Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus (DJS23)

First Year B.Tech

Common For All Programs

(Semester I and II)

Revision: 3 (2023)
With effect from the Academic Year: 2023-2024

1st September 2023

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)

Proposed scheme for First Year B.Tech Program (All Programs) : Semester I
(Academic Year 2023-2024)

Sr.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment			Semester End Assessment (B) (marks)						(A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Time (hrs.)	Th / Cb	O	P	O & P	Total SEA (B)		
Compulsory courses offered to all the Programs																	
1	DJS23FCBS101	Mathematics - I	3	--	--	3	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FTBS101	Mathematics - I Tutorial	--	--	1	1	--	25	25	--	--	--	--	--	--	25	
2	DJS23FCES101	Structured Programming using C	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLES101	Structured Programming using C Laboratory	--	2	--	1	--	25	25	--	--	--	--	25	25	50	
		Total	**5**	**2**	**1**	**7**	**80**	**50**	**130**	**4**	**120**	**0**	**0**	**25**	**145**	**275**	**7**
Courses offered in Group A																	
1	DJS23FCBS102	Physics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FLBS102	Physics Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	--	50	
2	DJS23FCES102	Computational Engineering Mechanics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLES102	Computational Engineering Mechanics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	--	25	
3	DJS23FCES103	Basic Electrical Engineering & Digital Electronics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FLES103	Basic Electrical Engineering & Digital Electronics	--	2	1	2	--	50	50	--	--	--	--	--	--	50	
4	DJS23FTLL101	Liberal Learning	--	--	2	2	--	25	25		--	25	--	--	25	50	**2**
		Total	**6**	**6**	**4**	**13**	**120**	**150**	**270**	**6**	**180**	**25**	**0**	**0**	**205**	**475**	**13**
Courses offered in Group B																	
1	DJS23FCBS103	Chemistry	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FLBS103	Chemistry Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	--	50	
2	DJS23FCES104*	Engineering Graphics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLES104	Engineering Graphics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	--	25	
3	DJS23FCHS101	Effective Communication Skills	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLHS101	Effective Communication Skills Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	--	25	
4	DJS23FLVS101	Workshop Practices	--	2	--	1	--	25	25	--	--	--	--	--	--	25	**1**
5	DJS23FTHS102	Indian Knowledge System	--	--	2	2	--	25	25	--	--	25	--	--	25	50	**2**
		Total	**6**	**8**	**3**	**13**	**120**	**150**	**270**	**6**	**180**	**25**	**0**	**0**	**205**	**475**	**13**

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

Course Code	Course Category	Sem I	Sem II	Total
DJS23FCBS1xx	Basic Science Courses	8	8	16
DJS23FCES1xx	Engineering Science Courses	10	6	16
DJS23FTLL1xx	Liberal Learning Courses	2	0	2
DJS23FCHS1xx	Humanities Social Science and Management	0	5	5
DJS23FLVS1xx	Vocational and Skill Enhancement Courses	1	0	1
DJS23FCPC2xx	Program Core Courses ()	0	2	2
	Total credits	21	21	**42**

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)

Proposed scheme for First Year B.Tech Program (All Programs) : Semester II
(Academic Year 2023-2024)

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)	Time (hrs.)	Th / Cb	O	P	O & P	Total SEA (B)		
Compulsory courses offered to all the Programs																	
1	DJS23FCBS201	Mathematics - II	3	--	--	3	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FTBS201	Mathematics - II Tutorial	--	--	1	1	--	25	25	--	--	--	--	--	--	25	
2	DJS23FCES201	Object Oriented Programming using Java	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLES201	Object Oriented Programming using Java Laboratory	--	2	--	1	--	25	25	--	--	--	--	25	25	50	
3	DJS23FCPC2EC DJS23FCPC2IT DJS23FCPC2CE DJS23FCPC2ME DJS23FCPC2DS DJS23FCPC2AM DJS23FCPC2AD DJS23FCPC2IC	Electrical Networks Foundation of Information Technology Foundation of Computing Technologies Elements of Mechanical Engineering Fundamentals of Data Analysis Fundamentals of AI & ML Fundamentals of AI & DS Fundamentals of Sensor and Secured Technologies	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**2**
		Total	**7**	**2**	**1**	**9**	**120**	**50**	**170**	**6**	**180**	**0**	**0**	**25**	**205**	**375**	**9**
Courses offered in Group A																	
1	DJS23FCBS102	Physics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FLBS102	Physics Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	--	50	
2	DJS23FCES102	Computational Engineering Mechanics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLES102	Computational Engineering Mechanics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	--	25	
3	DJS23FCES103	Basic Electrical Engineering & Digital Electronics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FLES103	Basic Electrical Engineering & Digital Electronics Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	--	50	
4	DJS23FTLL101	Liberal Learning	--	--	2	2	--	25	25		--	25	--	--	25	50	**2**
		Total	**6**	**6**	**4**	**13**	**120**	**150**	**270**	**6**	**180**	**25**	**0**	**0**	**205**	**475**	**13**
Courses offered in Group B																	
1	DJS23FCBS103	Chemistry	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**4**
	DJS23FLBS103	Chemistry Laboratory & Tutorial	--	2	1	2	--	50	50	--	--	--	--	--	--	50	
2	DJS23FCES104*	Engineering Graphics	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLES104	Engineering Graphics Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	--	25	
3	DJS23FCHS101	Effective Communication Skills	2	--	--	2	40	--	40	2	60	--	--	--	60	100	**3**
	DJS23FLHS101	Effective Communication Skills Laboratory	--	2	--	1	--	25	25	--	--	--	--	--	--	25	
4	DJS23FLVS101	Workshop Practices	--	2	--	1	--	25	25	--	--	--	--	--	--	25	**1**
5	DJS23FTHS102	Indian Knowledge System	--	--	2	2	--	25	25	--	--	25	--	--	25	50	**2**
		Total	**6**	**8**	**3**	**13**	**120**	**150**	**270**	**6**	**180**	**25**	**0**	**0**	**205**	**475**	**13**

Learners 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 only.

Course Code	Course Category	Sem I	Sem II	Total
DJS23FCBS2xx	Basic Science Courses	8	8	16
DJS23FCES2xx	Engineering Science Courses	10	6	16
DJS23FTLL1xx	Liberal Learning Courses	2	0	2
DJS23FCHS1xx	Humanities Social Science and Management	0	5	5
DJS23FLVS1xx	Vocational and Skill Enhancement Courses	1	0	1
DJS23FCPC2xx	Program Core Courses ()	0	2	2
	Total credits	21	21	**42**

Program		Course
EXTC		Electrical Networks
IT		Foundation of Information Technology
Computer		Foundation of Computing Technologies
Mechanical		Elements of Mechanical Engineering
CSE(DS)		Fundamentals of Data Analysis
AI_ML		Fundamentals of AI & ML
AI_DS		Fundamentals of AI & DS
CSE(ICB)		Fundamentals of Sensor and Secured Technologies

Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (mins)
Theory	a. Term Test 1 (based on 40 % syllabus)	15	45
	b. Term Test 2 (on next 40 % syllabus)	15	45
	c. Assignment / course project / group discussion / presentation / quiz/ any other.	10	--
	Total marks (a + b + c)	40	--
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.	60	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

Prepared by Checked by Head of the Department Principal

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 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: 3 (DJS23)

With effect from the Academic Year: 2023-2024

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: 3 (DJS23)

With effect from the Academic Year: 2023-2024

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

Course: Mathematics - I (DJS23FCBS101)

Course: Mathematics - I Tutorial (DJS23FTBS101)

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 numbers.

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 Expansion of functions.
4. Illustrate the basic principles of Partial differentiation and its application to find maxima and minima.
5. Illustrate SciLab programming techniques to the solution of linear and simultaneous algebraic equations.

Mathematics - I (DJS23FCBS101)		
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 nθ, cos nθ in powers of sin θ, cos θ 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. 2.5. Logarithmic functions, Separation of real and Imaginary parts of Logarithmic functions.	**11**
3	**Expansion of Function:** 3.1. Taylor's Theorem (Statement only), Taylor's series and Maclaurin's series (Statement only). Expansion of standard functions.	**04**

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.	**09**
5	**Applications of Partial Differentiation:** 5.1. Maxima and Minima of a function of two independent variables. 5.2. Jacobian's of two and three independent variables.	**04**
6	**Numerical Solutions of Transcendental Equations, System of Linear Algebraic Equations, Curve fitting:** 6.1. Solution of Algebraic and Transcendental Equations by: Newton Raphson Method 6.2. Solution of system of linear algebraic equations by Gauss Seidal Iteration Method. 6.3. Curve fitting: Fitting a straight line, Quadratic curve.	**04**
	Total	**39**

Mathematics - I Tutorial (DJS23FTBS101)	
Tut.	**Suggested Tutorials (including SciLab programs)**
1	Matrices.
2	Matrices (SciLab)
3	Complex Numbers.
4	Hyperbolic and Logarithm of complex no.
5	Expansion of Function.
6	Partial Differentiation.
7	Application of Partial Differentiation.
8	Solution of Transcendental Equations by Newton Raphson Method.
9	Solution of system of linear algebraic equations by Gauss Seidal Iteration Method.
10	Curve Fitting.

Minimum eight tutorials (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 (DJS23FCES101)

Course: Structured Programming using C Laboratory (DJS23FLES101)

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 (DJS23FCES101)		
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 Algorithm & Flowchart: Three constructs of Algorithm and flowchart: Sequence, Decision (Selection) and Repetition, Compilation process: Syntax and semantic errors,	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 6.2 Pointer Arithmetic 6.3 Call by value, call by Reference	04
	Total	**26**

Structured Programming using C Laboratory (DJS23FLES101)	
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. 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.
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.
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: Physics (DJS23FCBS102)

Course: Physics Laboratory & Tutorial (DJS23FLBS102)

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 the 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. Assimilate the concepts of Electrodynamics, which are prerequisite in modern developments for signal communications, Antenna Theory etc.

CO4. Explore basic sensing techniques for physical measurements in modern instrumentation.

Physics (DJS23FCBS102)		
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 (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 & quantum computing, Qubits, Quantum Superposition theorem, Quantum Entanglement theorem)	5 hrs

2	**OPTICS FOR ENGINEERS** ***(Prerequisites:*** *Wavefront and Huygens's principle, reflection, refraction, interference, Young's double slit experiment, diffraction)* • **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 in reflected light; Formation of Newton's rings; Applications (Antireflecting & High reflecting films) • **Diffraction:** Introduction (distinguish between interference & diffraction), Fresnel & Fraunhofer diffraction, Fraunhofer diffraction at single slit & double slit (qualitative), Diffraction Grating, Absent spectra, Resolving power & Dispersive power of a grating (qualitative), Applications**.**	7 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, 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, Applications (Optical fibre Transmission).	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, Gauss's law for electrostatics & magneto statics, Faraday's Law, Ampere's circuital law)* • Scalar and Vector fields, Physical significance of gradient, divergence, and curl in Cartesian co-ordinate system. • Divergence theorem, Stokes theorem. • Maxwell's equations (Free space and time varying fields) & Significance.	4 hrs
5	**PHYSICS OF SENSORS** ***(Prerequisites:*** *Transducer concept, meaning of calibration, piezoelectric effect, IR waves**)*** • **Ultrasonic sensors**: Concept of inverse piezoelectricity, Ultrasonic transducer as distance meter, Applications • **Light sensors**: Photodiode & LDR (Principle, working & Applications) • **Hall sensor:** (Principle of Hall effect, working & Applications) • **IR sensor:** (Principle, working & Applications)	4 hrs
	Total	**26 hrs**

Physics Laboratory & Tutorial (DJS23FLBS102)	
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.

Minimum 8 experiments as laboratory work from the above suggested list or any other experiment based on syllabus should be conducted batch wise to develop a rational temperament for scientific observations which lead to constructive inferences essential for technology studies.

Tutorials:

A minimum of 8 tutorial sessions on topics covering the entire syllabus should be conducted batchwise for effective interactive sessions focusing on better understanding of the subject.

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. Quantum Mechanics: Theory & Applications-Ajoy Ghotak & S. Lokanathan
6. Modern Engineering Physics – Vasudeva, S. Chand.
7. Engineering Physics- Wiley.

8. Engineering Physics – R K Gaur & S L Gupta, Dhanpat Rai Publications.
9. Engineering Physics – Shatendra Sharma & Jyotsna Sharma, Pearson publications.
10. Engineering Physics – D. K. Bhattacharya & Poonam Tandon, Oxford publications.
11. Engineering Physics – V Rajendran, McGraw Hill Educations.
12. Optics - Ajay Ghatak, Tata Mc Graw Hill.
13. 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).
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 (DJS23FCES102)

Course: Computational Engineering Mechanics Laboratory (DJS23FLES102)

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 objects/bodies.

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

1 Illustrate the effect of force and moment to determine the resultant of force system
2 Apply the concept of equilibrium systems with the help of free body diagram.
3 Correlate real life application to friction and estimate the Power transmitted by the belt.
4 Apply the concept of geometric transformations to find the transformed position of an element/object.
5 Analyze general plane motion of rigid bodies.

Computational Engineering Mechanics (DJS23FCES102)		
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.	**06**
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.	**06**
3	**Computation and analysis of Frictional force :** 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. Belt friction, Power transmitted by flat belt drives. (Numericals on Block, Wedge and Ladder friction excluded.) ** Application of software packages for analysis and computation of friction forces.	**04**
4	**Robot Kinematics (Part-I): Geometric Transformations** **2D transformations:** Translation, Scaling, Rotation, Shear and Reflection; Matrix representation and Homogeneous Coordinates; Composite transformation. **Introduction to 3D Transformations:** Translation, Rotation, Scaling and Reflection (Numerical on 3D transformations excluded). ** Programming for transformations of basic geometric 2D elements/objects.	**05**

5	**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. Introduction to Forward Kinematics and Inverse Kinematics. Applications of Mechanics in Robotics, Machine Learning and AI. ** Application of software packages for simulating Kinematics of Rigid Body.	**05**
	Total	**26**

Computational Engineering Mechanics (DJS23FLES102)	
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 five from 1 to 7 and any three 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 (DJS23FCES103)

Course: Basic Electrical Engineering & Digital Electronics Laboratory & Tutorial (DJS23FLES103)

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 techniques.
2. To get an insight of 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.

Basic Electrical Engineering & Digital Electronics (DJS23FCES103)		
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 • Star – Delta Transformation • Superposition Theorem • Thevenin'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 • Calculation of power and power factor	10
4	**Number Systems and Logic Gates** • Review of number system • Decimal, Binary, Binary coded decimal, Octal, and Hexadecimal number systems and conversions • Basic gates • Universal gates • Boolean algebra • De Morgan's Laws	04

5	**Latches and Flip flops** • Introduction to Latches • Flip-flops: RS, JK, T, D flip-flops	03
	Total	**28**

Basic Electrical Engineering & Digital Electronics Laboratory & Tutorial (DJS23FLES103)	
Exp.	**Suggested experiments**
1	Study of basic laboratory instruments. ***(compulsory)***
2	Mesh and Nodal analysis.
3	Verification of Superposition Theorem.
4	Verification of Thevenin / 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	Implementation of basic gates using universal gates.

Batchwise laboratory work of 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.

Batchwise tutorial sessions are to be conducted on topics which would help the learner to identify/analyze the problem and to apply problem solving techniques learnt.

Books Recommended:

Text Books:

1. B. R. Patil, “Basic Electrical Engineering”, Oxford Higher Education, 2016.
2. R. R. Singh, “Network Analysis and Synthesis”, McGraw Hill, 2nd Edition, 2019.
3. R. S. Sedha, “A textbook of Electronic Devices and Circuits”, S. Chand, 2002.
4. R. P. Jain, “Modern Digital Electronics”, McGraw Hill, 2011.

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. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
4. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
5. M. Morris Mano, “Digital design”, Prentice Hall India.

Prepared by Checked by Head of the Department Principal

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

Course: Liberal Learning **Group-A**

Health and Wellness- Mind and Body Management (DJS23FTLL101)

Objectives:

1. To acquaint learners with the basic concept of Health and wellbeing.
2. To develop healthy lifestyle habits for good health.
3. To understand emotional & mental well-being.
4. To impart strategies to maintain Good Health.

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

1. Implement the knowledge of Health and wellness in daily lives.
2. Apply appropriate & innovative methods to avoid risks from harmful habits.
3. Employ personal development (both physical & emotional) strategies for better living.
4. Create a plan for good health through a positive mindset.

Health And Wellness (DJS23FTLL101)		
Unit	**Suggested Description of Tutorial Activities**	**No of Assignments**
1	**Fundamentals of Good Health** 1. Divide the students into small groups and assign each group a specific lifestyle choice (Healthy or Unhealthy) to explore. • Ask them to discuss the potential effects on health and present their findings to the class.	1
2	**The Basics of Health** 1. Create a Personalized Health Goal Plan 2. Role-play techniques to promote awareness regarding health and disease prevention. **Select a Relevant Topic**: Choose a specific health-related topic such as hygiene practices, vaccination, or mental health. **Script Development**: Develop a script that combines informative content with creative elements. Include key messages, facts, and practical tips related to the health issue. Use humor, drama, and relatable scenarios to capture the audience's attention. **Characterization**: Each character should have a distinct personality and contribute to the overall message of the play.	2
3	**Yoga for Mind and Body (Any 2)** 1. Mindfulness and Meditation Session 2. Written assignment on the Role of Yoga in enhancing concentration. 3. **Stress Awareness Discussion Group**	2

	• Create a safe and supportive space for students to discuss and share their stressors. • Organize a stress awareness discussion group where students can openly express their concerns, challenges, and coping strategies. • Facilitate meaningful conversations on stress management techniques. • Provide resources for support (such as counseling services) and encourage peer support within the group.	
4	**1. Emotional Intelligence and Mind Management (Any 2)** 1. Role-Play on Conflict Resolution: a) **Find a partner**: Choose a friend who is willing to participate in this role-play activity with you. b) **Select a scenario**: Together with your partner, select a conflict scenario to role-play. It could be a common situation that often leads to conflicts, such as a disagreement over how to divide household chores, a difference of opinion on a project at work, or a conflict over limited resources. c) **Assign roles**: Decide who will play each role in the conflict scenario. One person will take on the role of one party involved in the conflict, and the other person will take on the role of the other party. d) **Practice conflict resolution techniques**: Use the conflict resolution techniques you have learned, such as active listening, expressing feelings using "I" statements, seeking common ground, and brainstorming solutions. e) **Reflect and switch roles**: After the initial role-play, take a moment to reflect on the experience. Discuss what worked well and areas that could be improved. Then, switch roles and repeat the role-play, allowing each participant to experience the situation from the perspective of the other party involved in the conflict. • Remember, the purpose of the activity is not to "win" the conflict but rather to practice and develop the skills necessary for constructive conflict resolution. • Approach the role-play with an open mind, a willingness to learn, and a commitment to respectful communication. **2. Self-Assessment and Reflection (Mood O Meter chart activity)** • Begin the tutorial by facilitating self-assessment activities that encourage students to reflect on their emotions, thoughts, and behaviors. • Provide questionnaires or reflective exercises that prompt students to identify their strengths, areas for improvement, and triggers for stress or negative emotions. **3. Case Study discussion based on Emotional Intelligence**	2
5	**Self-Reflection and Wellness Goal Setting**	1

	Gratitude journaling: Have students maintain a gratitude journal where they write down three things, they are grateful for each day on the following indicators: • How did it feel to write in the gratitude journal? • Did you find it challenging or easy to identify things to be grateful for? • What positive emotions or thoughts arose while writing the journal? • Do you think maintaining a gratitude journal can have a positive impact on your well-being as an engineering student?	

Mini Project – Community Health and Wellness Initiative

1. **Research and Assess Community Needs**:
   - Conduct surveys or interviews to assess the health and wellness needs of your community.
   - Identify specific areas where improvements can be made, such as physical fitness, mental health, social connections, or access to healthcare resources.
2. **Fitness and Recreation Events**:
   - Arrange fitness events, such as community walks or runs, group exercise classes, yoga sessions, or sports tournaments.
3. **Health Education Campaigns**:
   - Launch health education campaigns to raise awareness about specific health issues relevant to your community.
   - This could include distributing informational pamphlets, organizing educational talks, or **Creating Social Media Campaigns** to share important health messages.
   - Develop a plan to sustain the project beyond its initial phase.

OR

Health and Wellness Advocacy Project

- Choose a health issue you are passionate about and design a health and wellness advocacy project.
- Students can create a **Persuasive Video, Infographic or Social Media Campaign** to raise awareness and mobilize support for their chosen cause.

Assessment Scheme for Proposed Course on "Health and Wellness- Mind and Body Management", Course Code: DJS23FTLL101

Assessment Scheme- Total 50 Marks

Term Work	25 Marks
Mini Project	25 Marks

Term Work shall consist of a minimum of **five tutorial assignments** from the above-mentioned list.

Suggested Reference books

1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell.
2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.
3. Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well-Being by Nashay Lorick, 2022
4. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018.
5. Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013
6. Yoga for Beginners: A Practical Guide" by Iyengar B.K.S ,Dorling Kindersley,2006
7. Emotional Intelligence: Why It Can Matter More Than IQ By Daniel Goleman,Bantam, 2006
8. Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones by James Clear, Penguin,2018

Prepared by Checked by Head of the Department Principal

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

Course: Chemistry (DJS23FCBS103)

Course: Chemistry Laboratory & Tutorial (DJS23FLBS103)

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. Recognize new approaches of chemical analysis, which are more convenient, less hazardous and sustainable to perform.
2. Describe applications based on nanomaterials and modern polymers in engineering techniques.
3. Analyze the quality of fuel for energy efficiency.
4. Recognize properties of materials and alloys with phase transformation.
5. Identify the parameters responsible for water pollution using suitable methods of water treatment.

Chemistry (DJS23FCBS103)		
Unit	**Description**	**Duration**
1	**Sustainable approach to Chemistry** **(A) 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. **(B) Green Chemistry** • Introduction: Definition, significance. • Twelve Principles of green chemistry. • Conventional and green synthesis of : • (i) Carbaryl (ii) Indigo (iii) Adipic acid (iv) Acrylamide • Percentage atom economy (Numericals). • Green solvent: Supercritical CO_2	8

2	**Engineering Materials** **(A) Nanomaterials:** • Introduction to nanomaterials. • Fullerenes: Properties and applications. • Carbon nanotubes: Types, Properties, Method of preparation (Laser, CVD), Applications. **(B) 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.	5
3	**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).	5
4	**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.	4
5	**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.	4
	Total	**26**

Chemistry Laboratory & Tutorial (DJS23FLBS103)	
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, which would help the learner to apply the concept learnt.

Tutorials:
Minimum eight tutorials based on syllabus will be conducted. 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 Text Book 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 (DJS23FCES104)

Course: Engineering Graphics Laboratory (DJS23FLES104)

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 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 (DJS23FCES104)		
Unit	**Description**	**Duration**
1	**Introduction to Engineering Drawing**. Types of Lines, Dimensioning Systems as per IS conventions, Types of Projections. ****Introduction to Auto CAD**: - Basic Drawing and Editing Commands. Knowledge of setting up layers, Dimensioning, Hatching, plotting and Printing	02
2	**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.**	05
3	**Sectional Orthographic projections:-** • Concept of sectioning and drawing section lines, • Need for drawing sectional views • Section of simple geometrical solids-cases involving different types of cutting planes. ****Drawing of Sectional orthographic projections using Auto CAD.**	05
4	**Isometric Views:-** Isometric Views/Drawings of blocks (plain and cylindrical, excluding spheres). ****Drawing of Isometric Views using Auto CAD.**	06

5	**Projection of Solids: -** (Prism, Pyramid, Cylinder & Cone only) Projections of Solids with the axis inclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum). Use change of position or Auxiliary plane method. ****Drawing of Projection of Solid using Auto CAD.**	08
	Total	**26**

**** Should be covered during Auto CAD Practical.**

Engineering Graphics Laboratory (DJS23FLES104)	
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.
3. Basant Agrawal, C M Agrawal, 'Engineering Drawing',Third Edidtion, Tata McGraw Hill Education Private Limited.

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 (DJS23FCHS101)

Course: Effective Communication Skills Laboratory (DJS23FLHS101)

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 (DJS23FCHS101)		
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 (DJS23FLHS101)

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 (2022). *Professional Communication and Ethics-I*. 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: Workshop Practices (DJS23FLVS101)

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 comprehend 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 be familiar with the basic concept and structure of computer hardware and networking.
6. To know how to use 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 acquainted 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 (DJS23FLVS101)		
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 jobs like, Lap welding of two plates, butt welding of plates with simple cover, arc welding to join plates at right angles.	**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 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.	**12**

4	**Computer Hardware and Networking:** Disassembly 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 welding techniques and make a V-butt joint or Lap-joint, using the given mild steel pieces by arc welding.
3. To make printed circuit board as per the given circuit drawing.
4. To make connection to two lights controlled by one switch in series or one light, controlled by two-way switches.
5. To study computer hardware and operating system.
6. To study various types of sheet metal tools and make square or rectangular tray.
7. To study various types of plumbing tools and make one job containing various pipe fitting.

8. To study various operations of a CNC machining centre and make one simple job on CNC turning.
9. To study various 3D printing techniques and make a simple object using any of this technique.
10. 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

Any one Job from Group A (Main Job)	: 15 marks
Any two Jobs from Group B (Group Job)	: 10 marks
Total Marks	: 25 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 **F.Y. B. Tech**

Course: Indian Knowledge System (DJS23FTHS102)

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 history of Indian education system.
CO2 Learn about Indian Scientists and their inventions.
CO3 Understand and appreciate the various art forms and architecture in India.
CO4 Illustrate the classic literature written in Indian languages.
CO5 Know the various religions followed in India and their philosophies.

Indian Knowledge System (DJS23FTHS102)		
Unit	**Description**	**Duration**
1	**Indian Education System** 1.1. Gurukul system 1.2. Ancient Universities (Nalanda, Takshashila,Vikramshila,Vallabhi,Nagarjuna,etc.)	4
2	**Indian Scientists and Their inventions** 2.1. Patanjali, Aryabhatta, Bhaskaracharya, Charaka, Brahmagupta, Varahmitra, Sushruta, Kanada, Baudhyana, etc.	6
3	**Indian art and architecture** 3.1 Mughal Paintings, Tanjore Paintings, Madhubani Paintings, Warli Paintings, etc. 3.2 Harrappa and Mohenjo-Daro Civilization 3.3 Temples and other religious places 3.4 Buddhist stupas 3.5 Forts and monuments	6
4	**Indian Classic Literature** 4.1. Puranas 4.2. Epics (Ramayana, Mahabharata, Shakuntala, Meghdoota, Arthashastra,Sangam Literature, Malavikagnimitram etc.)	6
5	**Religion and Philosophy** 5.1. Vedas 5.2. Buddhism 5.3. Jainism and other religions	4
	Total	**26**

List of Tutorials/Assignments

1. **Indian Education System**
    i. Group discussions/debates on various education systems.
2. **Indian Scientists and Their inventions**
    i. Group presentations on various Indian scientists
    ii. An assignment on different inventions by Indians and their impact on world.
3. **Indian art and architecture**
    i. Group Poster project on different painting forms and Harappa and Mohenjo-Daro civilization.
    ii. Group presentation on different archaeological structures in India
4. **Indian Classic Literature**
    i. An assignment on review of any one of the Indian classic literatures.
    ii. Group discussion/Debate on the importance of the Indian classic literature in spreading the awareness about the importance of Indian culture and traditions.

    OR

    iii. **Dramatic Adaptations**:
    - Ask students to adapt a scene or act from Indian classical literature into a dramatic performance.
    - They can write scripts, create props and costumes, and rehearse their adaptations.
    - Encourage creativity while staying true to the essence of the original work.
    - Students can perform their adaptations for the class or in a larger setting.
5. **Religion and Philosophy**
    i. A group discussion/debate on the various religions and their philosophies

Suggested Text/Reference Books

1. B. Mahadevan, V. R. Bhat, Nagendra Pavana, '*Introduction to Indian Knowledge Systems: Concepts and Applications',* PHI Learning Publications, Delhi, 2022.
2. Satishchandra Chaterjee, Dheerendramohan Datta, *An Introduction to Indian Philosophy,* Motilal Banarsidass Publishing House, New Delhi, 2016
3. V.Sivaramakrishnan (Ed.), *'Cultural Heritage of India-course materia'l,* Bharatiya Vidya Bhavan, Mumbai. 5th Edition,2014

Evaluation Scheme

Tutorials (Term work)

Term work shall consist of 8 tutorials/assignments and a mini project presentation.

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

Tutorials/Assignments ……. (25) Marks

Mini project Report Presentation……. (25) Marks

TOTAL: ……... (50) Marks

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

Prepared by Checked by Head of the Department Principal

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

Course: Mathematics - II (DJS23FCBS201)

Course: Mathematics - II Tutorial (DJS23FTBS201).

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. Solve Multiple integrals.
3. Apply the concepts of Multiple Integrals to find Area, Volume, and mass of lamina.
4. Solve various types of First Order and Higher Order differential equations.
5. Apply the principles of Numerical Method for solving differential equation and numerical integration analytically and using SciLab.

Mathematics - II (DJS23FCBS201)		
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.	**12**
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). Triple Integration: 2.5. Introduction and evaluation of Triple Integrals using Cartesian coordinate system. 2.6. Evaluation of triple integrals using cylindrical and spherical coordinate systems.	**7**
3	**Application Multiple Integrals:** 3.1. Application of double integrals to compute Area and Mass. 3.2. Application of triple integrals to compute Volume.	**04**

4	**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.	**05**
5	**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.	**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) 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).	**04**
	Total	**39**

Mathematics - II Tutorial (DJS23FTBS201).	
Tut.	**Suggested Tutorials (including SciLab programs)**
1	Beta and Gamma Functions, DUIS and Rectification.
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.
8	Curve Tracing.
9	Numerical Integration by Trapezoidal rule.
10	Numerical Integration by Simpson's 1/3rd rule.
11	Numerical Integration by Simpson's 3/8th rule.
12	Numerical Solution of Ordinary Differential Equations of first order and first degree.
15	Numerical Solution of Ordinary Differential Equations using Runge-Kutta fourth order method.

Minimum eight tutorials (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. 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.

Prepared by Checked by Head of the Department Principal

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

Course: Object Oriented Programming using Java (DJS23FCES201)

Course: Object Oriented Programming using Java Laboratory (DJS23FLES201)

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 (**Exception Handling and Multithreading**).
3. Design Graphical User Interface using swing.

Object Oriented Programming using Java (DJS23FCES201)		
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, 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, finalize method. 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 (DJS23FLES201)	
	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 on String and String Buffer. 5. Program on Collections (ArrayList/ Vectors) 6. Program to create class with members and methods. 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. 12. Program to demonstrate multiple inheritance using interfaces (Use super keyword). 13. Program on abstract class 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

Prepared by Checked by Head of the Department Principal

Program: Electronics and Telecommunication Engineering F.Y B.Tech Semester: II

Course: Electrical Networks (DJS23FCPC2EC)

Pre-requisite:

1. Basic Electrical Engineering and Digital Electronics
2. Mathematics - I

Objectives:

1. To analyse the circuits in time domain.
2. To study network topology, network functions, two port network.
3. To synthesize passive network by various methods

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

1. Apply the time-domain method for analysis of circuits.
2. Find the various parameters of two port network.
3. Apply network topology for analyzing the circuit
4. Synthesize the network using passive elements.

Electrical Networks (DJS23FCPC2EC)		
Unit	**Description**	**Duration**
1	**Graph Theory** Objectives of graph theory, Linear Oriented Graphs, graph terminologies, Matrix representation of a graph: Incidence matrix, Circuit matrix, Cut-set matrix, reduced incident matrix, tieset matrix, f-cutset matrix. KVL & KCL using matrix, solution of resistive networks and principle of duality.	**06**
2	**Time domain analysis** Transient Analysis of circuits containing R, L and C, Time domain analysis of R-L, R-C and R-L-C Circuits, Forced and natural response.	**06**
3	**Network functions** Network functions for the one port and two port networks, driving point and transfer functions, Poles and Zeros of Network functions, necessary condition for driving point functions, necessary condition for transfer functions, Hurwitz Criterion.	**04**
4	**Network Synthesis** Concept of positive real function, testing for necessary and sufficient conditions for Positive Real Functions, Synthesis of LC, RC & RL Circuits: properties of LC, RC & RL driving point functions, LC, RC & RL network Synthesis in Cauer-I & Cauer-II, Foster-I & Foster-II forms.	**07**
5	**Two port Network** Parameters: Open Circuits, Short Circuit, Transmission and Hybrid parameters, relationship among parameters, conditions for reciprocity and symmetry (without dependent sources)	**05**
	Total	**28**

Books Recommended:

Text books:

1. Franklin F Kuo, *"*Network Analysis and Synthesis", Wiley, 2nd.ed. 1966
2. M E Van Valkenburg, *"*Network Analysis*",* Prentice-Hall of India Pvt Ltd, New Delhi, 26th Indian Reprint, 2000.
3. Ravish Singh, "Circuit Theory and Networks", Tata McGraw-Hill education, 2e, 2016.

Reference Books:

1. A Chakrabarti*, "*Circuit Theory", Dhanpat Rai & Co., Delhi, 6th Edition.
2. Sudhakar, Shyammohan S. Palli "Circuits and Networks", Tata McGraw-Hill education.
3. Smarajit Ghosh, "Network Theory Analysis & Synthesis", PHI learning.
4. K.S. Suresh Kumar, "Electric Circuit Analysis", Pearson (2013)
5. D Roy Choudhury, Networks and Systems, New Age International 1998.

Prepared by Checked by Head of the Department Principal

Program: Information Technology **F. Y B.Tech** **Semester: II**

Course: Foundation of Information Technology (DJS23FCPC2IT)

Pre-requisite: --

1. Computer Fundamentals

Course Objective: The objective of the course is to introduce the learner to the basics of computers, viz., the architecture, computer arithmetic, operating system and network basics. The course will also abreast the learner of the basics of computer security.

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

1. Understand the organization of a computer system and networking.
2. Understand the basics of computer security.

Foundation of Information Technology (DJS23FCPC2IT)		
Unit	**Description**	**Duration**
1	**Introduction to Computers and its Architecture:** Von Neumann model, Input-Output Devices, Memory Hierarchy-Cache Memory, Internal Memory, External Memory, Primary Vs Secondary Storage, Data Storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: HDD, SSD	03
2	**The Central Processing Unit:** The ALU, Integer Representation, Integer Arithmetic, Floating Point Representation, Floating-Point Arithmetic, Machine Instruction Characteristics, Types of Operations – Data Transfer, Arithmetic, Logical, Conversion, Input/Output, Addressing Modes – Immediate, Direct, Indirect, Register, Register Indirect, Register Organization, Instruction Cycle	05
3	**Computer Arithmetic:** Introduction to number systems-Binary number systems, octal, hexadecimal and their operations, conversion, 1's and 2's complement, Binary Arithmetic using complements – addition, subtraction, signed and unsigned integers.	06
4	**Operating System:** Functions, Measuring System Performance, Batch Processing, Multiprogramming, Multi-Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	05
5	**Data Communication and Networks:** Communication Process, Data Transmission speed, Communication Types (modes), Network Devices, Types of Networks, LAN Topologies, compression and its types-Lossy and Lossless. Fundamentals of cloud computing-SaaS, PaaS, IaaS, applications	04
6	**Attacks on Computers and Computer Security:** Introduction, Need for Security, Security Approaches, Principles of Security, Types of Attacks	03
	Total	**26**

Books Recommended:

Textbook Books:

1. "Introduction to Computer Science", ITL Education Solutions Limited, 2nd Edition, Pearson, 2011.
2. Atul Kahate, "Cryptography and Network Security", 4th Edition, McGraw-Hill, 2019.
3. R. P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill, 2009.
4. M. Morris Mano, "Digital Logic and computer Design", 1st Edition, Pearson Education India, 2016.

Reference Books:

1. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, Prentice Hall India, 2003.
2. Donald P Leach, Albert Paul Malvino, "Digital Principles and Applications", 8th Edition, Tata McGraw Hill, 2014.
3. Behrouz A. Forouzan, "Cryptography & Network Security", 3rd Edition, Tata McGraw Hill, 2015.
4. William Stallings, "Computer Organization and Architecture: Designing for Performance", 10th Edition, Pearson, 2015.

Prepared by Checked by Head of the Department Principal

Program: First Year Computer Engineering **Semester : II**

Course: Foundation of Computing Technologies (DJS23FCPC2CE)

Prerequisite: Computer Basics

Foundation of Computing Technologies (DJS23FCPC2CE)		
Unit	**Description**	**Duration**
1	**Introduction to Computer Fundamentals** **Introduction to Computers**: Characteristics, Components, Advantages & Limitations, Classification of computers, Software- Classification & Application **Introduction to Computer Architecture & Organization:** Introduction, Basic organization of computer architecture; Von Neumann model and Harvard architecture; Data Representation and Arithmetic Algorithms- Addition, Subtraction, Multiplication - unsigned multiplication, Booth's algorithm (Signed multiplication), Division of integers - restoring division, non-restoring division., Types of RAM (SRAM, DRAM, SDRAM, DDR, SSD) and ROM	05
2	**Data Communication and Networking** **Communication concepts**: Characteristics of Signal (Amplitude, Frequency, Period, Wavelength). Channel Capacity for noiseless channel (Nyquist Law) and noisy channel (Shannon's Law). Data Rate versus Baud Rate, Error detection: Parity –based, CRC-based, **Wired Networks**: Goals and applications of networks. LAN, MAN & WAN Architectures, Concept of WAN subnet, Overview of existing networks. Need for a Protocol Architecture, OSI Reference Model Architecture, FCS Computation. Error Control and recovery techniques, Concept of ARQ standard and its versions. **Wireless Networks**: Bluetooth, Wi-Fi, Li-Fi	04
3	**Data Base Management Systems** **Introduction to Database:** History, Characteristics, Users and Advantages, Classification of Database, Data Models, Schemas & Instances, Three Schema Architecture & Data Independence. DBMS Languages & Interfaces, Conceptual Data modeling using ER Model, **Relational Data Model Concepts:** Domains, Attributes, Tuples, Relations & their characteristics. Relational Data Model Constraints-Entity Integrity, Referential Integrity, Foreign Keys and other Relational Database design using ER to Relational Mapping	03
4	**Fundamentals of Operating System** Definition of Operating System Objectives, types, and functions of Operating Systems, Architecture of Operating System, Internal and External Commands, Batch Files, Types of O.S- Windows, Linux, RTOS, Android, iOS, etc.	03

5	**Introduction to Computer Security:** **Basics of Security**: Security Trends, CIA Trial, Threats, attacks, Vulnerability, Cryptography and its types, Security mechanisms **Introduction to Cyber Security**: Hacking, Data Theft, Cyber Terrorism, Virus & Worm's, Email Bombing, Pornography, online gambling, Forgery, Web Defacements, Web Jacking, Illegal online Selling, Cyber Defamation, Software Piracy, Electronics/ Digital Signature, Phishing, Password Cracking	03
6	**Introduction to Advanced Computing Technology:** **Big data**: Introduction, Characteristics of big data, Big data case studies, **Data Science**: Introduction to data science concept, Data Science Profile, The Data Science Process **Data analytics:** Overview, Importance of data analytics, Types of data analytics, Advantages of data analytics **Data warehousing and Mining:** Introduction to Data Warehouse and Dimensional modelling, Data Mining Task and Techniques, KDD process, Issues in Data Mining, Applications of Data Mining **Data Engineering:** Introduction to Data Engineering, Data cleansing, data transformation **Block chain Technology:** Introduction, Bitcoin, Ethereum, Consensus algorithms, Smart contract	08

Textbooks:

1. William Stallings, "Computer Organization & Architecture- Designing for Performance", Pearson 11th Edition, 2022.
2. Andrew Tanenbaum, David Wetherall, "Computer Networks", Pearson 5th Edition, 2010.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System concepts", TMH 7th Edition, 2021.
4. Abraham Silberschatz, Peter Galvin, "Operating System Concept", Wiley 9th Edition, 2018.
5. Behrouz Forouzan, Depdeep Mukhopadhyay, "Cryptography and Network Security", TMH 3rd Edition, 2015.
6. Nilakshi Jain, Ramesh Menon, "Cyber Security and Cyber Laws", Wiley 1st Edition, 2020.
7. Neeraj Kumar, N. Gayathri, Md Arafatur Rahman, B. Balamurugan, "Blockchain, Big Data and Machine Learning: Trends and Applications", CRC Press 1st Edition, 2020

Reference Books:

1. Mano M Morris, "Computer System Architecture", Pearson 3rd Edition, 2017.
2. Behrouz Forouzan, "Data Communications and Networking with TCPIP Protocol", Mc Graw Hill 6th Edition, 2022.
3. Elmasri Ramez, Navathe Shamkant, "Fundamentals of Database System", Pearson 7th edition, 2017.
4. Achyut Godbole, Atul Kahate, "Operating Systems", Mc Graw Hill 3rd Edition, 2017.
5. William Stallings, Lawrie Brown, "Computer Security - Principles and Practice", Pearson 4th Edition, 2019.
6. Nina Godbole, Sunit Belapure, "Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspective", Wiley 1st Edition, 2011.
7. Gerard Cardoso, Marialena Zinopoulou, Stylianos Kampakis, Theodosis Mourouzis, "Business Models in Emerging Technologies: Data Science, AI, and Blockchain", Business Expert Press, 2022

Prepared by Checked by Head of the Department Principal

Program: Mechanical Engineering **Group A & B** **F.Y B. Tech** **Semester: II**

Course: Elements of Mechanical Engineering (DJS23FCPC2ME)

Objectives:

1. To acquaint learners with the basics of thermodynamics and energy conversion devices.
2. To familiarize learners with the machine elements.
3. To impart the knowledge of materials, manufacturing processes and machine tools.

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

1. Understand the scope of mechanical engineering and fundamentals of thermodynamics.
2. Understand working principle of various energy conversion devices.
3. Identify various machine elements for different applications.
4. Understand various additive and subtractive manufacturing processes, chip less and chip removal processes.
5. Describe various types of conventional machine tools and CNC machines, with machining operations to generate cylindrical, and planar components.

Elements of Mechanical Engineering (DJS23FCPC2ME)		
Unit	**Description**	**Duration**
1	**Introduction to Mechanical Engineering** (Overview only): Role of Mechanical Engineering in Industry and Society - Emerging Trends and Technologies in different sectors, such as Energy, Manufacturing, Automotive, Aerospace and Marine sectors. **Thermodynamics** Thermodynamic work, p-dV work in various processes, p-V representation of various thermodynamic processes and cycles, Ideal gas equation, Properties of pure substance, Statements of First and Second law of thermodynamics and their applications. Carnot cycle for Heat engine, Refrigerator and Heat pump.	**06**
2	**Energy Conversion Devices** (Theoretical study and applications) Steam generation process, Boiler: Mountings and accessories, Fire tube and Water tube boiler, Construction and working of Babcock & Wilcox, Cochran boiler, Introduction and Working principle of Steam Turbines, Gas turbine, Hydraulic turbines: Working of Pelton wheel and Francis turbine, Reciprocating Compressor, Reciprocating Pump, Working of Reciprocating I.C. engines (2 Stroke and 4 stroke), Study of household refrigerator and air conditioner.	**05**
3	**Machine elements** (Theoretical study and applications) Power transmission shafts, axles, keys (Types and its applications). Bearings: Purpose, Classification, sliding contact bearing: Solid journal bearing, Bush bearing, rolling contact bearing: Ball bearing, Roller bearings. Power Transmission Devices (Basic elements and its applications): Belt drives, Gear drives and Couplings: Types and its applications. **Introduction to machine design process.**	**05**

4	**Materials and Manufacturing Processes** Introduction to Engineering materials and material selection criteria. Classification of manufacturing process based on additive and subtractive process, chip-less and chip-removal process. Additive Manufacturing process (Liquid based, Solid based & Powder based processes). Casting, Forging, Extrusion, Rolling, Sheet metal forming/cutting, Metal joining processes.	**05**
5	**Machine Tools** Conventional machine tools required to generate cylindrical and planar components. Introduction to Numerical Control (NC) and Computer Numerical Controlled (CNC) machines. Introduction to various non-conventional machining processes, classification based on Thermal, Electrical, Chemical and Mechanical energy.	**05**
	Total	**26**

Books Recommended:

Text Book:

1. R. K. Rajput, "Elements of Mechanical Engineering", Laxmi Publications Pvt Ltd, 2017.
2. B. Y. Patil and H. G. Patil, "Elements of Mechanical Engineering", John Wiley & Sons, 2020.
3. Mahesh Kumar, "Elements of Mechanical Engineering", John Wiley & Sons, 2019.
4. N. R. Babapurmath and V. S. Yalliwal, "Basic Mechanical Engineering", Vikas Publishing, 2014.

Reference Books:

1. P. K. Nag, "Engineering Thermodynamics", Tata McGraw-Hill Publishing Co. Ltd, 2018.
2. Yunus A. Cengel and Boles, "Thermodynamics: An Engineering Approach ", Tata McGraw-Hill Publishing Co. Ltd., 2019.
3. Arora and Domkundwar, "Thermal Engineering", Dhanpat Rai and Sons, 2009.
4. V. B Bhandari, "Design of machine elements", Tata McGraw Hill, 2017.
5. W. A. J. Chapman, "Workshop Technology Part 1 & 2", fifth edition, Routledge, Taylor & Francis Group, 2019.
6. Serope Kalpakjian and Steven R. Schmid "Manufacturing Processes for Engineering Materials", Pearson, Sixth Edition, 2017.
7. Mikell P. Groover, "Fundamentals of Modern Manufacturing, Materials, Processes and Systems", John Wiley & Sons, Inc, Seventh Edition, 2020.

Prepared by Checked by Head of the Department Principal

Program: Computer Science and Engineering (Data Science) **F.Y B.Tech** **Semester: II**

Course: Fundamentals of Data Analysis (DJS23FCPC2DS)

Prerequisite: Basic Mathematics and Data Interpretation.

Objectives:

To develop skills of data analysis techniques for data modelling.

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

1. Understand data properties.
2. Apply statistical methods for data analysis.
3. Articulate various techniques to improve quality of data.

Fundamentals of Data Analysis (DJS23FCPC2DS)		
Unit	**Description**	**Duration**
1.	**Data:** Data objects and attributes: nominal, binary, ordinal, numeric, discrete, continuous; Characteristics of datasets: dimensionality, sparsity, resolution; Types of data sets: record data, data matrix, graph-based data, sequential data, sequence data, time-series data, spatial data.	**04**
2.	**Data and Text Visualization:** Seven Stages of Data Visualization, Types of charts (comparison, distribution, composition, relationship), Structured Data: bar chart, pie chart, histogram, stacked bar graph, box plot, scatter plot, heat map, line chart, Node-link, dual axis chart. Unstructured Data: word count, bar chart, word tree, line chart diagrams, Word clouds.	**04**
3.	**Descriptive Statistics:** Population Vs Sample; Measure of Central Tendency: arithmetic mean, weighted mean, median, mode, grouped and ungrouped data, empirical relationship between mean, median and mode, geometric mean, harmonic mean and outliers; Measure of Dispersion: Range, quartile deviation, mean deviation, standard deviation, variance, empirical relationship between measures of dispersion, absolute and relative dispersion, skewness, kurtosis and histogram; Measure of Position: Quartiles, interquartile range, semi interquartile range, percentile, percentile rank, box and whisker plot.	**06**
4.	**Data Preprocessing:** Need of Data Pre-processing; Data Cleaning: Handling missing values and noisy data; Data Transformation: Smoothing, attribute construction, aggregation, normalization; Data Discretization: Binning and Histogram analysis; Outlier Detection: Types of outliers, challenges, statistical method (z-score), proximity-based method (K-NN and LOF).	**07**
5.	**Feature Engineering:**	**05**

	Curse of Dimensionality, Feature Selection: Univariate methods (Pearson Correlation, Chi-square) and Multivariate methods (Forward Selection, Backward Selection and Stepwise Selection).	

Books Recommended:

Text Books:

1. Sharada Sringeswara, Purvi Tiwari, U. Dinesh Kumar, Data Visualization Storytelling using Data, 1st Edition, Wiley, 2022.
2. Data Mining Concepts and Techniques, Han, Kamber, Morgan Kaufmann Elsevier, 2022.
3. Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor, Sultan ChandPublisher, 2020

Reference Books:

1. Data Preparation for Machine Learning, Jason Browniee, ebook by Machine Learning Mastry. 2020
2. Best Practices in Data Cleaning: A Complete Guide to Everything you Need to Do Before andAfter Collecting Your Data, Jason Osborne, Sage Publication, 2012.
4. Bad Data Handbook: Cleaning Up the Data so you can get back to work, Ethan McCallum,O'Reilly, 2012
5. Feature Engineering and Selection: A practical Approach for Predictive Models, Max Kuhn and Keijell Johnson, CRC Press, 2020

Prepared by Checked by Head of the Department Principal

Program: Artificial Intelligence & Machine Learning **F.Y B.Tech** **Semester: II**

Course: Fundamentals of Artificial Intelligence & Machine Learning (DJS23FCPC2AM)

Pre-requisite: --

1. Basic knowledge of computers

Objectives:

1. To familiarize the fundamentals of Artificial Intelligence and Machine Learning

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

1. Understand the basics of Artificial Intelligence and its applications
2. Apply problem-solving techniques for problem formulation
3. Understand the fundamentals of Data Processing and Machine Learning

Fundamentals of Artificial Intelligence & Machine Learning (DJS23FCPC2AM)		
Unit	**Description**	**Duration**
1	**Introduction to Artificial Intelligence:** Introduction, History of Artificial Intelligence, Types of AI, Intelligent Systems: Categorization of Intelligent System, Components of AI Program, Applications of AI (Robotics, Healthcare, Industry), Current trends in AI. Intelligent Agents: Agents and Environments, The concept of rationality, The nature of environment, PEAS representation, The structure of Agents, Types of Agents, and Learning Agent.	05
2	**Problem solving and Searching Techniques:** Problem Solving Agent, Formulating Problems: steps problem solving in AI, Example Problems: Vacuum world state space graph, 8 Puzzle Problem, 4 queen and 8 Queen Problem. Introduction to searching techniques in AI.	05
3	**Knowledge Representation:** A Knowledge Based Agent, Overview of Propositional Logic, First Order Predicate Logic, Introduction to PROLOG, Case Study	05
4	**Expert Systems:**	05

	Introduction, Phases in building Expert Systems, Expert system Architecture, Case Study on Expert System. Applications of Expert Systems. How to achieve AI in practical: Introduction to Machine and Deep Learning, Introduction to No code AI tools.	
5	**Introduction to Machine Learning** History of Machine Learning, Life cycle of Machine learning, Classification of Machine Learning, Introduction to Data warehouse and data mining, Data preprocessing overview, Case study. Applications of Machine Learning.	06
	Total	**26**

Books Recommended:

Text books:

1. Stuart J. Russell and Peter Norvig, "Artificial Intelligence A Modern Approach", Fourth Edition, Pearson Education, 2022
2. Saroj Kaushik "Artificial Intelligence", First Edition, Cengage Learning, 2011
3. George F Luger "Artificial Intelligence" Low Price Edition, Pearson Education., Fifth edition, 2005
4. Deepak Khemani." A First Course in Artificial Intelligence", McGraw Hill Education (India), Sixth reprint 2018 edition (1 July 2017).

Reference Books:

1. Ivan Bratko "PROLOG Programming for Artificial Intelligence", Addison-Wesley, 4th edition, 2011
2. Elaine Rich and Kevin Knight "Artificial Intelligence" Third Edition, 2017
3. Davis E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. Patrick Henry Winston, "Artificial Intelligence", Addison-Wesley, Third Edition, 1992
5. Han Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, 3rd edition, 2011
6. N.P. Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press,

Online References:

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

Prepared by Checked by Head of the Department Principal

Program: First Year B.Tech. in Artificial Intelligence & Data Science **Semester: II**

Course: Fundamentals of Artificial Intelligence & Data Science (DJS23FCPC2AD)

Pre-requisite: --

1. Basic knowledge of computers

Objectives:

1. To familiarize the fundamentals of Artificial Intelligence and Data Science

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

1. Understand the basics of Artificial Intelligence and its applications
2. Apply problem-solving techniques for problem formulation
3. Understand the fundamentals of Data Science

Fundamentals of Artificial Intelligence & data Science (DJS23FCPC2AD)		
Unit	**Description**	**Duration**
1	**Introduction to Artificial Intelligence:** Introduction, History of Artificial Intelligence, Types of AI, Intelligent Systems: Categorization of Intelligent System, Components of AI Program, Applications of AI (Robotics, Healthcare, Industry), Current trends in AI. Intelligent Agents: Agents and Environments, The concept of rationality, The nature of environment, PEAS representation, The structure of Agents, Types of Agents, and Learning Agent.	06
2	**Problem solving and Searching Techniques:** Problem Solving Agent, Formulating Problems: Steps problem solving in AI, Example Problems: Vacuum world state space graph, 8 Puzzle Problem, 4 queen and 8 Queen Problem. Introduction to searching techniques in AI.	06
3	**Expert Systems:** Introduction, Phases in building Expert Systems, Expert system Architecture, Case Study on Expert System. Applications of Expert Systems. How to achieve	06

	AI in practical: Introduction to Machine and Deep Learning, Introduction to No code AI tools.	
4	**Fundamentals of Data Science:** Introduction to data lake, Data Lake frameworks, Data Pre-Processing An Overview, Cleaning, Data Integration, data reduction, Data Transformation and Data discretization. Exploratory Data Analysis (EDA): Philosophy of EDA - The Data Science Process	08
	Total	**26**

Books Recommended:

Text books:

1. Stuart J. Russell and Peter Norvig, "Artificial Intelligence A Modern Approach", Fourth Edition, Pearson Education, 2022
2. Saroj Kaushik "Artificial Intelligence", First Edition, Cengage Learning, 2011
3. George F Luger "Artificial Intelligence" Low Price Edition, Pearson Education., Fifth edition, 2005
4. Deepak Khemani." A First Course in Artificial Intelligence", McGraw Hill Education (India), Sixth reprint 2018 edition (1 July 2017).

Reference Books:

1. Ivan Bratko "PROLOG Programming for Artificial Intelligence", Addison-Wesley, 4th edition, 2011
2. Elaine Rich and Kevin Knight "Artificial Intelligence" Third Edition, 2017
3. Davis E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. Patrick Henry Winston, "Artificial Intelligence", Addison-Wesley, Third Edition, 1992
5. Han Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, 3rd edition, 2011
6. N.P. Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press,

Online References:

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

Prepared by Checked by Head of the Department Principal

Program: First Year B.Tech. in Computer Science & Engineering (IoT and Cybersecurity with Blockchain technology) **Semester : II**

Course : Fundamentals of Sensor and Secured Technologies (DJS23FCPC2IC)

Prerequisite: Computer Fundamentals

Objectives:

1. To explore the role of sensors and actuators.
2. To introduce security fundamentals, security principles and security control mechanisms.
3. To understand emerging Blockchain Technology and its relevance with cryptography.

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

1. Gain the foundational knowledge of Internet of Things.
2. Understand the interfacing of Arduino Uno with sensors
3. Explore system security concepts
4. Understand fundamentals of Cyber Security and its significance in digital world
5. Acquire basic knowledge of Blockchain technology
6. Apply methods for securing Blockchain networks

Fundamentals of Sensor and Secured Technologies (DJS23FCPC2IC)		
Unit	**Description**	**Duration**
1	**Fundamentals of IoT** Introduction of IoT, Definition and Characteristics of IoT,History of IoT, Importance of IoT, Real time Examples of IOT,IoT standards, IoT enabling technologies, IoT physical entities, IoT Building blocks – Architecture, Study of existing IoT platforms	**05**
2	**Introduction to Arduino uno and Sensors** Overview, Board description, Installation, Pin configuration and architecture of Arduino uno. Introduction to Sensors, Actuators, Sensor Characteristics, Classification of Sensors. Study of Humidity Sensor, Temperature Sensor, PIR Sensor, Ultrasonic Sensor	**04**
3	**Overview of Security**	**04**

	Introduction, Security goals, Security services and mechanisms, Security models, Threats , Types of attacks, CIA Triad: Confidentiality, Integrity, and Availability	
4	**Introduction to Cyber Security** Need of Cyber Security, Types of Cyberattacks: CyberAttacks against individuals, CyberAttacks against organization, CyberAttacks against Society	**03**
5	**Blockchain Fundamentals** Traditional N/W Vs Blockchain, Centralize Vs Decentralized N/W, Terminologies of Blockchain, Properties of Blockchain, Generic elements of Blockchain, Structure of Block,Types of Blockchain and Usage	**05**
6	**Cryptocurrency and Bitcoin** **The Evolution of Cryptocurrencies:** Design Goals for Cryptocurrency Development, Cryptocurrency wallets: Hot and cold wallets, Cryptocurrency usage **Bitcoin:** Introduction to Bitcoin, Bitcoin common terminologies, Bitcoin block, bitcoin P2P network, transactions, Bitcoin mining	**05**
	Total	**26**

Books Recommended:

Text Books:

1. Raj Kamal, INTERNET OF THINGS (IOT)- Architecture and Design Principles, McGrawHills, 2nd Edition, 2022.
2. "Computer Security: Principles and Practice" by William Stallings and Lawrie Brown, 4th Edition, Pearson Publication, 2021
3. Cryptography and Network Security – Principles and Practice by William Stallings, Pearson 2017
4. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd,1st Edition,2011
5. Imran Bashir , Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Packt Publishing, 2020, ISBN: 9781839213199,
6. Kumar Saurabh, Ashutosh Saxena, Blockchain Technology: Concepts and Applications , 1st Edition, Wiley Publication, 2020, ISBN:978-81-265-5766-0

Reference Books:

1. Internet of Things (IOT) & Its Applications, Prof. Satish Jain, Shashi Singh , BPB Publications, 2020.
2. Network Security Essentials: Applications and Standards" by William Stallings,6th Edition, Pearson Publication,2018
3. Nina Godbole, Information Systems Security, Wiley India, New Delhi
4. Antony Lewis, Basics of Bitcoins and Blockchain, Mango Publishing, 2021
5. Blockchain Basics, A non Technical Introduction in 25 Steps, Daniel Drescher, Apress.

Web resources:

1. IoT For All - https://www.iotforall.com/
2. IoT World Today -https://www.iotworldtoday.com/
3. SecurityFocus, https://www.securityfocus.com/
4. Cybersecurity Resource Center, https://csrc.nist.gov/
5. Blockchain Guide for Beginners,https://blockgeeks.com/guides/what-is-blockchain-technology/
6. Bitcoin,https://bitcoin.org/

Online Courses: NPTEL / Swayam

1. Introduction To Internet Of Things, By Prof. Sudip Misra, IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2. Cyber Security, By Dr.G.PADMAVATHI, Avinashilingam Institute for Home Science & Higher Education for Women,Coimbatore

   https://onlinecourses.swayam2.ac.in/cec23_cs16/preview

3. Cyber Security and Privacy, By Prof. Saji K Mathew, IIT Madras, https://onlinecourses.nptel.ac.in/noc23_cs127/preview
4. Blockchain and its Applications, By Prof. Sandip Chakraborty, Prof. Shamik Sural IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc23_cs47/preview

Prepared by Checked by Head of the Department Principal

Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Course : Fundamentals of Sensor and Secured Technologies

Semester: II

Course Code: DJS23FCPC2IC

Approved by: - Board of Studies in Computer Science and Engineering (IoT and Cyber Security with Block Chain Technology)

With effect from the Academic Year: 2024-2025

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)

Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block Chain Technology)	**F.Y.B.Tech**	**Semester : II**
Course : Fundamentals of Sensor and Secured Technologies	**Course Code: DJS23FCPC2IC**	

Teaching Scheme (Hours / week)				**Evaluation Scheme**								
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**					**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test 1**	**Term Test 2**	**Assign ment**	**Total**		
				60			**15**	**15**	**10**	**40**		**100**
				Laboratory Examination			**Term work**			**Total Term work**		
2	**--**	**--**	**2**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory Work**	**Tutorial / Mini project / presentation/ Journal**				**--**
				--	**--**	**--**	**--**	**--**		**--**		

Prerequisite: Computer Fundamentals

Objectives:

1. Develop a solid foundation in the core concepts of IoT
2. Gain a comprehensive understanding of the complete design process for connected devices
3. To understand emerging Block chain Technology and its relevance with cryptography.

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

1. Gain the foundational knowledge of Internet of Things.
2. Demonstrate a deep understanding of standardizations and communication technologies.
3. Analyze system security concepts.
4. Understand fundamentals of Cybersecurity and its significance in digital world
5. Acquire the knowledge of Distributed Computing in building large-scale distributed applications.
6. Explore fundamentals of Block chain technology

Detailed Syllabus		
Unit	**Description**	**Duration**
1	**Fundamentals of IoT** Introduction of IoT, IoT Definition and Characteristics of IoT, IoT Vision Genesis of IoT, IoT conceptual framework, IoT architectural view, Technology behind IoT, Sources of IoT, M2M communication, Examples of IOT.	4
2	**Design Principles for Connected Devices** **IoT/M2M Systems, Layers and Designs standardization:** Modified OSI Model for the IoT/M2M Systems, ITU-T Reference Model, ETSI M2M Domains and High-level Capabilities. **Communication Technologies:** Wireless Communication Technology, Wired Communication Technology, Communication Technologies—A Comparison	5
3	**Overview of Security** Introduction, Security goals, Security services and mechanisms, Security models, Threats , Types of attacks, CIA Triad: Confidentiality, Integrity, and Availability	4
4	**Introduction to Cyber Security** Need of Cyber Security, Types of Cyberattacks: Cyber Attacks against individuals, Cyber Attacks against organization, Cyber Attacks against Society	3
5	**Distributed Computing Fundamentals** Introduction to Distributed Systems, Definition and Characteristics, Interprocess communication (IPC): Remote Procedure Call (RPC), Group Communication, Introduction to Replication, Consistency and Fault Tolerance	5
6	**Fundamentals of Blockchain** Traditional N/W Vs Blockchain, Centralized Vs Decentralized N/W, Blockchain and Decentralization, Terminologies of Blockchain, Properties of Blockchain, Generic elements of Blockchain, Types of Blockchain and Usage	5
Total		26

Books Recommended:

Text Books:

1. Raj Kamal, INTERNET OF THINGS (IOT)- Architecture and Design Principles, McGrawHills, 2nd Edition, 2022.
2. "Computer Security: Principles and Practice" by William Stallings and Lawrie Brown, 4th Edition, Pearson Publication, 2021
3. Cryptography and Network Security – Principles and Practice by William Stallings, Pearson 2017
4. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd,1st Edition,2011
5. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Education, 2015
6. Pradeep K.Sinha, "Distributed Operating System-Concepts and design", PHI,2015.
7. Imran Bashir , Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Packt Publishing, 2020, ISBN: 9781839213199,
8. Kumar Saurabh, Ashutosh Saxena, Blockchain Technology: Concepts and Applications , 1st Edition, Wiley Publication, 2020, ISBN:978-81-265-5766-0

Reference Books:

1. Internet of Things (IOT) & Its Applications, Prof. Satish Jain, Shashi Singh , BPB Publications, 2020.
2. Network Security Essentials: Applications and Standards" by William Stallings,6th Edition, Pearson Publication,2018
3. Nina Godbole, Information Systems Security, Wiley India, New Delhi
4. Antony Lewis, Basics of Bitcoins and Blockchain, Mango Publishing, 2021
5. Blockchain Basics, A non Technical Introduction in 25 Steps, Daniel Drescher, Apress.

Web resources:

1. IoT For All - https://www.iotforall.com/
2. IoT World Today -https://www.iotworldtoday.com/
3. SecurityFocus, https://www.securityfocus.com/
4. Cybersecurity Resource Center, https://csrc.nist.gov/
5.
6. Blockchain Guide for Beginners,https://blockgeeks.com/guides/what-is-blockchain-technology/
7. Bitcoin,https://bitcoin.org/

Online Courses: NPTEL

1. Introduction To Internet Of Things, By Prof. Sudip Misra, IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2. Cyber Security, By Dr.G.PADMAVATHI, Avinashilingam Institute for Home Science & Higher Education for Women,Coimbatore

   https://onlinecourses.swayam2.ac.in/cec23_cs16/preview

3. Cyber Security and Privacy, By Prof. Saji K Mathew, IIT Madras, https://onlinecourses.nptel.ac.in/noc23_cs127/preview
4. Distributed Systems, By Dr. Rajiv Misra IIT Patna https://nptel.ac.in/courses/106106168
5. Blockchain and its Applications, By Prof. Sandip Chakraborty, Prof. Shamik Sural IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc23_cs47/preview

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus total comprising of 60 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Continuous Assessment (B):

Theory:

1. Term Test 1 (based on 40 % syllabus) of 15 marks for the duration of 45 min.
2. Term Test 2 (on next 40 % syllabus) of 15 marks for the duration of 45 min.
3. Assignment / course project / group discussion /presentation / quiz/ any other for 10 marks.

Prepared by **Checked by** **Head of the Department** **Vice Principal** **Principal**