabricate and test mini drones.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Reference Books

1. Mechanical Workshop Practice, 2nd Edition, K.C. John, PHI Learning Pvt. Ltd. 2014
2. Manufacturing Technology- Vol 1, 4th Edition, P. N. Rao Tata McGraw Hill, 2014.

3. Printed Circuit Boards: Design, fabrication, assembly and testing. 1st Edition, R. S. Khandpur. Tata McGraw Hill 2005.

Text Books

1. Manufacturing Process and Systems. 9th Edition. P.F. Ostwald. John Wiley and Sons INC. UK 2008.

2. Electrical Workshop: Safety, Commissioning, maintenance and testing of electrical equipment. 3rd Edition, R.P. Singh. IK International Publishing House Pvt. Ltd. 2012.

Evaluation scheme Term work shall consist of minimum one main job and two group jobs

The distribution of marks for term work shall be follows:

Laboratory work (Performance of experiments) : 25 Marks

Anyone Job from Group A (Main Job) : 15 Marks

Any two Jobs from Group B (Group Job) : 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Indian Knowledge Tradition
(22AUFY1100/22AUFY2100)

Semester-I/II

Teaching Scheme
Lectures : 01 Hr./week
Practical : -
Tutorial : -
Credit : -

Examination Scheme
Term Test : -
Teacher Assessment : -
End Sem Exam : -
Total Marks : -

Course Objectives

1. To impart knowledge about basic principles of thought process, reasoning and inferencing.
2. To make students aware of Indian Traditional knowledge Systems connecting society and nature.
3. To acquaint students with holistic lifestyle of yogic science and wisdom in modern society with rapid technological advancements and societal disruptions.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the importance, nature and scope of Indian Knowledge Tradition.	L2	Understand
CO2	Know the history of Indian Knowledge System.	L1	Remember
CO3	Know the basic structure of Indian Knowledge Tradition.	L1	Remember
CO4	Acquire knowledge about the various systems followed to impart knowledge in ancient and medieval India.	L2	Understand
CO5	Be aware of Yoga system and its impact on health.	L3	Apply

Course Contents

Unit-I Introduction to the Indian knowledge system 02 Hrs.

- Origin and Nature
- Importance

Unit-II History of Indian Knowledge System 03 Hrs.

- Ancient
- Medieval
- Contemporary

Unit-III Basic Structure of Indian Knowledge System 03 Hrs.

- Ancient
- Medieval
- Contemporary

Unit-IV Types of Indian Knowledge System 03 Hrs.

- Gurukul
- Vedic
- Modern

Unit-V Yoga and Health Care 02 Hrs.

- Origin and History
- Importance

Suggested Text/Reference Books

1. V.Sivaramakrishnan (Ed.). Cultural Heritage of India-course material.Bharatiya Vidya Bhavan. Mumbai. 5th Edition.2014

2. G. N. Jha (Eng. Trans.). Ed. RN Jha. Yoga-darshanam with Vyasa Bhashya. Vidyanidhi Prakashan, Delhi.2016

3. R. N. Jha. Science of Consciousness Psychotherapy and Yoga Practices. Vidyanidhi Prakashan. Delhi.2016