Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus (DJS22)

First Year B.Tech

in

Common For All Programs

(Semester I and II)

Revision: 2 (2022)
With effect from the Academic Year: 2022-2023

1st September, 2022

Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Scheme for First Year B. Tech Program (All Programs): Semester I
(Academic Year 2022-2023)

Sr.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment (A) (marks)			Semester End Assessment (B) (marks)					(A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Th / Cb	O	P	O & P	Total SEA (B)		
Compulsory courses offered to all the Programs																
1	DJS22FEC11	Engineering Mathematics - I	4	--	--	4	35	--	35	65	--	--	--	65	100	5
	DJS22FET11	Engineering Mathematics - I Tutorial	--	--	1	1	--	25	25	--	--	--	--	--	25	
2	DJS22FEC12 *	Structured Programming using C	2	--	--	2	35	--	35	65	--	--	--	65	100	3
	DJS22FEL12	Structured Programming using C Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
		Total	**6**	**2**	**1**	**8**	**70**	**50**	**120**	**130**	**0**	**0**	**0**	**130**	**250**	**8**
Courses offered in Group A																
1	DJS22FECEP	Engineering Physics	3	--	--	3	35	--	35	65	--	--	--	65	100	5
	DJS22FELEP	Engineering Physics Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	50	
2	DJS22FECEM	Computational Engineering Mechanics	3	--	--	3	35	--	35	65	--	--	--	65	100	4
	DJS22FELEM	Computational Engineering Mechanics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
3	DJS22FECBE	Basic Electrical Engineering & Digital Electronics	3	--	--	3	35	--	35	65	--	--	--	65	100	4
	DJS22FELBE	Basic Electrical Engineering & Digital Electronics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
		Total	**9**	**6**	**1**	**13**	**105**	**100**	**205**	**195**	**0**	**0**	**0**	**195**	**400**	**13**
Courses offered in Group B																
1	DJS22FECEC	Engineering Chemistry	3	--	--	3	35	--	35	65	--	--	--	65	100	5
	DJS22FELEC	Engineering Chemistry Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	50	
2	DJS22FECEG*	Engineering Graphics	3	--	--	3	35	--	35	65	--	--	--	65	100	4
	DJS22FELEG	Engineering Graphics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
3	DJS22FECCS	Effective Communication Skills	2	--	--	2	35	--	35	65	--	--	--	65	100	3
	DJS22FELCS	Effective Communication Skills Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
4	DJS22FEWP	Workshop Practices	--	2	--	1	--	25	25	--	--	--	--	--	25	1
5	DJS22A1	Indian Knowledge Tradition (Non Credit)	1	--	--	--	--	--	--	--	--	--	--	--	--	--
		Total	**9**	**8**	**1**	**13**	**105**	**125**	**230**	**195**	**0**	**0**	**0**	**195**	**425**	**13**

Learners will be offered compulsory courses and courses either in Group A or Group B.
* Computer based assessment in the college premises.

Th	Theory	**T/W**	Termwork
P	Practical	**O**	Oral
T	Tuturial	**Cb**	Computer based

Prepared by Checked by Head of the Department Principal

Scheme for First Year B. Tech Program (All Programs): Semester II
(Academic Year 2022-2023)

Sr.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment (A) (marks)			Semester End Assessment (B) (marks)					(A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Th / Cb	O	P	O & P	Total SEA (B)		
Compulsory courses offered to all the Programs																
1	DJS22FEC21	Engineering Mathematics - II	4	--	--	4	35	--	35	65	--	--	--	65	100	5
	DJS22FET21	Engineering Mathematics - II Tutorial	--	--	1	1	--	25	25	--	--	--	--	--	25	
2	DJS22FEC22 *	Object Oriented Programming using Java	2	--	--	2	35	--	35	65	--	--	--	65	100	3
	DJS22FEL22	Object Oriented Programming using Java Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
		Total	**6**	**2**	**1**	**8**	**70**	**50**	**120**	**130**	**0**	**0**	**0**	**130**	**250**	**8**
Courses offered in Group A																
1	DJS22FECEP	Engineering Physics	3	--	--	3	35	--	35	65	--	--	--	65	100	5
	DJS22FELEP	Engineering Physics Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	50	
2	DJS22FECEM	Computational Engineering Mechanics	3	--	--	3	35	--	35	65	--	--	--	65	100	4
	DJS22FELEM	Computational Engineering Mechanics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
3	DJS22FECBE	Basic Electrical Engineering & Digital Electronics	3	--	--	3	35	--	35	65	--	--	--	65	100	4
	DJS22FELBE	Basic Electrical Engineering & Digital Electronics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
		Total	**9**	**6**	**1**	**13**	**105**	**100**	**205**	**195**	**0**	**0**	**0**	**195**	**400**	**13**
Courses offered in Group B																
1	DJS22FECEC	Engineering Chemistry	3	--	--	3	35	--	35	65	--	--	--	65	100	5
	DJS22FELEC	Engineering Chemistry Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	50	
2	DJS22FECEG*	Engineering Graphics	3	--	--	3	35	--	35	65	--	--	--	65	100	4
	DJS22FELEG	Engineering Graphics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
3	DJS22FECCS	Effective Communication Skills	2	--	--	2	35	--	35	65	--	--	--	65	100	3
	DJS22FELCS	Effective Communication Skills Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	25	
4	DJS22FEWP	Workshop Practices	--	2	--	1	--	25	25	--	--	--	--	--	25	1
5	DJS22A1	Indian Knowledge Tradition (Non Credit)	1	--	--	--	--	--	--	--	--	--	--	--	--	--
		Total	**9**	**8**	**1**	**13**	**105**	**125**	**230**	**195**	**0**	**0**	**0**	**195**	**425**	**13**

Learners those who were offered **Group A in Sem I**, will be offered **Group B in Sem II** and **vice versa**.
* Computer based assessment in the college premises.

Th	Theory	**T/W**	Termwork
P	Practical	**O**	Oral
T	Tuturial	**Cb**	Computer based

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Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (hrs.)
Theory	a. One Term test (based on 40 % syllabus)	20	1
	b. Second Term test (next 40 % syllabus) / presentation / assignment / course project / group discussion / any other.	15	1
	Total marks (a + b)	35	--
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation / group project / any other tool.	--	As applicable
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	25	
Laboratory &Tutorial	Performance in the laboratory and tutorial.	50	

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

Semester End Assessment (B):

Course	Assessment Tools	Marks	Time (hrs.)
Theory / * Computer based	Written paper based on the entire syllabus.	65	2
	* Computer based assessment in the college premises.		
Oral	Questions based on the entire syllabus.	25	As applicable
Practical	Performance of the practical assigned during the examination and the output / results obtained.	25	2
Oral & Practical	Project based courses - Performance of the practical assigned during the examination and the output / results obtained. Based on the practical performed during the examination and on the entire syllabus.	As per the scheme	2

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Dwarkadas J. Sanghvi College of Engineering

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Course Structure and Syllabus

of

First Year (Semester I) B. Tech.

(Common for all Programs)

Prepared by: - Board of Studies for FE

Recommended by: - Academic Council of D. J. Sanghvi College of Engineering

Approved by: - Governing Body of D. J. Sanghvi College of Engineering

Revision: 2 (DJS22)

With effect from the Academic Year: 2022-2023

Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Course Structure and Syllabus

of

First Year (Semester II) B. Tech.

(Common for all Programs)

Prepared by: - Board of Studies for FE

Recommended by: - Academic Council of D. J. Sanghvi College of Engineering

Approved by: - Governing Body of D. J. Sanghvi College of Engineering

Revision: 2 (DJS22)

With effect from the Academic Year: 2022-2023

Program: Common for all Programs **F.Y B.Tech Semester: I**

Course: Engineering Mathematics - I (DJS22FEC11)

Course: Engineering Mathematics - I Tutorial (DJS22FET11)

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.

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.

Outcomes: On completion of the course, the learner will be able to:

1. Apply principles of basic operations of matrices to find rank and echelon form of matrices to solve system of simultaneous equations.
2. Illustrate the basic concepts of Complex numbers and apply the knowledge of complex numbers to solve problems in hyperbolic functions and logarithmic functions.
3. Illustrate the knowledge of Successive differentiation and Expansion of function.
4. Illustrate the basic principles of Partial differentiation and application to find maxima, minima, error & approximation.
5. Illustrate SciLab programming techniques to the solution of linear, non-linear and simultaneous algebraic equations.

Engineering Mathematics - I (DJS22FEC11)		
Unit	**Description**	**Duration**
1	**Matrices:** 1.1. Types of Matrices: Symmetric, Skew- Symmetric, Hermitian, Skew-Hermitian, Unitary, Orthogonal Matrices. Rank of a matrix using Echelon form. 1.2. System of homogeneous and non–homogeneous equations, their consistency and solutions. Linear dependent and independent vectors.	**07**
2	**Complex Numbers, Hyperbolic function and Logarithm of Complex Numbers:** 2.1. Review statement of D'Moivre's Theorem. 2.2. 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, expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ and to find sum of the trigonometric series. 2.3. Roots of complex number. 2.4. 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.	**11**

	2.5. Logarithmic functions, Separation of real and Imaginary parts of Logarithmic functions.	
3	**Successive differentiation and Expansion of Function:** 3.1. Successive differentiation: n^{th} derivative of standard functions. Leibnitz's theorem (without proof) and problems. 3.2. Taylor's Theorem (Statement only), Taylor's series and Maclaurin's series (Statement only). Expansion of standard functions.	**08**
4	**Partial Differentiation:** 4.1. Partial Differentiation: Function of several variables, Partial derivatives of first and higher order, Differentiation of composite function, Total differentials and Implicit functions. 4.2. Euler's Theorem on Homogeneous functions with two and three independent variables (with proof). Deductions from Euler's theorem.	**10**
5	**Applications of Partial Differentiation:** 5.1. Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint. 5.2. Introduction of errors and approximations. 5.3. Jacobian's of two and three independent variables.	**06**
6	**Numerical Solutions of Transcendental Equations, System of Linear and Non-Linear Equations, Curve fitting:** 6.1. Solution of Algebraic and Transcendental Equations by: (1) Regula –Falsi Method (2) Newton Raphson Method (3) Chebyshev Method. 6.2. Solution of system of linear algebraic equations by Gauss Seidal Iteration Method. 6.3. Newton Raphson Method for system of Non-Linear equations. 6.4. Curve fitting: Fitting a straight line, Quadratic curve, Exponential curve by Least-Squares Method.	**10**
	Total	**52**

Engineering Mathematics - I Tutorial (DJS22FET11)	
Tut.	**Suggested Tutorials (including SciLab programs)**
1	Matrices.
2	Complex Numbers.
3	Hyperbolic and Logarithm of complex no.
4	Successive Differentiation and Expansion of Function.

5	Partial Differentiation.
6	Application of Partial Differentiation.
7	Solution of Transcendental Equations by Regula –Falsi Method.
8	Solution of Transcendental Equations by Newton Raphson Method.
9	Solution of Transcendental Equations by Chebyshev Method.
10	Solution of system of linear algebraic equations by Gauss Seidal Iteration Method.
11	Solution of system of non-linear algebraic equations by Newton Raphson Method.
12	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.

Books Recommended:

Text books:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication.
2. Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright.

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 & Sons, INC.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **F. Y B.Tech** **Semester: I**

Course: Structured Programming using C (DJS22FEC12)

Course: Structured Programming using C Laboratory (DJS22FEL12)

Pre-requisite: None

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.

Outcomes: On completion of the course, the learner will be able to:

1. Implement the programs in C.
2. Debug the C programs.

Structured Programming using C (DJS22FEC12)		
Unit	**Description**	**Duration**
1	**Introduction to Computer, Algorithm and Flowchart:** 1.1 The Turing Machine architecture, the Von Neumann architecture, Number system. 1.2 Introduction to operating sytsem components. 1.3 System and application software. 1.4 Basic constructs of Algorithm and flowchart: Sequence, Decision (Selection) and Repetition. 1.5 Compilation process: Syntax and semantic errors, ASCII.	03
2	**Fundamentals of C-Programming:** 2.1 Character Set, Identifiers and keywords, Data types, Constants, Variables. 2.2 Operators-Arithmetic, Relational and logical, Assignment, Unary, Conditional, Bitwise, Comma, and other operators. Expression, statements, Library Functions, Preprocessor. 2.3 Data Input and Output: getchar (), putchar (), scanf (), printf (), gets (), puts (), Structure of C program.	04
3	**Control Structures:** 3.1 Decision making with Branching: If statement, If-else Statement, Switch case statement. 3.2 Looping: while, do-while, for. 3.3 Nested control structure. 3.4 Continue statement, Break statement, goto statement.	05
4	**Functions and Parameter:** 4.1 Function -Introduction of Function, defining a Function, accessing a Function, Function Prototype, Passing Arguments to a Function, Designing Recursive function. 4.2 Storage Classes –Auto, Extern, Static, Register.	03
5	**Arrays, String, Structure:** 5.1 Array-Concepts, Declaration, Definition, accessing array element, One- dimensional and Multidimensional array, Passing Arrays to Function. 5.2 String- Basics of String, Functions in string.h, user defined function for String handling. 5.3 Structure- Declaration, Initialization, structure within structure, Operation on structures, Array of Structure, Structure padding.	07

6	**Pointers:** 6.1 Introduction, Definition and uses of Pointers, Address Operator, Pointer Variables, Double pointer. 6.2 Pointer Arithmetic. 6.3 Call by value, call by Reference. 6.4 Pointer to Array and Pointer to Structure.	04
	Total	**26**

Structured Programming using C Laboratory (DJS22FEL12)	
Exp.	**Suggested experiments**
1	Write a program to swap two variables values with and without using third variables. 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 ABA ABCBA ABCDCBA ABCDEDCBA
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 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. 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.

Books Recommended:

Books Recommended:

Textbooks:

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

Reference Books:

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

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group A** **F. Y B. Tech** **SEM I/II**

Course: Engineering Physics (DJS22FECEP)

Course: Engineering Physics Laboratory & Tutorial (DJS22FELEP)

Pre-requisite: --

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

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

Outcomes: On completion of the course, the learner will be able to:

CO1. Relate the scope and foundation of quantum mechanics & quantum computing and its role in development of modern technology.

CO2. Apply the foundations of Optics and Photonics in precision measurements indispensable for the development of modern communication technology.

CO3. Relate and interpret the basics of Electrodynamics, which are prerequisite in modern developments for signal communications, Antenna Theory etc

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.

Engineering Physics (DJS22FECEP)		
Unit	**Description**	**Duration**
1	**QUANTUM PHYSICS & COMPUTING** **(*Prerequisites:*** *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.	9 hrs

	• 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 & quantum computing, Qubits, Quantum Superposition theorem, Quantum Entanglement theorem, Quantum cryptography)	
2	**OPTICS FOR ENGINEERS** ***(Prerequisites:*** *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 & extended source); Interference in Wedge shaped film; Formation of Newton's rings; Applications. • **Diffraction:** Introduction (distinguish between interference & diffraction), Fresnel & 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 & Applications.	11 hrs
3	**PHOTONICS & FIBRE OPTICS** ***(Prerequisites:*** *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 & four level lasers, types of pumping, Helium Neon laser; Nd:YAG laser, CO_2 laser, Pulsed lasers, Applications. • **Fiber optics:** Structure of an optical fiber, Types: Single mode & Multimode, Step index & Graded index, Numerical Aperture for step index fiber, Modes of propagation, V number Attenuation & Dispersion, Applications.	6 hrs
4	**ELECTRODYNAMICS** ***(Prerequisites:*** *Coulomb's law-force between two-point charges, electric field due to a point charge, electric field due to a dipole, Cartesian cylindrical & Spherical co-ordinate system, Gauss's law for electrostatics & magneto statics 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) & Applications.	5 hrs

5	**SUPERCONDUCTORS** ***(Prerequisites:*** *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 & DC Josephson Junctions). • Type I & Type II and high Tc superconductors. • Applications (MAGLEV, SQUIDS).	4 hrs
6	**PHYSICS OF SENSORS** ***(Prerequisites:*** *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 & Applications)	4 hrs
	Total	**39 hrs**

Engineering Physics Laboratory & Tutorial (DJS22FELEP)	
Exp.	**Suggested experiments**
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.

Term work shall consist of Laboratory work and Tutorial sessions.

Batch wise laboratory work is to be conducted to develop a rational temperament for scientific observations which lead to constructive inferences essential for technology studies. Students must be encouraged to perform minimum eight experiments and submit the laboratory journal.

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.

Books Recommended:

Textbooks:

1. A textbook of Engineering Physics-Avadhanulu & Kshirsagar, S. Chand
2. Problems in Engineering Physics- Avadhanulu & 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 & Joseph W. Haus CRC Press
6. Quantum Mechanics: Theory & Applications-Ajoy Ghotak & S. Lokanathan
7. Modern Engineering Physics – Vasudeva, S. Chand
8. Engineering Physics- Wiley
9. Engineering Physics – R K Gaur & S L Gupta, Dhanpat Rai Publications
10. Engineering Physics – Shatendra Sharma & Jyotsna Sharma, Pearson publications
11. Engineering Physics – D. K. Bhattacharya & 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

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 & Measurement Techniques by Albert D. Helfrick & William D. Cooper (PHI) Edition

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

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group A** **F.Y B.Tech** **Semester: I**

Course: Computational Engineering Mechanics (DJS22FECEM)

Course: Computational Engineering Mechanics Laboratory (DJS22FELEM)

Pre-requisite: --

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

Objectives:

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

Outcomes: On completion of the course, the learner will be able to:

1 Illustrate the effect of force and moment and apply the same along with the concept of equilibrium systems with the help of FBD.

2 Correlate real life application to specific type of friction and estimate required force to overcome friction.

3 Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the relation.

4 Understand the concept of geometric transformations of an element/object.

5 Analyze general plane motion of rigid bodies.

6 Analyze problems on statics and dynamics using software packages.

Computational Engineering Mechanics (DJS22FECEM)		
Unit	**Description**	**Duration**
1	**Computation and analysis of System of Forces (Co-planar):** 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 ******Introduction to programming software packages (Python/Matlab/Scilab or any other suitable software)**,** Application of software packages for determination of Resultant.	**07**
2	**Computation and analysis of Equilibrium Systems**: 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. ** Application of software packages for analysis of bodies in equilibrium.	**07**
3	**Computation and analysis of Frictional Forces**: 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. ** Application of software packages for computation of friction forces.	**07**

4	**Kinematics of Particle**: Rectilinear motion. Motion curves (a-t, v-t, s-t curves). Curvilinear Motion including projectile motion. ** Application of software packages for plotting of motion curves.	**07**
5	**Robot Kinematics (Part-I): Geometric Transformations** **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. ** Programming for transformations of basic geometric 2D elements.	**05**
6	**Robot Kinematics (part-II):** 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. ** Application of software packages for simulating Kinematics of Rigid Body.	**06**
	Total	**39**

Computational Engineering Mechanics (DJS22FELEM)	
Exp.	**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).
	****List of Programming Exercises**
8	Programming exercises on determination of Resultant of Coplanar Force System.
9	Programming exercises on determination of Support Reaction.
10	Programming exercises on Friction.
11	Plotting of Motion Curves.
12	Programming exercises on transformations of basic geometric 2D elements.
13	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).

Books Recommended:

Text books:

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

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. & 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 & Engineers, 1st Edn., Oxford University Press, 2010.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group: A/B** **F.Y B.Tech** **Semester: I/II**

Course: Basic Electrical Engineering & Digital Electronics (DJS22FECBE)

Course: Basic Electrical Engineering & Digital Electronics Laboratory (DJS22FELBE)

Pre-requisite:

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

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.

Outcomes: On completion of the course, the learner will be able to:

1. Apply the knowledge of theorems/laws to analyse the DC circuits.
2. Analyse single phase AC circuits.
3. Demonstrate knowledge of basic number system, logic gates and sequential circuits.
4. Illustrate the working principle behind the electronic components used to build a drone.

Basic Electrical Engineering & Digital Electronics (DJS22FECBE)		
Unit	**Description**	**Duration**
1	**DC Circuits** • Introduction to ideal and practical voltage and current sources • Kirchhoff's current and voltage laws • Mesh and nodal analysis • Supernode and supermesh analysis	05
2	**DC Network Theorems** • Source transformation and star – delta connections • Superposition Theorem • Thevenin's Theorem and Norton's Theorem • Maximum Power Transfer Theorem	06
3	**AC Circuits** • 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	11

4	**Number Systems and Logic Gates** • 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	06
5	**Latches and Flip flops** • Introduction to latches and flip-flops: RS, JK, T, D flip-flops • Introduction to counters: design of 2-bit asynchronous counter • Introduction to registers	06
6	**Introduction to drones** • Introductions to drones • Sensors • Controllers • Actuators • Electronic assembly • Applications of drones	05
	Total	**39**

Basic Electrical Engineering & Digital Electronics Laboratory (DJS22FELBE)	
Exp.	**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.

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.

Books Recommended:

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.

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, “Electrical 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.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group B** **F.Y B.Tech** **Semester: I/II**

Course: Engineering Chemistry (DJS22FECEC)

Course: Engineering Chemistry Laboratory & Tutorial (DJS22FELEC)

Pre-requisite: --

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

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.

Outcomes: On completion of the course, the learner will be able to:

1. Understand new approaches of analysis, which are more convenient, less hazardous and sustainable to perform.
2. Understand applications based on nanomaterials and modern polymers in engineering techniques.
3. Rationalize properties of materials and alloys with phase transformation and analyze the quality of fuel for energy efficiency.
4. Suggest suitable methods of water treatment and identify the parameters responsible for water pollution.

Engineering Chemistry (DJS22FECEP)		
Unit	**Description**	**Duration**
1	**Spectroscopic Techniques and Applications:** • 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.	7
2	**Engineering Materials** **Nanomaterials:** • Introduction to nanomaterials • Fullerenes: Properties and applications • Carbon nanotubes: Types, Properties, Method of preparation (Laser, CVD), Applications	7

	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	
3	**Green Chemistry** • 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	6
4	**Fuels and Combustion** • Introduction: Definition, classification, characteristics of a good fuel. • Calorific value: Definition, Units, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & 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)	7
5	**Phase Rule and Applications** • 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.	6
6	**Water Technology** • 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.	**6**
	Total	**39**

Engineering Chemistry Laboratory & Tutorial (DJS22FELEC)	
Exp.	**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.
1 1	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 λ_{max} 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.

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.

Books Recommended:

Text books:

1. Engineering Chemistry - Jain & Jain (DhanpatRai)
2. Engineering Chemistry – Dara &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)

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 & K.M. Balakrishna (Atlantic)

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs	Group B	F.Y B.Tech	Semester: I and II
Course: Engineering Graphics (DJS22FECEG)			
Course: Engineering Graphics Laboratory (DJS22FELEG)			

Pre-requisite: --

1. Basics of geometrical constructions

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.

Outcomes: On completion of the course, the learner will be able to:

1. Recognize the value of engineering graphics, as a language of engineers.
2. Construct orthographic views of lines, and basic shapes of solids.
3. Interpret and sketch orthographic and sectional orthographic views of various machine components.
4. Visualize objects, and draw isometric views.
5. Build 2D sketches using Auto CAD.

Engineering Graphics (DJS22FECEG)		
Unit	**Description**	**Duration**
1	**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	02 07
2	**Isometric Views:** Isometric Views/Drawings of blocks (plain and cylindrical, excluding spheres). **• **Drawing of Isometric Views using Auto CAD.**	05
3	**@ Engineering Curves:** Involute of circle (problems on string only). Cycloid – Plane cycloid (circle rolling in one direction only).	03
4	**Projection of Points and Lines:-** Lines inclined to both the Reference Planes. (Excluding Traces) First Quadrant only.	05
5	****Projection of Solids: -** (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.	08
6	**@ 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.	05

	@ Development of Surfaces:- Lateral surface development of Prism, Pyramid, Cylinder, Cone with section plane inclined to HP or VP only. (Exclude Reverse Development)	04
	Total	**39**

**** 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).

Engineering Graphics Laboratory (DJS22FELEG)	
Exe.	**Suggested exercise**
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.

Books Recommended:

Text books:

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

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.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group B** **F.Y B.Tech** **Semester: I&II**

Course: Effective Communication Skills (DJS22FECCS)

Course: Effective Communication Skills Laboratory (DJS22FELCS)

Pre-requisite:

Basic proficiency in English Language

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

Outcomes: On completion of the course, the learner will be able to:

1. Use skills related to the various aspects of communication to express ideas with greater clarity
2. Apply appropriate verbal/non-verbal cues in social and workplace situations and overcome the barriers to communication
3. Employ personal development strategies for self-assessment, goal setting and maintaining a professional persona online

Effective Communication Skills (DJS22FECCS)		
Unit	**Description**	**Duration**
1	**FUNDAMENTALS OF COMMUNICATION** 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)	10

2	**SPEAKING SKILLS** 2.1. Developing Verbal Aptitude • Meaning of Words in Context • Synonyms & 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	2
3	**READING SKILLS** 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	3
4	**LISTENING SKILLS** 4.1 Purpose of Listening 4.2 Process of Listening 4.3 Barriers to Listening 4.4 Techniques for Improving Listening Skills	2
5	**WRITING SKILLS** 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	6

	• Problems in Email Communication • Techniques for Writing Effective Emails • Email etiquette	
6	**PERSONAL DEVELOPMENT PLANNING** 6.1 Self- Assessment strategies (SWOT Analysis) 6.2 Digital Footprints-Maintaining a Professional Persona 6.3 Goal Setting	**3**
	Total	**26**

Effective Communication Skills Laboratory (DJS22FELCS)

Laboratory (conducted batch wise) will comprise of activities and assignments based on the syllabus

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.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group B F.Y B.Tech Semester: I & II**

Course:

Course: Workshop Practices (DJS22FEWP)

Pre-requisite: Basic Science

Objectives:

1. To explain the concepts of industrial safety and the importance 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 & house wiring connections etc.

Outcomes: On completion of the course, learner will be able to:

1. Get oriented to an engineering workshop environment and learn to conduct oneself adhering to the safety norms and set procedures.
2. 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.
3. Get familiarize with the production of simple jobs like joints, component of simple shape etc. as per component drawings with reasonable degree of tolerance.in fitting, carpentry, sheet metal, plumbing, welding, machining, 3D printing, electrical and electronic trades.

Workshop Practices (DJS22FEWP)		
Trade	**Description**	**Duration (Hrs.)**
Group A		
1	**Fabrication Processes** Use and setting of fitting tools for chipping, cutting, filing, marking, 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, arc welding to join plates at right angles. Use and setting of hand tools like handsaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods	**12**
2	**PCB** Design, Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique, component mounting and circuit testing.	**12**
3	**House Wiring** Electrical safety in the workplace and safe work practices. Protective equipment, measures and tools. Introduction to house wiring, different types of	**12**

	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:** Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc. Assembling of PC, Installation of Operating System (Any one) and Device drivers, Boot-up sequence. Installation of application software (at least one). Basic troubleshooting 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.	**12**
Group B		
5	**Sheet Metal** Introduction to primary technology processes involving bending, punching and drawing, various sheet metal joints, development of joints.	**08**
6	**Pipe Fitting** 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.	**08**
7	**CNC Machines** Introduction of CNC machine tools, working principle, classification, constructional features of CNC machines, CNC controller, types of motion controls in CNC machines, applications of CNC machines. Manual part programming for turning and milling.	**08**
8	**3D Printing** Introduction to Additive Manufacturing Technologies for engineering applications. 3D printing of a simple custom object using FDM, SLA and SLS technologies.	**08**
9	**Drone:** Introduction to drone and its applications. Fabrication and testing of mini drones.	**08**

List of Laboratory Experiments:

1. To study various types fitting tools and make a Square joint, V joint, T joint, half round joint, dovetail joint from the given two M.S 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 arc welding.
4. To make printed circuit board as per the given circuit drawing.

5. To make connection to two lights controlled by one switch in series or one light, controlled 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 centre and make one simple job on CNC turning.
10. To study various 3D printing techniques and make a simple object using any of this 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.

Books Recommended:

Text books:

1. Mechanical Workshop Practice, 2nd Edition, K.C. John, PHI Learning Pvt.Ltd.2014.
2. Manufacturing Technology-Vol I, 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.

Reference Books:

1. Manufacturing Processes and Systems,9th Edition, P.F.Ostwald, John Willy &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:

Laboratory: (Term work)

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

The distribution of marks for term work shall be as follows:

Laboratory work (Performance of Experiments)	: 25 Marks
Any one Job from Group A (Main Job)	: 15 marks
Any two Job 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.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **Group B** **F.Y B.Tech**

Course: Indian Knowledge Tradition (DJS22A1)

Pre-requisite: --

1. NIL

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.

Outcomes: On completion of the course, the learner will be able to:

CO1 Understand the importance, nature and scope of Indian Knowledge Tradition.
CO2 Know the history of Indian Knowledge System.
CO3 Know the basic structure of Indian Knowledge Tradition.
CO4 Acquire knowledge about the various systems followed to impart knowledge in ancient and medieval India.
CO5 Be aware of Yoga system and its impact on health.

Indian Knowledge Tradition (DJS22A1)		
Unit	**Description**	**Duration**
1	**Introduction to the Indian knowledge system** 1.1 Origin and Nature 1.2 Importance	2
2	**History of Indian Knowledge System** 2.1 Ancient 2.2 Medieval 2.3 Contemporary	3
3	**Basic Structure of Indian Knowledge System** 3.1 Ancient 3.2 Medieval 3.3 Contemporary	3
4	**Types of Indian Knowledge System** 4.1. Gurukul 4.2. Vedic 4.3. Modern	3
5	**Yoga and Health Care** 5.1. Origin & History 5.2. Importance	2
	Total	**13**

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

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs **F.Y B.Tech** **Semester: II**

Course: Engineering Mathematics - II (DJS22FEC21)

Course: Engineering Mathematics - II Tutorial (DJS22FET21)

Pre-requisite: -- Knowledge of

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

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.

Outcomes: On completion of the course, the learner will be able to:

1. Illustrate the concepts of Beta and Gamma function, DUIS and rectification of plane curves.
2. Apply the concepts of Multiple Integrals.
3. Solve various types of First Order and Higher Order differential equations.
4. Apply the basic concepts of Descriptive Statistics.
5. Apply the principles of Numerical Method for solving differential equation and numerical integration analytically and using SciLab.

Engineering Mathematics - II (DJS22FEC21)		
Unit	**Description**	**Duration**
1	**Beta and Gamma Function, Differentiation under Integral sign and Rectification:** 1.1 Beta and Gamma functions and its properties. 1.2 Differentiation under integral sign with constant limits of integration. 1.3. Tracing of curves: Cardioid, Strophoid, Bernoulli's Lemniscate, Astroid, and Cycloid. 3D Solids - Sphere, Cone, Cylinder, Paraboloid, Ellipsoid. 1.4 Rectification of plane curves in Cartesian form. 1.5. Rectification of curve in Parametric and Polar forms.	**10**
2	**Multiple Integrals:** Double Integration: 2.1. Introduction, Evaluation of Double Integrals. (Cartesian & Polar). 2.2. Evaluation of double integrals by changing the order of integration. 2.3. Evaluation of double integrals over the given region. (Cartesian & Polar). 2.4. Evaluation of double integrals by changing to polar coordinates (using Jacobian). 2.5. Application of double integrals to compute Area and Mass. Triple Integration: 2.6. Introduction and evaluation of Triple Integrals using Cartesian coordinate system. 2.7. Evaluation of triple integrals using cylindrical and spherical coordinate systems. 2.8. Application of triple integrals to compute Volume.	**13**

3	**Differential Equations of First Order and First Degree:** 3.1 Exact differential Equations, Equations reducible to exact form by using four rules of integrating factors. 3.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation. 3.3. Simple application of differential equation of first order and first degree to Engineering problem.	**06**
4	**Higher Order Linear Differential Equations with Constant Coefficients and Variable Coefficients:** 4.1. Linear Differential Equation with constant coefficient: complementary function, particular integrals 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 . 4.2. Method of variation of parameters (upto 3rd order). 4.3. Cauchy's homogeneous linear differential equation and Legendre's differential equation. 4.4. Applications of Higher order differential equation (upto 2nd order).	**09**
5	**Descriptive Statistics:** 5.1. Measure of Central Tendency: Arithmetic Mean (simple and weighted), Median, Mode, Geometric Mean, Harmonic Mean. 5.2. Measure of Dispersion: Range, Semi-inter quartile range, Mean absolute deviation, Standard deviation, Variance, Coefficient of variation. 5.3. Moments: Raw and Central moments up to fourth order and relationships among them. 5.4. Measure of Skewness and Kurtosis based on moments.	**07**
6	**Numerical solution of ordinary differential equations of first order and first degree, Numerical Integration:** 6.1. Numerical solution of ordinary differential equation using: (a) Taylor series method (b) Euler's method (c) Modified Euler method (d) Runge-Kutta method of order four. 6.2. Numerical integration by (a) Trapezoidal rule (b) Simpson's 1/3rd rule (c) Simpson's 3/8th rule (all without proof).	**07**
	Total	**52**

Engineering Mathematics - II Tutorial (DJS22FET21)	
Tut.	**Suggested Tutorials (including SciLab programs)**
1	Beta and Gamma Functions, DUIS and Rectification of plane curves.
2	Double integration.
3	Triple Integration.
4	Application of multiple integrals.
5	Differential Equation of First Order and First Degree.
6	Higher Order Differential Equation.
7	Descriptive Statistics.
8	Curve Tracing.

9	Numerical Integration by Trapezoidal rule.
10	Numerical Integration by Simpson's $1/3^{rd}$ rule.
11	Numerical Integration by Simpson's 3/8th rule.
12	Ordinary Differential Equation.
13	Numerical Solution of Ordinary Differential Equations using Euler's method.
14	Numerical Solution of Ordinary Differential Equations using Modified Euler's method.
15	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.

Books Recommended:

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.

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, 28^{th} 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.

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Program: Common for all Programs **Group A** **F.Y B.Tech** **Semester: II**

Course: Object Oriented Programming using Java (DJS22FEC22)

Course: Object Oriented Programming using Java Laboratory (DJS22FEL22)

Pre-requisite: --

1. Basics of Programming

Objective: The objective of this course is

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.

Outcomes: On completion of the course, the learner will be able to:

1. Develop programs by applying Object-Oriented concepts of JAVA to solve real-world problems.
2. Achieve Robustness and Concurrency while developing programs
3. Design Graphical User Interface using swing.

Object Oriented Programming using Java (DJS22FEC22)		
Unit	**Description**	**Duration**
1	**Introduction to Java as Object Oriented Programming Language** 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	04
2	**Branching and Looping** 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	04
3	**Classes and Objects** Access specifiers**,** static and non-static members, Passing and returning variables and references**,** Method Overloading, Recursion, finalize method, Array of Objects **Constructors** Constructors: Default, Parameterized Constructors, copy constructor and Constructor overloading	06

4	**Inheritance, Interfaces and packages** 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	06
5	**Exception Handling and Multithreading (Robustness and Concurrency)** 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	04
6	**GUI programming in JAVA** SWING Programming: Swing Components and Containers, Swing Packages, A Simple Swing Application, Designing Swing GUI Application and Event handling	02
	Total	**26**

Object Oriented Programming using Java (DJS22FEL22)	
	Suggested experiments
	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.

Books Recommended:

Textbook Books:

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

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. Scrip tDemics, “Learn to Master JAVA”, from Star EDU solutions, 2017.
4. Ivor Horton, “Beginning JAVA“, Wiley India.

Digital Material:

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

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