Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus (DJS22)

Second Year B. Tech

in

(Semester III)

Program: Electronics and Telecommunication Engineering	S. Y. B. Tech	Semester: III
Course: Engineering Mathematics-III (DJS22EC301)		
Course: Engineering Mathematics-III Tutorial (DJS22ET301)		

Pre-requisite:

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

Objectives:

1. To build the strong foundation in Mathematics of learner needed for the field of Electronics and Telecommunication Engineering.
2. To provide learner with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.
3. To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.
4. To prepare learner to work as part of teams on multi-disciplinary projects.

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

1. Apply the knowledge of Laplace transform and its properties to evaluate specific kind of integrals.
2. Apply knowledge of Inverse Laplace transform to solve ordinary, simultaneous differential equations.
3. Follow Fourier series expansion of functions which satisfy Dirichlet conditions and Fourier transform.
4. Demonstrate an ability to use vector algebra and vector calculus.
5. Apply the knowledge of analytic functions to obtain functions, conformal mapping, bilinear transformations.

Engineering Mathematics-III (DJS22EC301)		
Unit	**Description**	**Duration**
1	**Laplace Transform:** Laplace Transform (LT) of Standard Functions: Definition of Laplace transform, Condition of Existence of Laplace transform, Laplace transform of e^{at}, $\sin(at)$, $\cos(at)$, $\sinh(at)$, $\cosh(at)$, t^n, Properties of Laplace Transform, Linearity, first shifting theorem, second shifting theorem, effect of multiplication by t^n, effect of division by t, Laplace Transform of derivatives and integrals, change of scale, convolution theorem, Evaluation of integrals using Laplace transform.	**07**
2	**Inverse Laplace Transform & its Applications:** Partial fraction method, Method of convolution, Laplace inverse by derivative, Heaviside unit step function, Dirac-delta function, Laplace transform of Periodic function, **Applications of Laplace Transform**: Solution of ordinary differential equations, Solving RLC circuit differential equation of first order and second order with boundary condition using Laplace transform (framing of differential equation is not included).	**09**
3	**Fourier Series:** Introduction: Orthogonal and orthonormal set of functions, Introduction of Dirichlet's conditions, Euler's formulae. Fourier Series of Functions: Exponential, trigonometric functions of any period 2L, Even and odd functions, half range sine and cosine series. Complex form of Fourier	**10**

	series, Fourier Integral, Fourier Transform, Fourier sine and cosine Transform, Inverse Fourier Transform.	
4	**Vector Algebra, Vector Differentiation & Vector Integral:** Vector differentiation, Gradient of scalar point function, Divergence and Curl of vector point function, Properties: Solenoidal and irrotational vector fields, conservative vector field, **Vector Integral**: Green 's theorem in a plane, Gauss 'divergence theorem and Stokes 'theorem.	**09**
5	**Complex Variable:** Analytic Function: Necessary and sufficient conditions (No Proof), Cauchy Riemann equation Cartesian form (No Proof) Cauchy Riemann Equation in polar form (with Proof), Milne Thomson Method and its application, Harmonic function, orthogonal trajectories, Mapping: Conformal mapping, Bilinear transformations, cross ratio, fixed points.	**07**
	Total	**42**

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

Engineering Mathematics-I Tutorial (DJS22ET301)	
Tut.	**Suggested Tutorials**
1	Laplace Transform
2	Inverse Laplace Transform
3	Application of Laplace and Inverse Laplace Transform
4	Fourier Series
5	Complex form of Fourier series
6	Fourier Transform
7	Vector Algebra and Vector Differentiation
8	Vector Integral
9	Complex Variable analytic Function
10	Mapping of Complex variable

Books Recommended:

Text books:

1. Dr. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publication, 43rd Edition, 2020.
2. B. V. Ramana, *Higher Engineering Mathematics*, Tata Mc-Graw Hill Publication, 6th Edition, 2018.

Reference Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley Eastern Limited, 10th Edition, 2015.
2. Wylie and Barret, *Advanced Engineering Mathematics*, Tata Mc-Graw Hill, 6th Edition, 1995.
3. Dennis G. Zill & Warren S. Wright, *Advanced Engineering Mathematics*, Jones and Bartlett Publishers, 1st Edition, 2009.

Program: Electronics and Telecommunication Engineering	S. Y. B. Tech	Semester: III
Course: Electronics Circuit Design (DJS22EC302)		
Course: Electronics Circuit Design Laboratory (DJS22EL302)		

Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics (DJS22FECBE)
2. Engineering Physics (DJS22FECEP)

Objectives:

1. To understand operation of semiconductor devices.
2. To understand DC analysis and AC models of semiconductor devices.
3. To apply concepts for the design of amplifiers.
4. To verify the theoretical concepts through laboratory and simulation experiments.
5. To implement mini projects based on concept of electronics circuit concepts.

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

1. Understand the current voltage characteristics of semiconductor devices.
2. Analyze DC circuits and relate AC models of semiconductor devices with their physical operation.
3. Design and analyze of amplifier circuits.
4. Evaluate frequency response to understand behavior of electronic circuits.

Electronics Circuit Design (DJS22EC302)		
Unit	**Description**	**Duration**
1	**DC analysis of common BJT circuits:** analysis and design of voltage divider bias, stability factor analysis, **Small Signal Mid Frequency Models:** Hybrid-pi model, early effect, h-parameter model.	**06**
2	**Small Signal Amplifier Analysis:** Graphical analysis to evaluate parameters, small signal analysis of Common Emitter configurations using hybrid-pi model. Darlington emitter follower (CC-CC). Low frequency and high frequency response amplifier. Design of single stage CE amplifier, **Power Devices:** Construction, Operation, and V-I Characteristics of Silicon Controlled Rectifier (SCR), DIAC, and Triac.	**10**
3	**Introduction to MOSFET:** Symbol, Types of MOSFET: Depletion and Enhancement type MOSFET (N channel and P channel), Construction, Operation, and V-I characteristics of MOSFET. MOSFET biasing, MOSFET as a switch, MOSFET as amplifier.	**10**
4	**Power Amplifiers:** Introduction to power amplifier, Need of power amplifier and Harmonic distortion, Power efficiency of class A, B, AB and C amplifier.	**08**
5	**Feedback amplifiers and oscillators:** Concept of negative Feedback, voltage / current, series, Shunt feedback. Positive feedback, **Introduction to oscillator:** Operation of oscillator, Types of Transistor oscillators. RC oscillators: Phase shift and Wein bridge. LC oscillators: Hartley, Colpitt's and Clapp. Tuned Oscillators: Twin-T oscillator and crystal oscillator.	**08**
	Total	**42**

Electronic Circuit Design (DJS22EL302)	
Exp.	**Suggested Experiment List**
1	BJT Biasing.
2	Single stage Common Emitter Amplifier.
3	Frequency Response of RC Coupled Common Emitter amplifier.
4	Single Stage Common Source (CS) Amplifier using MOSFET.
5	Darlington Emitter Follower.
6	SCR Characteristics.
7	Complementary symmetry Class-B Push Pull Power Amplifier.
8	Negative Feedback Amplifier.
9	RC Phase Shift Oscillator.
10	LC Oscillator.

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

Books Recommended:

Text books:

1. Jacob Millman, Christos Halkias and Chetan Parikh, *Electronic Devices and Circuits* (SIE), McGraw Hill Education, 4th Edition, 2015.
2. D. A. Neamen, *Electronic Circuit Analysis and Design*, Tata McGraw Hill, 3rd Edition, 2006.

Reference Books:

1. Jacob Millman, Christos Halkias and Chetan Parikh, *Integrated Electronics – Analog and Digital Circuit and Systems*, McGraw Hill Education, 2nd Edition, 2017.
2. A. Mottershead, *Electronic Devices and Circuits: An Introduction*, Prentice Hall India Learning Private Limited, 2022.
3. S. Sedra, K. C. Smith, and A. N. Chandorkar, *Microelectronic Circuits Theory and Applications*, International Version, Oxford International Students, 7th Edition, 2017.
4. David A. Bell, *Electronic devices and circuits*, Oxford University higher education, 5th Edition, 2008.
5. Boylestad and Nashelesky, *Electronic Devices and Circuits Theory*, Pearson Education,11th Edition, 2013.
6. J B. Gupta, *Electronic Devices and Circuits*, Katson Education Series, 6th Edition, 2016.

Prepared by Checked by Head of the Department Principal

Program: Electronics and Telecommunication Engineering	S. Y. B. Tech	Semester: III
Course: Digital System Design (DJS22EC303)		
Course: Digital System Design Laboratory (DJS22EL303)		

Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics (DJS22FECBE)

Objectives:

1. To introduce signed binary number representation.
2. To introduce methods for minimizing logical expressions.
3. To outline the formal procedure to design combinational logic circuits.
4. To introduce flip flops and outline the formal procedure to sequential circuits.
5. To illustrate concept of programmable devices.

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

1. Explain different signed number representation and signed binary arithmetic.
2. Minimize logic expressions using various reduction techniques.
3. Design combinational logic circuits using logic gates and implement the circuit by carrying out required investigations and debugging techniques.
4. Design flip-flops using logic gates and use them to realize different sequential circuits and implement the circuit by carrying out required investigations and debugging techniques.
5. Classify different programmable logic devices (PLD) and design combinational circuits using PLD.

Digital System Design (DJS22EC303)		
Unit	**Description**	**Duration**
1	**Signed Binary Numbers:** Signed-Magnitude representation, One's complement representation and Two's complement representation, **Binary Arithmetic:** One's complement Addition and Subtraction, Two's complement Addition and Subtraction.	**04**
2	**Minimization Techniques:** Implementations of Logic Functions using basic and universal gates. Boolean postulates and laws, De-Morgan's Theorem, **Standard Representations of Logic Functions:** Boolean expression-Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), **Minimization of Boolean expressions:** Karnaugh map Minimization (up to four variables), Minimizing Sum of products, simplifying products of Sums, Quine-Mc Cluskey method of minimization, Don't care conditions.	**12**

3	**Design of Combinational Logic:** Introduction to combinational logic, Code converter: Binary Coded Decimal (BCD), Excess-3, Gray code, Binary Code, **Arithmetic Circuits:** Half- Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder, parallel Adder/Subtractor, BCD adder, Look ahead carry generator; Multiplexer, Multiplexer tree, De-multiplexer & Decoders, Implementation of SOP and POS using Multiplexer & De-multiplexer/Decoder.	**12**
4	**Sequential Logic Design:** Introduction to sequential logic; Preset & Clear, Truth Tables and Excitation tables of Flip flops, Conversion from one type to another type of Flip Flop, **Shift Registers:** Serial Input Serial Output (SISO**)**, Serial Input parallel Output (SIPO), parallel Input Serial Output (PISO), parallel Input Parallel Output (PIPO), Bi-directional shift registers, Universal shift registers, **Counters:** Asynchronous counter, Synchronous counter, Binary up-counter, down-counter and up-down counters, Modulus of the counter, Design of counter for a given sequence, Lock out condition, ring counters, Johnson Counter. **State Machines:** Basic design steps-State diagram, State table, State reduction, State assignment, Mealy and Moore machines representation, Sequence detector.	**12**
5	**Programmable Logic Devices:** Architecture of Programmable Read Only Memory (PROM), Programmable Array Logic (PAL), Programmable Logic Array (PLA), designing combinational circuits using PLDs.	**03**
	Total	**40**

Digital System Design Laboratory (DJS22EL303)	
Exp.	**Suggested Experiment List**
1	Verify different logic gates.
2	Simplification of Boolean functions.
3	Verify Universal gates and design EXOR and EXNOR gates using Universal gates.
4	Implement Half adder, Full adder, Half subtractor and Full subtractor circuits.
5	Implement BCD adder using four-bit binary adder IC-7483.
6	Flip flops conversion JK to D, JK to T and D to TFF.
7	Implement logic equations using Multiplexer.
8	Design synchronous MOD N counter using IC-7490.
9	Verify encoder and decoder operations.
10	Implement digital circuits to perform binary to gray and gray to binary operations.
11	Verify truth table of different types of flip flops.
12	Verify different counter operations.

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

Books Recommended:

Text books:

1. John F. Wakerly, *Digital Design Principles and Practices*, Pearson Education, 5th Edition, 2021.
2. R. P. Jain, *Modern Digital Electronics*, Tata McGraw Hill Education, 5th Edition, 2022.

Reference Books:

1. Morris Mano, Michael D. Ciletti, *Digital Design*, Pearson Education, 5th Edition, 2013.
2. Thomas L. Floyd, *Digital Fundamentals*, Pearson Prentice Hall, 11th Global Edition, 2015.
3. Mandal, *Digital Electronics Principles and Applications*, McGraw Hill Education, 1st Edition, 2010.
4. Ronald J. Tocci, Neal S. Widmer, *Digital Systems Principles and Applications*, PHI, 10th Edition, 2009.
5. Donald P. Leach, Albert Paul Malvino, Gautam Saha, *Digital Principles and Applications*, Tata McGraw Hill, 11th Edition, 2011.

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Program: Electronics and Telecommunication Engineering	S. Y. B. Tech	Semester: III
Course: Signals & Systems (DJS22EC304)		
Course: Signals & Systems Laboratory (DJS22EL304)		

Pre-requisite:

1. Engineering Mathematics-II (DJS22FECBE)

Objectives:

1. To introduce students, the concept and theory of signals and systems needed in Electronics and Telecommunication Engineering fields.
2. To introduce students to the basic idea of signals and systems analysis with its characterization in time and frequency domain.

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

1. Perform mathematical operations on signals to construct complex signals using basic elementary signals.
2. Classify signals and systems on the basis of their properties and analyze the implications in the context of practical signals and systems.
3. Represent signals in the time and frequency domain using multiple representations and analyze LTI systems using convolution in the frequency domain.
4. Compute Fourier series/different transforms for a set of well-defined signals from first principles and apply their appropriate properties for a broader class of signals.

Signals & Systems (DJS22EC304)		
Unit	**Description**	**Duration**
1	**Classification of Signals and Systems:** Introduction to signals: Definition, sampling theorem, sampling of continuous time signals, Nyquist Criterion, concept of aliasing, concept of digital frequency. Continuous and discrete time representation of elementary signals: exponential, sine, step, impulse, ramp, rectangular, triangular, signum, sinc, operations on signals (shift, invert, scale), **Classification of signals**: Continuous and discrete time, deterministic and non-deterministic, periodic and aperiodic, symmetric (even) and asymmetric (odd), energy and power, causal and anti-causal signal, **Introduction to systems:** Definition, Classification of systems: Static and dynamic, time variant and time invariant, linear and nonlinear, causal and non-causal, stable and unstable systems, Invertible and Non-Invertible Systems.	**10**
2	**Continuous Time and Discrete Time Linear Time Invariant(LTI) Systems:** Response of Continuous Time–LTI System: Representation of systems using differential equation, Impulse response and convolution integral, properties of convolution, signal responses to CT-LTI system, system stability Impulse, step and, system stability, **Response of Discrete Time-LTI System:** Representation of systems using difference equation, Impulse response characterization and	**10**

	convolution sum, Properties of convolution summation, Impulse response of DT-LTI system and its properties, step response, system stability, **Correlation and spectral Density:** Auto-correlation, cross-correlation, analogy between correlation and convolution, definition of power spectral density (PSD) and Energy spectral density (ESD), relation of ESD and PSD with auto-correlation.	
3	**Analysis of Continuous Time Signals and Systems:** Trigonometric and exponential Fourier series representation of C T signals, Gibbs phenomenon, **Fourier Transform (FT):** Fourier Transform and Inverse Fourier Transform of a-periodic continuous and discrete time signals and systems, limitations of CT/DT Fourier Transform and need for Laplace / Z Transform, **Laplace Transform (LT):** Review of unilateral and bilateral Laplace Transform, properties, inverse of Laplace Transform, concept of Region of Convergence (ROC), poles and zeros, relation between continuous time Fourier Transform and Laplace Transform.	**12**
4	**Analysis of Discrete Time Signals and Systems:** Introduction to Z-Transform Need of Z-Transform, definition of unilateral and bilateral Z-Transform, Z- Transform of finite and infinite duration sequences, properties, Inverse Z-Transform, relation between discrete time Fourier Transform and Z-Transform, Z -Transform of standard signals, ROC for Z-Transform, plotting poles and zeros of transfer function, **Analysis of discrete time LTI systems using Z-Transform:** Transfer Function, causality and stability of systems, relation between Laplace Transform and Z–Transform, **Realization structures:** direct form–I, direct form–II, cascade, and parallel forms.	**10**
	Total	**42**

Signals & Systems Laboratory (DJS22EL304)	
Exp.	**Suggested Experiment List**
1	Perform classification of Signals and Systems.
2	Perform mathematical operations in Signals and Systems.
3	Plot various types of Continuous Time Signals.
4	Implement sampling and reconstruction of Continuous Signals.
5	Plot various types of Discrete Time Signals and perform various operations on Unit Step Signals.
6	Analysis of Continuous Time Signals.
7	Analyze Linear Time Invariant (LTI) Continuous Time Systems.
8	Analysis of Discrete Time Signals.
9	Analyze Linear Time Invariant (LTI) Discrete Time System.
10	Perform convolution of Discrete Time Signals.
11	Observe frequency response of various signals.
12	Determine poles, zeros and ROC of any DT System using Z Transform.

Minimum five experiments to be performed using MATLAB/SCILAB/OCTAVE and five tutorials 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. Ramesh Babu P. and Anandanatarajan, *Signals and Systems*, 5th Revised Edition, 2022.
2. Simon Haykin, Barry Van Veen, *Signals and Systems*, John Wiley & Sons, 2nd Edition, 2021.

Reference Books:

1. Hwei. P Hsu, *Signals and Systems*, Tata McGraw Hill, 3rd Edition, 2010.
2. V. Krishnaveni, A.Rajeshwari, *Signals and Systems*, Wiley-India, 1st Edition, 2012.
3. A. Nagoor Kani, *Signals and Systems*, McGraw Hill India, 1st Edition, 2018.

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Program: Electronics and Telecommunication Engineering	S. Y. B. Tech	Semester: III
Course: Electrical Networks Analysis & Synthesis Laboratory (DJS22EL305)		

Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics (DJS22FECBE)
2. Engineering Mathematics - I (DJS22FEC11)
3. Engineering Mathematics - II (DJS22FEC21)

Objectives:

1. To analyse the circuits in time and frequency domains.
2. To synthesize passive network by various methods.

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

1. Apply their knowledge in analyzing Circuits by using network theorems.
2. Find the various parameters of two port networks.
3. Synthesize the network using passive elements.

Electrical Networks Analysis & Synthesis Laboratory (DJS22EL305)	
Suggested Experiment List	
1	Study of charging and discharging of capacitor and to determine RC time constant. (Student need to solve first order differential equation to find RC time constant of the given circuit.)
2	Determination of two port parameters of the given network and verification by analytical method. (Student need to find Z-, Y-, T parameters analytically of the given circuit and then verify the same practically of the two-port network.)
3	Formulate differential equation for RL and RC circuits and solve for current and voltages by determining initial conditions for driven and source free conditions.
4	Analyze series/parallel R-L and R-C circuit in time/frequency domain and simulate using Tinker CAD.
5	Carry out the transient analysis and determine the voltage, current expressions for a given network involving RLC. (Student need to solve second order differential equation and also check underdamped, critically damped and over damped conditions of series R-L-C network)
6	Finding and plotting poles and zeros of driving point functions. (Student need to find poles and zeros of given driving point functions and verify the same using MATLAB)
7	Carry out analysis of Positive Real Function. (Student need to check necessary and sufficient conditions for a network function to be positive real)

8	Realize the network function in Foster form. (Identify the type of the network and realise the function in Foster-I and Foster-II form)
9	Realize the network function in Cauer form. (Identify the type of the network and realise the function in Cauer-I and Cauer-II form)
10	Numerical from past years GATE Examination papers related to Circuit analysis.

Minimum eight experiments from the above suggested list.

Books Recommended:

Text books:

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

Reference Books:

1. A. Chakrabarti, *Circuit Theory*, Dhanpat Rai & Co., 6th Edition, 2019.
2. Smarajit Ghosh, *Network Theory Analysis & Synthesis*, PHI learning, 3rd Edition, 2019.
3. D Roy Choudhury, Networks and Systems, New Age International, 4rd edition, 2019.

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Program: Electronics & Telecommunication Engineering	S.Y B. Tech	Semester: III
Course: Python Programming Laboratory (DJS22EL306)		

Pre-requisite:

1. Knowledge of Object-Oriented Programming Lab

Objectives:

1. Python programming basics, Functions in Python and files handling.
2. GUI Programming and Databases operations in Python.

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

1. Describe the various data types, dictionaries and regular expressions in Python.
2. Describe different control statements, conditional statements and functions in Python.
3. Realize and encapsulate different File handling and exception handling operations using Python.
4. Design GUI, estimate different database operations and array handling in Python.

Python Programming Laboratory (DJS22EL306)		
Unit	**Description**	**Duration**
1	**Introduction to Python:** History of Python, Data types & Regular expression, Basic Data types identifiers, Basic Data types, Integer Data Type, Float and Complex Data Type, Mathematical Functions, String Data Types, String Manipulation Functions, String Slices, Basic Data Types Collections, Lists: Working with Lists, Basic Operations, Sorting, Count & Append, List Comprehension Dictionary: Definition, Update dictionary, Dictionary Comprehension, Sets, Tuples and Frozen Sets, Conversion of List to Dictionary Regular Expressions: Match function, Search Function, Modifiers, Patterns. **List of Suggested Practical (Any three)** 1. To read a number 'n' and print patterns 2. Program to map a list into a dictionary and vice versa 3. Program to study list and dictionary comprehension 4. To implement different string manipulation functions. 5. To count the number of letters/ vowels/ consonants in a string or a list or a dictionary. (Multiple variations of the above suggested programs can be performed)	**06**
2	**Control statements and Functions in Python:** While, for, Nested loops. Use of Continue, Pass and Break statement. Range function Conditional Statements: if, else, else if, nested if and Switch Case Statements. Function arguments pass by value and reference, Recursive Functions. **List of Suggested Practical (Any three)** Use of the control statements to implement: - 1. Factorial of a number 2. Palindrome of number or a string	**06**

	3. Fibonacci series 4. Sine and Cosine series 5. Pythagoras triplets Any one program to demonstrate the method of recursive functions.	
3	**Files Directories & Flow control:** Making and List directories, Changing directory, List files in directories. File & Directory manipulation, File functions, File object attributes, close () method, opening a binary file, File Attributes, read (read_fixed_size) readline () tell (). Read data from keyboard. File handling: Opening and closing file, Reading and writing files. Exception Handling, Except Clause, User defined Exceptions **List of Suggested Practical (Any three)** 1. Open a file and read the contents of a file and print 2. Open a file and write to a file (overwrite and append). 3. Open a file and count the characters present in the file. 4. Program to demonstrate Exception Handling 5. Splitting of lines by file handling.	**06**
4	**Python Database:** Introduction, Connections and Executing queries, Transactions and Handling Errors Introduction to GUI Programming. **List of Suggested Practical (Any Two)** 1. Install MySQL db 2. Establish database connection 3. Creating Database Table. 4. Use of Insert/Read/Update Operations in database	**04**
5	Working with numpy, constructing numpy arrays, Printing arrays, Arithmetic operations on matrix, Slicing Arrays, Random number generation. Working with Matplotlib, and pandas: Installation and implementation **List of Suggested Practical (Any Two**) 1. Data visualization with matplotlib. 2. Array manipulation/strings/indexing/slicing and other numpy library functions 3. Histogram using matplotlib. 4. Statistical functions in numpy. 5. Any one tool kits to extend python matplotlib functionality.	**04**
6	**Data Science using Python:** Data Frame, Creating Data Frame from .csv files, python dictionaries, Python List of Tuples, Operation on Data Frames, Data Visualization: Bar Graph, Histogram, Pie Chart creation and Creation of Line Graphs **List of Suggested Practical (Any Two)** 1. Create and visualize a Data Frame 2. Generating outliers in the data 3. Calculation of statistical parameters: Mean, Median and Mode of data 4. Creation and interpretation of box plots 5. Interpret the features of a given data frame using histogram, pie charts and line graphs.	**04**

	Total	**30**

Python Programming Laboratory (DJS22EL306)	
Exp.	**Suggested experiments**
1	Installing python and setting up environment. Basic operations like printing the names, numbers, arithmetic calculations, etc.
2	Performing string manipulation.
3	Perform operations on Lists, Tuples, Sets, arrays and dictionaries.
4	Programs based on various loops, conditional constructs and functions.
5	program to update in the file "friendsContact.txt" which has personal details and change the number of an old contact.
6	Demonstrate Amplitude-Shift-Keying (ASK) or On-Off Keying (OOK).
7	Compute the spectrum of the above OOK signal using FFT and plot its magnitude.
8	Program to demonstrate the BPSK signal of sequence [1 0 0 0 1 0 1 0 0 1]
9	Compute the spectrum of the above BPSK signal.
10	Given a data frame generate the box plot to determine the outliers
11	Given a specific data set (iris, titanic etc.) create a data frame interpret the features using histogram, pie charts and line graphs

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

Books Recommended:

Text Books:

1. Reema Thareja, *Python Programming: Using Problem Solving Approach*, Oxford University Press India, 2nd Edition, 2023.
2. R. Nageswara Rao, *Core Python Programming*, 3rd Edition, Dreamtech Press, 2021.

Reference Books:

1. Johannes Ernesti, Peter Kaiser, *Python 3: The Comprehensive Guide to Hands-On Python Programming*, Rheinwerk Computing, 1st Edition, 2022.

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Program: Electronics and Telecommunication Engineering	S. Y. B. Tech	Semester: III
Course: Innovative Product Development-I (DJS22A3)		

Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics (DJS22FECBE)

Objectives:

1. To identify real-world problem, based on the current industrial methods and practices to connect theory with practice.
2. To identify project goals, resource requirements and present them in the form of a document.
3. To familiarize with technical and time management skills.
4. To learn the process involved in planning, designing, and estimation as well as budgeting of a project.

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

1. Conduct a survey of several available literatures in the preferred field of study.
2. Demonstrate various/alternate approaches to complete a project.
3. Ensure a collaborative project environment by interacting and dividing project work among team members.
4. Manage project work effectively including the determination of scope, time, costs and quality.
5. Develop and enhance software/ hardware skills associated with the product design.

Syllabus:

- Domain knowledge (any field of knowledge and beyond) needed from the following areas for the effective implementation of the project:

  - Microcontroller and Embedded Systems, Signal Processing, Microwave and Antennas, Networking and Internet of Things, Data science and Big data, Communication, Web and Application development, Robotics, Artificial Intelligence (AI), Machine learning (ML) etc.

  - Above areas can be updated, based on the technological innovations and development needed for a specific project.

Guidelines:

The main purpose of this course is to improve the student's documentation and technical skills to find a cost-effective solution.

The guidelines are as follows:

1. The project work is to be carried out by a group of 4/5/6 students (2^{nd} second year and 3^{rd} third year students).
2. Each group is allotted a final year student as mentor and a faculty member as guide.

3. Project topics are floated in various domains. Each group submits three project topic preferences, out of which one topic is allotted in discussion with faculty guide and faculty coordinators
4. Each group identifies the hardware and software requirements for their problem statement.
5. Each group is reviewed twice in a semester (August and October) and grades are allotted based on the various points mentioned in the evaluation scheme.
6. In the first review of the semester, each group is expected to complete literature survey, budget plan and documentation based on the project methodology.
7. In the second review of the semester, each group is expected to complete 30% of project.
8. Subsequent reviews are carried out in fourth semester.

Evaluation Scheme:

Semester review (B):

Each group will be reviewed twice in a semester by faculty guide and faculty coordinators based on the following criteria:

1. Innovative ideas and Motivation
2. Objective and Expected outcome
3. Literature survey and Comparative Methodology
4. Documentation
5. Project Progress/Implementation
6. Long term social impact
7. Overall Presentation and Team work

The final certification and acceptance are subject to satisfactory performance of the project.

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