Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)

Syllabus Booklet
Electronics and Telecommunication Engineering

Second Year B.Tech.

With Effect from Academic Year 2024-25

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

				Semester-III									
Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment				Total [A+Average(B,C)+D]	
				L	T	P	TA [A]	Term Test 1 [B]	Term Test 2 [C]	ESE [D]		
1	PC	RCP23ECPC301	Mathematics for Telecommunication Engineering	3			20	20	20	60	100	3
2	PC	RCP23ECPC302	Electronics Devices & Circuits	3			20	20	20	60	100	3
3	PC	RCP23ELPC302	Electronics Devices & Circuits Laboratory			2	25			25**	50	1
4	PC	RCP23ECPC303	Digital System Design	3			20	20	20	60	100	3
5	PC	RCP23ELPC303	Digital System Design Laboratory			2	25			25**	50	1
6	MD	RCP23ELMD301	Python Programming Laboratory			2	25			25*	50	1
7	OE#	RCP23OCOE301 RCP23OCOE302 RCP23OCOE303 RCP23OCOE304 RCP23OCOE305 RCP23OCOE306 RCP23OCOE307 RCP23OCOE308	Product Life Cycle Management Management Information System Operations Research Personal Finance Management Public System and Policies Fundamentals of Biomedical Instruments IPR & Patenting Entrepreneurship and Startup Ecosystem	3			20	20	20	60	100	3
8	SC	RCP23IPSC301	Semester Project-I			2	25			25	50	1
9	HS	RCP23ITHSX01	Professional and Business Communication Tutorial		2		50				50	2
10	HS	RCP23ICHSX03	Economics and Financial Management	2			20	20	20	60	100	2
11	EL	RCP23ILELX05	Community Engagement Service			2	25				25	1
			Total	14	2	10	275	100	100	400	775	21

Any One Elective Course

TA-Teacher Assessment, ESE- End Semester Examination

* Oral Examination, ** Oral & Practical Examination,

Checked by (FSS)

BOS Chairman

COE

Dy. Director

Director

Deputy Director
R. C. Patel Institute of Technology
Shirpur, Dist. Dhule (MS)

DIRECTOR
R. C. Patel Institute of Technolo
Shirpur Dist Dhule (MS)

Prepared by (BVP)

Date

Controller of Examination
R.C.Patel Institute of Technology
Shirpur Dist.Dhule 425 405

				Teaching Scheme			Evaluation Scheme					
							Continuous Assessment					Credit
Sr	Course Category	Course Code	Course Title	L	T	P	TA [A]	Term Test 1 [B]	Term Test 2 [C]	ESE [D]	Total [A+Average(B,C)+D]	
1	PC	RCP23ECPC401	Signals & Systems	2			20	20	20	60	100	2
2	PC	RCP23ETPC401	Signals & Systems Tutorial		2		25				25	1
3	PC	RCP23ECPC402	Integrated Circuits	3			20	20	20	60	100	3
4	PC	RCP23ELPC402	Integrated Circuits Laboratory			2	25			25**	50	1
5	PC	RCP23ECPC403	Microcontroller & Applications	3			20	20	20	60	100	3
6	PC	RCP23ELPC403	Microcontroller & Applications Laboratory			2	25			25**	50	1
7	MD	RCP23ECMD401	Data Structures & Algorithms	2			20	20	20	60	100	2
8	MD	RCP23ELMD401	Data Structures & Algorithms Laboratory			2	25			25**	50	1
9	OE #	RCP23OCOE401	Project Management	3			20	20	20	60	100	3
		RCP23OCOE402	Cyber Security, Policies & Laws									
		RCP23OCOE403	Advanced Operations Research									
		RCP23OCOE404	Corporate Finance Management									
		RCP23OCOE405	Corporate Social Responsibility									
		RCP23OCOE406	Bio Informatics									
		RCP23OCOE407	Human Resource Management									
		RCP23OCOE408	Digital Marketing Management									
		RCP23OCOE409	Logistics & Supply Chain Management									
10	SC	RCP23IPSC401	Semester Project-II			2	25			25	50	1
11	HS	RCP23ILHSX02	Design Thinking Laboratory			2	25				25	1
12	HS	RCP23ICHSX04	Universal Human Values	3			20	20	20	60	100	3
			Total	16	2	10	270	120	120	460	850	22

TA-Teacher Assessment, ESE- End Semester Examination

Any One Elective Course

* Oral Examination, ** Oral & Practical Examination,

Checked by

(KSS)

BOS Chairman

COE

Prepared by

(BVP)

Date

Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)

Syllabus Booklet
Electronics and Telecommunication Engineering

Second Year B.Tech Semester - III

With Effect from Academic Year 2024-25

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

Mathematics for Telecommunication Engineering (RCP23ECPC301)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

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Examination

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Pre-requisite:

1.Mathematics-I

2.Mathematics-II

Course 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 analyze complex engineering problems.

3. To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Follow Fourier series expansion of functions which satisfy Dirichlet conditions and Fourier transform	L3	Apply
CO2	Demonstrate an ability to use vector algebra and vector calculus	L5	Evaluate
CO3	Apply the knowledge of analytic functions to obtain functions, conformal mapping,bilinear transformations.	L3	Apply
CO4	Classify signals on the basis of their properties and analyze the implications in the context of practical signals and systems with emphasis on non-deterministic signals	L3	Apply

Course Contents

Unit-I   **Matrix theory**   **08 Hrs.**

Eigenvalues and Eigenvectors , properties of Eigenvalues and Eigenvectors, Cayley-Hamilton theorem, Examples based on verification of Cayley-Hamilton theorem, Similarity of matrices, Diagonalization of matrices,Function of square matrix, Quadratic forms over real field, Reduction of quadratic form to a diagonal, canonical form, Rank, index and signature of quadratic form, class value of quadratic forms, definite, Semi-definite and indefinite.

Unit-II   **Fourier Series**   **08 Hrs.**

Introduction: Orthogonal and orthonormal set of functions,Introduction of Dirichlets conditions, Eulers 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 series.

Unit-III Vector Algebra, Vector Differentiation & Vector Integral 06 Hrs.

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.

Unit-IV   **Complex Variable**   **06 Hrs.**

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.

Unit-V   **Classification of signals**   **04 Hrs.**

Continuous and discrete time, periodic and aperiodic, symmetric (even) and asymmetric (odd), energy and power, causal and anti-causal signal. Deterministic and non-deterministic signals.

Unit-VI   **Introduction to Probability and Random Variable**   **07 Hrs.**

Conditional probability, Joint probability, Bayes' theorem, Independence of events, Definition of Random Variable. Discrete and Continuous random variables, probability mass function, probability density function, probability distribution function, Expectation, Variance and Moments of random Variable, Binomial, Poisson and Normal (Gaussian) distributions.

Operations on One and Multiple Random Variable: Functions of a random variable and their distribu-

tion and density functions, Pairs of random variables, Joint CDF, Joint PDF, Independence, Conditional CDF and PDF, Conditional Expectation, One function of two random variables, two functions of two random variables; joint moments, joint characteristic function, covariance, and correlation-independent, uncorrelated and orthogonal random variables.

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, 2017.

Reference Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Limited, 10th Edition,2009.

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.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Electronic Devices & Circuits (RCP23ECPC302)

Teaching Scheme	**Examination Scheme**
Lectures: 03 Hrs./Week	Term Test: 20 Marks
Credit: 03	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics

2. Electrical Networks

3. Physics

Course 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.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the current voltage characteristics of semiconductor devices,	L2	Understand
CO2	Analyze dc circuits and relate ac models of semiconductor devices with their physical operation.	L4	Analyze
CO3	Design and analyze of amplifier circuits.	L6	Create
CO4	Evaluate frequency response to understand behavior of Electronics circuits.	L5	Evaluate

Course Contents

Unit-I   **Bipolar Junction Transistor (BJT)**   **06 Hrs.**

Bipolar Junction Transistor (BJT):

Introduction, BJT characteristics, DC load line and region of operation, transistor as a switch. Analysis and design of voltage divider bias, stability factor analysis.

Small Signal Mid Frequency Models:

Hybrid-pi model, early effect, h-parameter model.

Unit-II   **Small signal BJT Amplifier Analysis**   **09 Hrs.**

Small signal BJT Amplifier Analysis:

Graphical analysis to evaluate parameters, Small signal analysis of Common Emitter configurations using hybrid-pi model. Introduction to multistage amplifier, Darlington emitter follower (CC-CC). Low frequency and high frequency response amplifier. Design of single stage CE amplifier

Unit-III   **MOS Field-Effect Transistor (MOSFET)**   **09 Hrs.**

MOS Field-Effect Transistor (MOSFET):

Introduction, 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, and MOSFET as a CS amplifier.

Unit-IV   **Power Amplifiers**   **07 Hrs.**

Power Amplifiers:

Introduction to power amplifier, Need of power amplifier and Harmonic distortion. Power efficiency of class A, B, AB and C amplifier.

Unit-V   **Feedback amplifiers and oscillators**   **08 Hrs.**

Feedback amplifiers and oscillators:

Concepts of Feedback:

Concept of negative Feedback, voltage / current, series, Shunt feedback. Positive feedback. **Introduction to Oscillator:**

Introduction, Operation of oscillator: Types of Transistor oscillators. RC oscillators: Phase shift and Wein bridge.LC Oscillators: Hartley, Colpitt's and Clapp. Tuned Oscillator: Twin-T oscillator and crystal oscillator.

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, 2nd Edition, 2001.

Reference Books

1. Jacob Millman, Christos Halkias and Chetan Parikh, "Integrated Electronics Analog and Digital Circuit and Systems", McGraw Hill Education, 4th Edition, 2015.

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, 6th Edition, 2017

4. David A. Bell, "Electronic devices and circuits", Oxford University higher education, 5th Edition, 2008

5. Boylestad and Nasheleky, "Electronic Devices and Circuits Theory", Pearson Education, 11th Edition, 2013.

6. J B. Gupta, "Electronic Devices and Circuits", Katson Education Series, 6th Edition, 2016.

Evaluation Scheme:

Continuous Assessment (A):

Course teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Electronic Devices & Circuits Laboratory (RCP23ELPC302)

Teaching Scheme

Practical: 02 Hrs/Week

Credit: 01

Examination Scheme

Teacher Assessment: 25 Marks

End Sem Exam : 25 Marks

Total: 50 Marks

Course 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.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the current voltage characteristics of semiconductor devices,	L2	Understand
CO2	Analyze dc circuits and relate ac models of semiconductor devices with their physical operation.	L4	Analyze
CO3	Design and analyze of amplifier circuits.	L4	Analyze
CO4	Evaluate frequency response to understand behavior of Electronics circuits.	L5	Evaluate

Course Contents

List of Laboratory Experiments: (Any Eight)

1. BJT Biasing.

2. Single stage Common Emitter Amplifier

3. Two stage amplifier.

4. Frequency Response of RC Coupled Common Emitter amplifier.

5. Single Stage Common Source (CS) Amplifier using MOSFET.

6. Darlington Emitter Follower

7. SCR Characteristics

8. Complementary symmetry Class-B Push Pull Power amplifier

9. Negative Feedback Amplifier

10. RC Phase Shift Oscillator

11. LC Oscillator.

12. Simulation of amplifier circuits.

    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.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

 The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

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

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Digital System Design (RCP23ECPC303)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

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Examination

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Pre-requisite:

Basic Electrical Engineering & Digital Electronics

Course 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.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand working of logic families and implement functions using logic gates.	L2	Understand
CO2	Minimize logic expressions using various reduction techniques.	L4	Analyze
CO3	Design combinational logic circuits using logic gates and implement the circuit by carrying out required investigations and debugging techniques.	L6	Create
CO4	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	L6	Create
CO5	Classify semiconductor memory and design combinational circuits using PLD.	L3	Apply

Course Contents

Unit-I   **Binary Arithmetic**   **06 Hrs.**

Binary Arithmetic: Signed binary representation, Addition, Subtraction using 1s and 2s Complement

Logic gates: Boolean postulates and laws, Implementations of Logic Functions using basic and universal gates.

Logic Families: Types of logic families (TTL and CMOS), characteristic parameters (propagation delays, power dissipation, Noise Margin, Fan-out and Fan-in). .

Unit-II   **Standard Representations of Logic Functions**   **08 Hrs.**

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, Dont care conditions

Unit-III   **Design of Combinational Logic**   **09 Hrs.**

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, Demultiplexer & Decoders, Implementation of SOP and POS using Multiplexer & Demultiplexer/Decoder.

Unit-IV   **Sequential Logic Design**   **12 Hrs.**

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.

Unit-V   **Semiconductor Memory**   **04 Hrs.**

Semiconductor Memory: Classification and Characteristics of memory, SRAM, DRAM, ROM, PROM,

EPROM and Flash memories

Programmable Logic Devices (PLD): Programmable Array Logic (PAL), Programmable Logic Array (PLA), designing combinational circuits using PLDs.

Text Books

1. John F. Wakerly, "Digital Design Principles and Practices", 5th Edn, Pearson Education, 2021.

2. R. P. Jain, "Modern Digital Electronics", 5th Edn, Tata McGraw Hill Education, 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.

Evaluation Scheme:

Continuous Assessment (A):

Course teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Digital System Design - Laboratory(RCP23ELPC303)

Teaching Scheme

Practical: 02 Hrs/Week

Credit: 01

Examination

Teacher Assessment: 25 Marks

End Sem Exam : 25 Marks

Total: 50 Marks

Course 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.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand working of logic families and implement functions using logic gates.	L2	Understand
CO2	Minimize logic expressions using various reduction techniques.	L4	Analyze
CO3	Design combinational logic circuits using logic gates and implement the circuit by carrying out required investigations and debugging techniques.	L6	Create
CO4	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	L6	Create
CO5	Classify semiconductor memory and design combinational circuits using PLD.	L3	Apply

Course Contents

List of Laboratory Experiments: (Any Eight)

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. Implement logic equations using Multiplexer IC 74151

7. Flip flops conversion JK to D, JK to T and D to TFF.

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.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

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

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Python Programming Laboratory (RCP23ELMD301)

Teaching Scheme

Practical: 02 Hrs/Week

Credit: 01

Examination

Teacher Assessment: 25 Marks

End Sem Exam : 25 Marks

Total: 50 Marks

Pre-requisite:

1. Object Oriented Programming using Java

2. Object Oriented Programming using Java Laboratory

Course Objectives

1. Python programming basics, Functions in Python and files handling.

2. GUI Programming and Databases operations in Python

3. Data handling using Python

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the various data types, control statements, conditional statements and functions in Python	L2	Understand
CO2	Understand different File handling and exception handling operations using Python	L2	Understand
CO3	Apply Database techniques in python using MySQL with Python	L3	Apply
CO4	Design GUI, apply different database operations and array handling in Python	L3	Apply
CO5	Implement Visualization of dataset using Pandas Dataframe and Matplotlib	L3	Apply

Course Contents

Unit-I   Introduction to Python   06 Hrs.

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, Data type Conversion

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)

Unit-II   Control statements and Functions in Python   06 Hrs.

While, for, Nested loops. Use of Continue, Pass and Break statement. Range function, Conditional Statements: if, else, elif, 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

3. Fibonacci series

4. Sine and Cosine series

5. Pythagoras triplets

6. Any one program to demonstrate the method of recursive function

Unit-III   Files Directories & Flow control   06 Hrs.

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.

Unit-IV   Python Database   04 Hrs.

Introduction to Python Database, Connections and Executing queries, Transactions and Handling Errors

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.

Unit-V   Introduction to GUI Programming   04 Hrs.

Introduction to Tkinter Working with Widgets Controlling Layout with Geometry Managers , Creating and using labels, Buttons, Check buttons, Radio Buttons , Making Applications Interactive

List of Suggested Practical (Any Two)

1.Example App: Temperature Converter

2. Example App: Text Editor

3. Tic tac toe Game using GUI

4. Scientific calculator.

Unit-VI   Visualization of Data   04 Hrs.

Working with numpy, constructing numpy arrays, Printing arrays, Arithmetic operations on matrix, Slicing Arrays, Random number generation. Working with Matplotlib, Working with 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.

Text Books

1. James Payne,"Beginning Python: Using Python 2.6 and Python 3.1",Wrox Publication

2. Dr. R. Nageswara Rao,"Core Python Programming" Dreamtech Press, Wiley Publication.

Reference Books

1. Lutz, "Learning Python" O'Really Publication

2. E. Balaguruswamy," Introduction to Computing and Problem Solving using Python", McGraw Hill Education India Pvt.,Ltd..

3. Magnus Lie Hetland,"Beginning Python from Novice to Professional", Second Edition, Apress Publication.

4. Charles Dierbach, Introduction to Computer Science using Python, Wiley, 2013

5. Laura Cassel, Alan Gauld "Python Projects", Wrox Publication

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

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

End Semester Examination (B):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Laboratory: (Suggested experiments)

1. Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.

2. Programs related to string manipulation.

3. Programs Lists, Tuples, Sets, arrays and dictionaries.

4. Programs based on various loops, conditional constructs and functions.

5. PYTHON program to update in the file "friends Contact.txt" which has name and contact and change the number of an old contact.

6. Write a program to demonstrate the BPSK signal of sequence [1 0 0 0 1 0 1 0 0 1].

7. Write a program create a table for books and extract the author's name and book title for books made after and 2022

8. Create a GUI that converts temperature input in Celcius to Farenheit

9. Read a csv dataset using pandas datafrme and create a scatter plot.

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

Product Life Cycle Management (RCP23OCOE301)

Teaching Scheme	**Examination**
Lectures: 03 Hrs./Week	Term Test: 20 Marks
Credit: 03	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Pre-requisite:

1. Basic Management knowledge

Course Objectives

1. To familiarize the students with the need, benefits and components of PLM.

2. To acquaint students with Product Data Management & PLM strategies.

3. To give insights into new product development program and guidelines for designing and developing a product.

4. To familiarize the students with Virtual Product Development.

5. To acquaint students with the need of Environmental aspects in PLM & its implementation

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.	L2	Understand
CO2	Illustrate various approaches and techniques for designing and developing products.	L3	Apply
CO3	Acquire knowledge in applying virtual product development tools.	L3	Apply
CO4	Acquire knowledge in implementation of Environmental aspects in PLM.	L2	Understand

Course Contents

Unit-I Introduction to Product Lifecycle Management (PLM) 07 Hrs.

Introduction to Product Lifecycle Management (PLM):

Product Lifecycle management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications.

PLM Strategies: Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy, Change management for PLM.

Unit-II Product Design and Development 07 Hrs.

Product Design and Development:

Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase.

Unit-III Methodological Evolution of Product Design 10 Hrs.

Methodological Evolution of Product Design:

Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering, Life Cycle Approach, Characteristic Features of Life Cycle Approach. The Design for X System, Objective Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process. New Product Development (NPD) and Strategies, Product Configuration and Variant Management.

Integration of Environmental Aspects in Product Design:

Sustainable Development Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design, Tools and techniques for integrated design, Implementation of international standards.

Unit-IV Product Data Management (PDM) 07 Hrs.

Product Data Management (PDM):

Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation.

Virtual Product Development Tools:

For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modelling and simulations in Product Design, Examples/Case studies.

Unit-V   Engineering Methods for product Duration design & evaluation   08 Hrs.

Engineering Methods for product Duration design & evaluation:

Durability of Products and Components, Design for Fatigue, Infinite Life Approach, Design for Finite Life.

Product Recovery Planning & Analysis:

Approach to the Recovery Problem, Method for Recovery Cycles Planning, Calculation Models for Recovery Cycles Planning, Basic procedure, Determinant Factors for Recovery, Effective Component Reusability, Recovery Fractions, Extension of Useful Life.

Text Books

1. John Stark, "Product Lifecycle Management: Paradigm for $21^{(st)}$ Century Product Realisation", Springer-Verlag, 2004. ISBN: 1852338105.

2. Fabio Giudice, Guido La Rosa, Antonino Risitano, "Product Design for the environment-A life cycle approach", Taylor & Francis 2006, ISBN: 0849327229

Reference Books

1. Saaksvuori Antti, Immonen Anselmie, "Product Life Cycle Management", Springer, Dreamtech, ISBN: 3540257314

2. Michael Grieve, "Product Lifecycle Management: Driving the next generation of lean thinking", Tata McGraw Hill, 2006, ISBN: 0070636265

3. Franois Villeneuve, Luc Mathieu, Max Giordano "Product Life-Cycle Management: Geometric Variations", United Kingdom: Wiley, 2010

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Management Information System (RCP23OCOE302)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

<div align="right">

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Pre-requisite:

Nil

Course Objectives

1. The course is blend of management and technical field.

2. Discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built.

3. Define and analyze typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage.

4. Identify the basic steps in systems development.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the fundamental concepts of the management information systems used in business.	L2	Understand
CO2	Describe IT infrastructure and its components and its current trends.	L2	Understand
CO3	Use the tools and technologies for accessing information from databases to improve business performance and decision making	L3	Apply
CO4	Identify and explain the security and ethical challenges in MIS along with the measures to be taken	L2	Understand
CO5	Select a suitable social computing platform for the given requirements that integrates AI and IoT.	L3	Apply
CO6	Explain the processes involved in the information system within the organization includes information acquisition and enterprise and global management technologies.	L2	Understand

Course Contents

Unit-I   Foundation Concepts   04 Hrs.

Foundation Concepts

Definition and scope of Management Information Systems (MIS) in business, Functional area information system, The components of information systems, Impact of IT on organizations and society, Business Process : BPR and BPI. Business Pressure, Organizational responses. Competitive Advantage and Strategic IS's.

Unit-II   Information Technology Infrastructure   05 Hrs.

Information Technology Infrastructure Overview of IT infrastructure, Hardware and software, Computer systems: End user and enterprise, Computing computer peripherals: Input, output, and storage technologies, Application software: End user applications, System software: Computer system management, Data resource management: Technical foundations of database management, Managing data resources, Big data, Data warehouse and data marts, Knowledge management, Networks: The networked enterprise (wired and wireless), Pervasive computing, Cloud computing models,

Unit-III MIS Tools and applications for Decision making 10 Hrs.

MIS Tools and applications for Decision making

ERP and ERP support of business Business intelligence (BI): Managers and Decision Making. Decision Support System (DSS): types, components, Data mining. Executive information system. Role of AI in decision making. Role of predictive analytics and data visualization in business

Unit-IV   Security and Ethical Challenges   08 Hrs.

Security and Ethical Challenges

Information security fundamentals, Key principles of information security , Common threats and vulnerabilities in MIS , Security measures and controls, Access control mechanisms: authentication, authorization, and accounting (AAA), Encryption techniques and cryptographic protocols , Ethical, and societal challenges of IT , Legal and regulatory framework, Privacy Policies

Unit-V   Social Computing (SC)   06 Hrs.

Social Computing (SC)

Web 2.0 and 3.0: static and dynamic platform, integration with AI and IoT , SC in business-shopping: leveraging social media platforms, Social listening and sentiment analysis, Social computing in Customer Relationship Management (CRM) , Marketing, operational and analytic CRM, E-business and E-commerce B2B B2C, E-commerce platforms and payment gateways , Mobile commerce: growth trends, mobile wallets, contactless payments, shopping apps and platforms .

Unit-VI   Information System within Organization   06 Hrs.

Information System within Organization

Acquiring Information Systems and Applications: Various System development life cycle models, Enterprise and Global Management of Information Technology: Managing Information Technology, Managing Global IT , Business processes and information systems.

Text Books

1. A. K. Gupta, "Management Information System", S. Chand Limited, 2010.

2. K. K. Ghosh, Saini Das, and S. Mukherjee, "Management Information System", Management, IIT, Kharagpur, 2021

Reference Books

1. J. A. OBrien, G. Marakas, "Management Information Systems", McGraw-Hill Companies, Incorporated, 2006.

2. K. Rainer, B. Prince, "Management Information Systems", Wiley, 2016.

Web References

- Management Information System:
  https://nptel.ac.in/courses/110105148

- Management Information System (Archive):
  https://archive.nptel.ac.in/courses/110/105/110105148/

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Operations Research (RCP23OCOE303)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Pre-requisite:

Knowledge of

1. Mathematics.

2. Probability

Course Objectives

1. Formulate a real-world problem as a linear programming problem and able to solve.

2. Understand the optimisation tools that are needed to solve linear programming problems.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Formulate the real-world optimisation problem into a Linear Programming Problem (LPP) and analyse the solution obtained using LPP optimisation models.	L4	Analyze
CO2	Solve Linear Programming Problems using transportation and assignment models.	L3	Apply
CO3	Apply Decision Theory to determine the optimal course of action when a number of alternatives are available, and their consequences cannot be forecast with certainty and uncertainty.	L3	Apply
CO4	Apply Game Theory for decision making under conflicting situations where there are one or more opponents (players).	L3	Apply
CO5	To breaking down a large problem into smaller sub problems and solved recursively or iteratively using Dynamic Programming models.	L4	Analyze

Course Contents

Unit-I   **Introduction to Operations Research**   **12 Hrs.**

Introduction to Operations Research:

Introduction, Structure of the Mathematical Model, Limitations of Operations Research.

Linear Programming:

Introduction, Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Graphical method, Simplex Method, Penalty Cost Method or Big M-method, Two Phase Method.

Unit-II   **Transportation Problem**   **08 Hrs.**

Transportation Problem:

Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions North-west corner rule, least cost method and Vogels approximation method. Optimality test: MODI method.

Assignment Problem:

Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Processing of n Jobs Through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem Routing Problem

Unit-III   **Decision Theory**   **06 Hrs.**

Decision Theory:

Steps in Decision Theory approach, Decision-making Environment, Decision making under condition of certainty, Decision making under condition of uncertainty, Decision making under condition of risk, Maximum likelihood criterion.

Unit-IV   **Game Theory**   **6 Hrs.**

Game Theory:

Competitive games, rectangular game, saddle point, minimax/maximin method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point mixed strategy for 2 X 2 games.

Unit-V   **Dynamic programming**   **07 Hrs.**

Dynamic programming:

Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stagecoach/Shortest Path, cargo loading and Reliability problems.

Text Books

1. Operations Research - An Introduction: Taha, H. A., Pearson Education, 2022.

2. Operations Research, Gupta, P. K. and Hira, D. S., S. Chand Publications, 2014.

Reference Books

1. Operations Research: Introduction to Models and Methods, Boucherie, R. J., Tijms, H. and Braaksma, A., 2021.

2. Introduction to Operations Research: Hiller, F. S. and Liebermann, G. J., McGrawHill Higher Education, 2010.

3. Operations Research: Principles and Practice: Ravindran, A., Phillips, D. T. and Solberg, J. J., Wiley India Pvt. Limited, 2009

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Personal Finance Management (RCP23OCOE304)

Teaching Scheme	Examination Scheme

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 20 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 60 Marks
Total: 100 Marks

Pre-requisite:

Nil

Course Objectives

1. To create awareness and educate consumers on access to financial services.

2. To make the students understand the basic concepts, definitions and terms related to direct taxation.

3. To help the students compute the Goods and Service Tax (GST) payable by a supplier after considering the eligible input tax credit.

4. To familiarize the students with micro finance for accelerating the expansion of local microbusinesses

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the Indian financial system.	L2	Understand
CO2	Use a framework for financial planning to understand the overall role finances play in his/her personal life.	L3	Apply
CO3	Compute income from salaries, house property, business/profession, capital gains and income from other sources.	L3	Apply
CO4	Compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.	L3	Apply
CO5	Understand how Microfinance can help in financial inclusion.	L2	Understand

Course Contents

Unit-I   **Overview of Indian Financial System**   **07 Hrs.**

Overview of Indian Financial System:

Characteristics, Components and Functions of Financial System. Financial Instruments and Financial Markets, Financial inclusion.

Introduction to Personal Finance

Personal Financial Planning in Action, Money Management Skills, Taxes in Your Financial Plan, Savings and Payment Services. Consumer Credit: Advantages, Disadvantages, Sources and Costs.

Unit-II   **Personal Financial Management**   **07 Hrs.**

Personal Financial Management

Loans:

Home, Car, Education, Personal, Loan against property and Jewel loan.

Insurance:

Types of Insurance ULIP and Term; Health and Disability Income Insurance, Life Insurance.

Investment:

Investing Basics and Evaluating Bonds, Investing in Stocks and Investing in Mutual Funds, Planning.

Unit-III   **Income Tax & Dynamics**   **09 Hrs.**

Income Tax

Income Tax Act Basics

- Introduction to Income Tax Act, 1961 **Heads of Income and Computation of Total Income and Tax Liability-** Heads of Income and Computation of Total Income under various heads, Clubbing Provisions, Set off and carry forward of Losses, Deductions, Assessment of Income and tax liability of different persons.

Tax Management, Administrative Procedures and ICDS -

TDS,TCS and Advance Tax Administrative Procedures, ICDS.

Unit-IV   **Goods and Services Tax**   **08 Hrs.**

Goods and Services Tax

GST Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration.

Levy and Collection of GST

Taxable event "Supply" of Goods and Services; Place of Supply: Within state, Interstate, Import and

Export; Time of supply: Valuation for GST- Valuation rules, taxability of reimbursement of expenses; Exemption from GST: Small supplies and Composition Scheme: Classification of Goods and Services

| Unit-V | Introduction to Microfinance | 08 Hrs. |

Introduction to Microfinance

Micro-Finance: Definitions, Scope & Assumptions, Types of Microfinances, Customers of Micro-finance, Credit Delivery Methodologies, SHG concept, origin, Formation & Operation of Self-Help Groups (SHGs).

Models in Microfinance - Joint Liability Groups (JLG), SHG Bank Linkage Model and GRAMEEN Model: Achievements & Challenges.

Institutional Mechanism

Current Challenges for Microfinance, Microfinance Institutions (MFIs): Constraints & Governance Issues, Institutional Structure of Microfinance in India: NGO MFIs, NBFC MFIs, Co-operatives, Banks, Microfinance Networks and Associations; Demand & Supply of Microfinance Services in India, Impact assessment and social assessments of MFI

Text Books

1. Banking and Financial Sector Reforms in India, by Asha Singh, M.S. Gupta, Serials Publication.

2. Indian Banking Sector: Essays and Issues (1st) , by M.S. Gupta & J.B. Singh, Serials Publication.

3. Basics Of Banking & Finance, by K.M. Bhattacharya O.P. Agarwal, Himalaya Publishing House.

4. Agricultural Finance and Management, by S. Subba Reddy, P. Raghu Ram.

5. The Indian Financial System and Development, by Dr.Vasant Desai, Himalaya Publishing House; Fourth Edition.

6. Income Tax Management, Simple Way of Tax Management, Tax Planning and Tax Saving, By Sanjay Kumar Satapathy.

7. Direct Tax System Income Tax by Dr. R. K. Jain, SBPD Publications.

8. Simplified Approach to GST Goods and Services Tax, By S K Mishra, Educreation Publishing.

9. Introduction To Microfinance, By Todd A Watkins, World Scientific Publishing company

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Public Systems and Policies (RCP23OCOE305)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

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Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Pre-requisite:

1. Basic Knowledge of Social science and Current affairs

Course Objectives

1. To explain public policy and its operations with special focus on policy relating to Government finance.

2. To analyze and evaluate the impact of public policy on firms and the economy at large.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the importance of public systems in a fast-changing environment in the global context.	L2	Understand
CO2	Analyze the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.	L4	Analyze
CO3	Explain public policy and its operations with special focus on policy relating to Government finance.	L2	Understand
CO4	Make policies and know about the happenings in the world, in the nation and those in their locality.	L4,L5	Analyze, Evaluate
CO5	Analyze and evaluate the impact of public policy on firms and the economy at large and work under various fields as policymakers.	L5	Evaluate

Course Contents

Unit-I   Introduction and Overview of Public Systems   10 Hrs.

Introduction and Overview of Public Systems:

Ideology of Public Systems; Mechanistic and Organic view of Society and Individuals, The Legal Framework; Federal Government; State and Local Governments, Government growth; The size of Government.

Unit-II   Public Sector in the Economics Accounts   06 Hrs.

Public Sector in the Economics Accounts:

Public Sector in the circular flow; Public Sector in the National Income Accounts.

Unit-III   Public Choice and Fiscal Politics   08 Hrs.

Public Choice and Fiscal Politics:

Direct Democracy; Representative Democracy; The Allocation Function; The Distribution Function; The Stabilization Function; Coordination of Budget Functions; The Leviathan Hypothesis.

Unit-IV   Introduction and Overview of Public Policy   10 Hrs.

Introduction and Overview of Public Policy:

Markets and Government; Social goods and Market failure, public expenditure and its evaluation; Cost Benefit Analysis, Public policy and Externalities, Taxation Policy and its impact, Income distribution, redistribution and social security issues Fiscal & Budgetary Policy, Fiscal Federalism in India.

Unit-V   Case Studies in Expenditure Policy   05 Hrs.

Case Studies in Expenditure Policy:

Public Services A) National Defence B) Highways C) Outdoor Recreation D) Education

Text Books

1. Charles J, Wheelan, "Introduction to Public Policy", W.W. Norton & Company, New York, 2011.

2. Thomas R, Dye, "Understanding Public Policy", Prentice Hall, 2008.

3. Anderson, James E, "Public Policy-Making: An Introduction", Boston, 2011.

4. Avasthi & Maheshwari, "Public Administration", Lakshmi Narain Agarwal, 2008.

5. Mohit Bhattacharya, "New Horizons of Public Administration", Jawahar Publishers, New Delhi, 2011

6. Nicholas Henry, "Public Administration and Public Affairs", Prentice Hall of India, New Delhi, 2017.

7. Harvey S Rosen and Ted Gayer, "Public Finance" 10th Edition, McGraw-Hill Education, 2013.

8. Richard A Musgrave and Peggy B Musgrave, "Public Finance in Theory and Practice", 5th Edition, Mcgraw Hill Book, 2017.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Fundamentals of Biomedical Instruments (RCP23OCOE306)

Teaching Scheme   **Examination Scheme**

Lectures: 03 Hrs./Week   Term Test: 20 Marks

Credit: 03   Teacher Assessment: 20 Marks

                                                             End Sem Exam: 60 Marks

                                                                  Total: 100 Marks

Pre-requisite:

1. Basic knowledge of Human Anatomy
2. Basic knowledge of Electronics

Course Objectives

1. To understand the basic principles and working of various medical instruments.

2. To familiarize the learners with the various medical imaging modalities, their operating principles, instrumentation and clinical applications

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Associate and describe the different physiological processes taking place within the human body.	L2	Understand
CO2	Identify the use of biomaterials and apply principles of various transducers and sensors.	L3	Apply
CO3	Demonstrate the working principle of various medical instruments.	L3	Apply
CO4	Demonstrate principles used in imaging modalities and analysis.	L3	Apply
CO5	Identify different processes used in telemetry and telemedicine.	L2	Understand

Course Contents

Unit-I   **Basic Human Physiology**   **04 Hrs.**

Basic Human Physiology

Cell: Electrical activity of excitable cells (Structure and functions of cell. Polarization and depolarization of cell)

Cardiovascular System: Heart, Conductive tissues of heart, Cardiac cycle, Heart Valves, System and Pulmonary Circulation, Transmission of Cardiac Impulse, Blood Pressure, ECG (Einthovens Triangle, Various leads and Waveforms).

Muscle Physiology: Muscle physiology and aspects of skin resistance. Generation of EMG

Nervous System: Different parts, their functions. Reflex actions and reflex arc, Function of Sympathetic and Parasympathetic nervous system. Generation of EEG

Unit-II   **Biomaterial, Transducers and Sensors**   **10 Hrs.**

Biomaterial, Transducers and Sensors:

Biomaterials used in fabrication of biodevices and implants: Polymeric, Composite biomaterials, Metallic biomaterials, and Ceramic biomaterials. Biopotential electrodes: Electrode tissue interface, Electrode electrolyte interface Electrodes used for ECG, EEG & EMG. Transducers & sensors: temperature transducer, pulse sensor, glucose sensor, respiration sensor , Introduction of biomaterials, Classification of biomaterials

Unit-III   **Overview of Medical Instruments**   **08 Hrs.**

Overview of Medical Instruments

Classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment , Method of operation of these Bio Medical Instruments , ECG , EEG,EMG

Unit-IV   **Imaging Modalities and Analysis**   **09 Hrs.**

Imaging Modalities and Analysis:

Radio graphic techniques, Computer Tomography, MRI, PET, SPECT , Ultrasonography , Endoscopy , Thermography, Retinal Imaging , Imaging application in Biometric systems, Analysis of digital images

Unit-V   **Telemetry & Telemedicine**   **08 Hrs.**

Telemetry & Telemedicine:

Introduction to Biotelemetry , Physiological parameters compliant to biotelemetry, Components of Biotelemetry system , Applications of telemetry in medical field (ECG, EEG & EMG)

Text Books

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice hall of India, New Delhi,2007.

2. M.Arumugam, "Bio-Medical Instrumentation", Anuradha Agencies, 2003.

3. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 2nd Edition, 2003.

4. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, NewYork, 1998.

5. "Biomaterials Science - An Introduction to Materials in Medicine", B.D. Ratner, A.S. Hoffmann, F. J. Schoen, J. E. Lemons, Academic Press, 1997.

Reference Books

1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad

2. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, 3rd Edition, Boca Raton, CRC Press LLC, 2006.

3. Curry, T. S., Dowdey, J. E., & Murry, R. C. (1990). Christensen's physics of diagnostic radiology. Lippincott Williams & Wilkins.

4. Biomaterials: An Introduction, Joon Park, R. S. Lakes, Springer Science & Business Media

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

IPR & Patenting (RCP23OCOE307)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 20 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 60 Marks
Total: 100 Marks

Pre-requisite:
Nil

Course Objectives:

1. To promote the knowledge of intellectual property laws of India and international treaties.

2. To encourage innovation.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Map a given project/ idea to a suitable intellectual property rights.	L3	Apply
CO2	Explain the fundamentals of the patents, copyrights, and design registrations.	L2	Understand
CO3	Draft applications to protect various intellectual property rights.	L6	Create
CO4	Communicate with national and/or international intellectual property organisations.	L4	Analyze

Course Contents

Unit-I Introduction to Intellectual Property Rights (IPR) 03 Hrs.

Concept meaning of IP and IPR, General principles of intellectual property rights,Need for intellectual property,Categories of IPR instruments - Patents, Trademarks, Copyrights, Industrial. Designs, Plant variety protection, Trade secrets, Geographical Indications etc.,Ownership, assignment, licenses, infringement, validity period, International treaties on IPR.

Unit-II Copyright and Design 09 Hrs.

The Indian Copyright Act, 1957, Meaning of copyrights and rights of copyrighted works,Types of copyright,Process of filing a copyright application,Introduction to Designs Law Definitions,Registration of designs and procedure.

Unit-III Basics of Patents 09 Hrs.

The Indian Patent Act and The Indian Patent Rules,Conditions of patentability,Patentable and non-patentable inventions,Types of patent applications and patent specification,Inventors and Applicants,Category of applicants - natural person, small entity, startup and others,Patent databases and prior art search, International Patent Classification code.

Unit-IV Patent Application Drafting 09 Hrs.

Application,Specification,Claims drafting: Independent and dependent claims drafting,Process patent and product patent claims,Abstract, Drawings,Declaration as to inventorship, Statement and undertaking.

Drafting response to communications from patent office.

Reading and understanding examination reports, Drafting response.

Unit-V Procedure for Filing a Patent Application, Timelines and Fees 09 Hrs.

Application for grant of patent,Forms and Fees, Request for (early) publication and / or (early) examination,Patent examination and hearing, Pre-grant and post-grant opposition.

Text Books

1. A Durafe and D Toradmalle,"Intellectual Property Rights", Wiley, 2020.

2. H Rockman, "Intellectual property law for engineers, scientists, and entrepreneurs", Wiley-IEEE Press, 2020.

Reference Books

1. Bare Act, "The Patents Act, 1970 with The Patents Rules, 2003", Universal, 2023.

2. Bare Act, "The Copyright Act, 1957", Universal and LexisNexis, 2021.

3. Bare Act, "The Designs ACT, 2000", Commercial Law Publishers (India) Pvt. Ltd. 2021

Online Resources:

1. W. Fisher,"Maps of Intellectual Property"
   https://cyber.harvard.edu/people/tfisher/IP/IPMaps.htm

2. World Intellectual Property Organisation courses
   https://www.wipo.int/academy/en/

3. Prof. Feroz Ali, "Patent Drafting for Beginners"
   https://onlinecourses.nptel.ac.in/noc24$_h$s59/$preview$

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Entrepreneurship and Startup Ecosystem (RCP23OCOE308)

Teaching Scheme	**Examination Scheme**
Lectures: 03 Hrs./Week	Term Test: 20 Marks
Credit: 03	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Pre-requisite:
Nil

Course Objectives

1. To foster an entrepreneurial mindset.

2. To guide participants in building effective Business Models.

3. To educate participants regarding Intellectual property and Fundraising for Innovative Ventures.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Effectively Navigate the Global Startup Landscape.	L3	Apply
CO2	Cultivate an Entrepreneurial Mindset.	L4	Analyze
CO3	Create Effective Business Models.	L6	Create
CO4	Understand the significance of Intellectual Property rights	L2	Understand
CO5	Master Fundraising Strategies.	L5	Evaluate

Course Contents

Unit-I   Understanding the Entrepreneurial Ecosystem   06 Hrs.

Introduction to Entrepreneurship and Startups, Role of Entrepreneurship in economy, Global and Local Entrepreneurial Landscapes , Role of Incubators and Accelerators , Case Studies of Successful Startups

Unit-II   Developing a Startup Mindset   08 Hrs.

Cultivating an Entrepreneurial Mindset , Market Analysis and Segmentation, Opportunity Recognition , Innovation and Idea Generation , Feasibility Analysis of Business Ideas , Role of innovation in Entrepreneurship , Fostering creativity , Practical Exercises and Workshops on Creative Problem Solving

Unit-III   Business Model Development   10 Hrs.

Introduction to Business Models , Lean Startup Methodology , Prototyping and Minimum Viable Product (MVP) , Financial Projections and Budgeting , Various forms of Business Ownership , Compliance and Legal Regulations , Operations and Supply Chain Management , Human Resource Management , Developing a marketing Strategy , Managing Growth Challenges

Unit-IV   Technological Innovation and Intellectual Property   08 Hrs.

Technology and Entrepreneurship ,Intellectual Property Basics (Patents, Trademarks, Copyrights),Patent Search and Analysis, Strategies for Protecting Intellectual Property, Ethical Considerations in Technology and Innovation

Unit-V   Fundraising and Investment Strategies   07 Hrs.

Fundraising Options for Startups, Angel Investors and Venture Capital , Crowdfunding Platforms , Financial Modelling for Startups , Crafting an Effective Pitch

Text Books

1. Alexander Osterwalder and Yves Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, John Wiley & Sons, Jul2010.

2. Peter Thiel and Blake Masters, Zero to One: Notes on Startups, or How to Build the Future, Virgin Books, 2015.

3. Alejandro Cremades, The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal,

and Everything Else Entrepreneurs Need to Know" by, John Wiley & Sons, Inc., Hoboken, New Jersey, 2016.

4. Christensen, Clayton M. The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston, MA: Harvard Business School Press, 1997.

5. Brad Feld and Jason Mendelson, Venture Deals: Be Smarter Than Your Lawyer and Venture Capitalist, Wiley; 4th edition, 1 October 2019

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Semester Project -I (RCP23IPSC301)

Practical Scheme

Practical : 02 Hrs./week

Credit : 01

Examination Scheme

Teacher Assessment : 25 Marks

End Sem Exam : 25 Marks

Total : 50 Marks

Course Objectives:

Students are expected to design, simulate/implement a project based on the knowledge acquired from current semester subjects.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Conduct a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	Demonstrate various/alternate approaches to complete a project.	L2	Understand
CO3	Ensure a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	Present their project work in the form of a technical report /paper and there by improve the technical communication skill	L3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	L2	Understand

Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the content of semester project report which is being submitted in partial fulfilment of the requirements of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject to the approval of the department committee and the Head of the department) shall be allotted for each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The departmental committee shall finalize one topic for every group. Semester Project Title or Theme should be based on knowledge acquired during semester. The project work shall involve sufficient work so that students get acquainted with different aspects of knowledge acquired from semester subjects.

Student is expected to:

- Select appropriate project title based on acquired knowledge from current semester subjects.

- Maintain Log Book of weekly work done(please see attached log book format).

- Report weekly to the project guide along with log book.

Assessment Criteria:

- At the end of the semester, after confirmation by the project guide, each project group will submit project completion report in prescribed format for assessment to the departmental committee (including project guide)

- Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide)

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- Introduction

- Literature Survey

- Related Theory

- Implementation details

- Project Outcomes

- Conclusion

- References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment:

Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam:

Departmental committee (including project guide) will evaluate project as per Table 3.

Each group shall present/publish a paper based on the semester project in reputed/peer reviewed Conference/Journal/TechFest/Magazine/ before the end of the semester.

Table 1: Log Book Format

Sr	Week (Start Date:End Date)	Work Done	Sign of Guide	Sign of Coordinator
1				
2				

Table 2: Continuous Assessment Sheet

Sr	Exam Seat No	Name of Student	Student Attendance	Log Book Maintain	Literature Review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3: Evaluation Sheet

Sr	Exam Seat No	Name of Student	Project Selection	Design/ Simulation/ Logic	PCB/ hardware/ programming	Result Verification	Presentation	Total
			5	5	5	5	5	25

Professional and Business Communication Tutorial (RCP23ITHSX01)

Teaching Scheme   **Examination Scheme**

Tutorials: 02 Hrs./Week

Credit: 02   Teacher Assessment: 50 Marks

Total: 50 Marks

Course Objectives

1. To inculcate professional and ethical attitude at the workplace.

2. To enhance communication and interpersonal skills

3. To develop effective employability skills

4. To hone written skills for technical documentation

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply group discussion techniques in professional situations	L3	Apply
CO2	Use employability skills to optimize career opportunities	L3	Apply
CO3	Employ storytelling techniques for effective presentation	L3	Apply
CO4	Prepare technical documents using appropriate style, format, and language	L6	Create
CO5	Analyze the concept of professional ethics	L4	Analyze
CO6	Demonstrate interpersonal skills in professional and personal situations	L2	Understand

Course Contents

The course is designed to equip students with essential skills, crucial for navigating the contemporary job market successfully and fostering a positive work environment through effective communication and collaboration. The assignments comprise of a combination of interactive activities, discussions, case studies and real-world simulations, to help students, not only to ace job interviews and professional interactions, but also to contribute positively to the ethical and productive functioning of any organization. For the project work, students must prepare and present a well-researched and persuasive business proposal, in groups, integrating the skills and knowledge acquired throughout the course

Unit	Description of Tutorial Activity	No of assignment

Unit-I   Group Discussion   1 Assignment

Purpose of a GD, types of GD, criteria for evaluating GD, Dos and Don'ts of GD

Activity: The students will be divided into groups of 8-12 and each group will be given a topic/case to discuss within a given time frame. Each student will submit a write-up on their observations of the GD.

Unit-II   Employment Skills   2 Assignment.

Resume Writing:

Types of resumes, structure, content, and formatting of resume

Activity: The students will prepare and submit their individual resume according to the professional requirements.

Interview Skills:

Types and modes of interview, Preparation for interview, Dos and Don'ts of interview, frequently asked questions during interview

Activity: The students will submit a write-up on the FAQs and participate in mock interviews.

Unit-III   Corporate Story Telling   1 Assignment

Elevator pitch, product stories, event stories, stories in presentations, storytelling in SOPs and interviews, storytelling to manage conflict or to motivate.

Activity: The students will be divided into groups of 8-12 and asked to give a team presentation using storytelling technique and submit the hardcopy of the ppt.

Unit-IV   Technical Writing and Documentation   1 Assignment

Business Proposal Writing:

Types of business proposals, format of proposal, language and style, presentation of proposal

Meeting Documentation: Planning layout of meetings, observing meeting decorum, drafting notice, agenda, and minutes of meeting

Activity: The students will be divided into groups of 8-12 and each group will conduct a mock meeting based on an agenda and submit a writeup of the meeting documentation.

Unit-V   Professional Ethics   1 Assignment

Effective work habits, accountability, integrity, and excellence

Activity: The students will be divided into groups of 8-12 and each group will analyse a case involving an ethical issue and submit the write up.

Unit-VI   Interpersonal Skills   2 Assignment

Team Building:

Difference between group and team, importance of teamwork, strategies to be a good team player

Activity: The students will be divided into groups of 8-12 and each group will be assigned a task to be accomplished as a team, for which they will submit the write up.

Leadership: Types of leadership, leadership styles, case studies

Activity: Each student will submit a write up involving a leader they admire, analysing various aspects of his leadership style.

Time Management: Importance of time management, cultural views of time, 80/20 rule, time wasters, setting priorities and goals.

Activity: Each student will submit a write up about a case involving time management.

Note: Batchwise tutorial work of minimum eight assignments from the above suggested list or any other assignments based on the syllabus will be included, which would help the learner to apply the concepts learnt.

Text Books

1. Fred Luthans, "Organizational Behavior", McGraw Hill, edition

2. Lesiker and Petit, "Report Writing for Business", McGraw Hill, edition.

3. Huckin and Olsen, "Technical Writing and Professional Communication", McGraw Hill.

4. Wallace and Masters, "Personal Development for Life and Work", Thomson Learning, 12th edition

5. Heta Murphy, "Effective Business Communication", Mc Graw Hill, edition

6. Sharma R.C. and Krishna Mohan, "Business Correspondence and Report Writing", Tata McGraw-Hill Education

7. Ghosh, B. N., "Managing Soft Skills for Personality Development", Tata McGraw Hill.Lehman

8. Bell, Smith, "Management Communication" Wiley India Edition, 3rd edition

9. Dr. Alex, K., "Soft Skills", S Chand and Company

10. Subramaniam, R., "Professional Ethics" Oxford University Press

11. Sandeep Das, "How Business Story Telling Works: Increase Your Influence and Impact" Penguin Random House India Pvt. Ltd.

Economics and Financial Management(RCP23ICHSX03)

Teaching Scheme

Lectures: 02 Hrs./Week

Credit: 02

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Objectives

1. To describe the relationships among variables to analyse economic issues

2. To Explain the function of the market and prices as an allocative mechanism.

3. To identify key macroeconomic indicators and measures of economic change, growth,and development

4. To understand basic concepts of financial management and their application in investment and financing decisions

5. To explore the relationship between Financial Management and Financial Statements.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyse individual decision making, how prices and quantities are determined in product and factor markets, microeconomic and macroeconomic outcomes	L4	Analyse
CO2	Analyse the performance and functioning of government, RBI, markets, and institutions in the context of social and economic problems.	L4	Analyse
CO3	Analyse the current economic status of India at global levels and provision in budget to address economic issues at national level.	L4	Analyse
CO4	Describe an understanding of the overall role and importance of the finance function.	L2	Understand
CO5	Analyse financial performance and make appropriate inferences	L4	Analyse

Course Contents

Unit-I   **Introduction to Economics**   **06 Hrs.**

Fundamentals of Economics, Definition and scope of economics, the nature of the economic problem, finite resources and unlimited wants, definitions of the factors of production and their rewards, definition of opportunity cost, the influence of opportunity cost on decision making.

Microeconomics and Macroeconomics The role of markets in allocating resources, the market system, introduction to the price mechanism, Demand, Supply and Price determination, Price elasticity of demand and supply (PED),

Unit-II   **Role of Government and RBI**   **04 Hrs.**

Money, Banking, Households, Firms, economies and diseconomies of scale, Market Structure, Fiscal Policy, Monetary Policy, Economic Growth, causes and consequences of recession, causes of economic growth, measurement of economic growth inflation and deflation, living standards, indicators of living standards

Unit-III   **Government Policies**   **04 Hrs.**

Last 20 years Journey of Indian Economy, Measures taken to grow Indian Economy, Meaning of India is the world's fifth-largest economy by nominal GDP and the third-largest by purchasing power parity (PPP), On a per capita income basis, India ranked 139th by GDP (nominal) and 127th by GDP (PPP) (Data reference year 2023), Comparison of top 5 largest economies in world, Discuss key points of India latest union budget and its impact on Indian economy and citizens, Meaning of Initiatives like Make in India, Digital India, Skill India etc. and expected impact on Indian Economy

Unit-IV   **Overview of Financial Management**   **04 Hrs.**

Fundamentals of financial management, principles and functions of the financial management, Strategy, methods, and techniques of the financial management, Overview of financial instruments, financial markets, financial Institutions

Unit-V   **Overview of Financial Statements**   **08 Hrs.**

Balance Sheet, Profit and Loss Account, and Cash Flow Statement; Purpose of Financial Ratio Analysis; Liquidity Ratios; Efficiency or Activity Ratios; Profitability Ratios; Capital Structure Ratios; Stock Market Ratios;

Text Books

1. Datt & Sundharam's Indian Economy by Gaurav Datt & Biswajit Nag, S. Chand Publications, 73$^{\text{rd}}$ Edition,2024

2. Fundamentals of Financial Management by Prasanna Chandra, McGraw Hill Publications, 7th Edition, 2020

Reference Books

1. Public Economics: The Macroeconomic Perspective by Burkhard Heer, Springer International Publications,2019

2. Indian Economy: Economic Ideas, Development, and Financial Reforms by Raj Kumar Sen, Deep & Deep Publications, 2008

3. Indian Economy: Performance and Policies by Dr. V. C. Sinha, SBPD Publications,2021

4. Financial Management by C. Paramasivan, T. Subramanian, New Age Publications,2009

5. Financial Management Practices in India by Sandeep Goel, Taylor & Francis Publications,2016

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Community Engagement Service (RCP23ILELX05)

Teaching Scheme　　　　　　　　　　　　　　　**Examination Scheme**

Practical: 02 Hrs./Week

Credit: 01　　　　　　　　　　　　　　　　　Teacher Assessment: 25 Marks

　　　　　　　　　　　　　　　　　　　　　　　Total: 25 Marks

Pre-requisite:
1. Fundamental of core branche
2. Communication Skill

Course Objectives

1. To sensitise the student / learner into recognising community level problems & challenges and give them an opportunity to engage in activities for solving the same.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Knowledge application: Applies knowledge understandings acquired from ones academic study/ field/ discipline for community level education, information dissemination by participation and engagement in community welfare activities.	L3	Apply
CO2	Commitment for cause: Identify and experience commitment for community engagement activities that reinforce sense of belongingness and gratitude towards societal cause.	L4	Analyze
CO3	Diversity: Witness diversity in communities and cultures and demonstrate change in approach / attitude as, an evidence of unconditional acceptance. .	L3	Apply
CO4	Team: Recognise, experience and value, effectiveness of working in a team, demonstrating co-existence of the roles - sincere worker and effective leader.	L4	Analyze

Course Contents

Unit-I   **Open Activities**   **04 Hrs.**

Participation in: blood donation camps organizer / donor, day-long tree plantation or afforestation / seed dispersal / cleanliness (water bodies, surrounding etc.) drives. Literacy drives for children / youth / adults. One day hand holding activities in work-shop conduct for under privilege kids in the areas of basic science, math, technical skill demonstration and building.

Unit-II   **Technical (Program core related)**   **05 Hrs.**

Cyber-crime, security awareness and vulnerabilities sensitization, information dissemination and awareness sessions in indicated focus areas. Promotion and Sensitization for Sustainable living focusing on solar power, water recycling, e-waste responsible disposal, waste recycling etc. in indicated focus areas.

Focus areas: residential societies, schools, under-privileged areas, governments /private offices, and similar other establishments.

Field Survey:

Reporting on proactively conducted survey in the areas of resource management for water, vegetables, electricity, crops etc

Activities to be performed:

Among the listed activities students are expected to complete one open activity mandatorily, and one technical (program core) OR field survey activity. The activities mentioned are exemplary in nature and any other additional activity of similar nature too can be undertaken by the learners, provided it is approved and endorsed by the faculty mentor / head of the department.

Suggested Activities

1. Undertaking cyber safety / security awareness sensitization drive / program especially for un-initiated students / individuals in schools / colleges / residential complex / offices etc. Typical suggested tabulation.

Participant No.	Name	Age	School/ College/ Residence/ Office	Email	Contact Number	Awareness Level	Remarks

2. Energy / Power assessment for establishments (societies, schools, colleges, residential complex, shops etc.) involving computing power devices ratings, power consumption over operating period, calculating energy cost from tariff card / rates for every group of appliances / devices or equipment. Typical suggested tabulation pattern.

Device/Appliance Group	Number of appliances /devices	Power Rating (kW)	Operating Hours (h/day)	Energy Consumption (kWh/day)	Tariff Rate (Rs./ kWh)	Energy Cost (Rs.)
Lighting Fixtures						
Ceiling Fans						
Air Conditioner (AC)						
Security Systems						
Water Pump						

3. Traffic light monitoring viz-e-viz average traffic density on road. Analysing the data and commenting on results. Evaluating and comparing impact on road repairs related lane blockage and proportional recommendation for lights timing variations. Typical suggested tabulation pattern.

Sr. No.	Timestamp	Traffic Density	Traffic Light Status	Road Repair Status	Remarks

4. Help compute green footprint of select number of household (per member) - say 10 houses of 3+ members. This is for evaluating dependence upon non green energy sources and habits and changes in lifestyle for attempts at their reductions. Learners are

encouraged to use typically available online carbon-footprint calculators. The table herewith maybe used for reference calculations.

House No.	House hold Name	Number of Members	Energy Usage (kWh)	Water Usage (liters)	Waste Production (kg)	Transportation Habits	Green Footprint

5. Compulsion of having a borewell for non-potable water supply in city residential complexes is a modern-day rule. Increased pace of re-development, as well as number of occupants in given area, has resulted in increased number of borewells being dug within and outside city limits. Reduced yield, quality and quantity of water adds to the recurring maintenance cost of borewells, especially in the city areas. Poor water recharge systems along-with depleting open soil cover area in wake of wall-to-wall of concrete carpet aggravate the problem. Study, analyse and report a residential society's capacity of water requirement, present day borewells in action, approximate yield, maintenance cost and frequency, borewell flushing iterations in wake of redevelopment in neighborhood. A typical tabulation mechanism for inferences can be as below:

Borewell No.	Location	Depth (ft)	Yield (Liters/Day)	Water Quality	Maintenance Cost (Rs.)	Remarks

6. Detection of Adulteration in food / fruits / vegetables / milk / mava /saffron etc. or contamination of potable drinking water. Ex. Adulteration in fruits could be apple waxing, injecting chemicals in watermelon, pomegranate etc. to give it a bright red color, artificial ripening of mangos etc. For a given activity, samples from more than one area, specifically from mofussil /interiors / 'gaothans etc, may be obtained, to evaluate sample purity or extent of adulteration. Learners are encouraged to use online resources provided by 'Food Safety and Standards Authority of India (fssai), for handholding in requisite procedures.

YouTube link:

Food Safety and Standards Authority of India: https://goo.gl/Y8Lzbu

Ex. 1 Milk Adulteration: https://www.youtube.com/watch?v=pbnmeRUBxKk

Ex. 2 Watermelon Adulteration: https://www.youtube.com/watch?v=yrLAj7oJies

Product	Adulterant	Testing Method	Result	Remarks

Certificates and Formats:

<div align="center">

Activity Endorsement Certificate

</div>

Date:

Community engagement service is a mandatory course, of two credits, introduced at second year of engineering under the autonomous structure of the institute.

Course objective: To sensitize the student / learner into recognizing social problems & challenges and give them an opportunity to engage in activities for solving the same.

Course outcomes:

1. **Knowledge application:** Applies knowledge understandings acquired from one's academic study/ field/ discipline for community level education, information dissemination by participation and engagement in community welfare activities.

2. **Commitment for cause:** Identify and experience commitment for community engagement activities that reinforce sense of belongingness and gratitude towards societal cause.

3. **Diversity:** Witness diversity in communities and cultures and demonstrate change in approach / attitude as an evidence of unconditional acceptance.

4. **Team:** Recognize, experience and value effectiveness of working in a team, demonstrating co-existence of the roles - sincere worker and effective leader.

This is to certify that Mr./Ms. _____ bearing PRN No._____ is a student of S.Y. B.Tech., _____ branch of engineering. He / She is a bonafide student of R. C. Patel Institute of Technology, Shirpur. He / She is reliable, sincere, hardworking and capable of conducting _____ activity in your premises. We request you to kindly allow for the conduction of the activity and we also solicit your earnest co-operation in the same.

Signature

Department Head:

<div align="center">**Disclaimer**</div>

(This form must be read, signed, and submitted prior to the beginning of the community service activity.)

Student Details	Activity Details
Name	
PRN No.	Date
Program	Time
Class/Div	Address

I, the undersigned _____ accept the following terms and conditions unconditionally:

1. I accept and understand that the community activity identification and selection has been done willingly by me.

2. I undertake to convey that, I am apparently in good health and well-being, and suffer no physical impairment that would or should prevent my participation in the activity.

3. I undertake to bear all related expenses and risk of travel related to the activity and shall not hold any personnel from the institute responsible with regards to claims and / or loss in the process of conduct of activity.

4. I undertake that my parents or legal/local guardians are aware of said activity and agree to above mentioned terms and conditions.

Students name & signature: _____

Parent or Guardians name & signature: _____

Guidelines for Assessment of the work

- The review/progress monitoring committee shall be constituted by the Head of the Department. The progress of selected/assigned activities is to be evaluated on a continuous basis, holding at least one review in the semester.

- In the continuous assessment, focus shall also be on each individual student's contribution to the team activity, their understanding and involvement as well as responses to the questions being raised at all points in time.

- Each group needs to submit the following forms to the respective supervisor after conducting both the activities:

  - Activity Conduction Report

  - Participant Feedback (online / offline)

  - Participant Attendance (online / offline)

  - Survey Report

  - Participation certification

Forms for Technical Activity:

1. **Activity Conduction Report**

Sr. No.	Name of the Activity	
1	Date of Activity	
2	Activity type (Open / Technical)	
3	Activity objectives	
4	Place of Activity	
5	PRN No. and Names of students	
6	Name of the Association	
7	Activity description	
8	No. of participants	
9	Photos (Geo tagged)	

2. **Participant feedback (online / offline):**

Sr. No.	Indicators	Scale: 1 (Lowest) to 5 (Highest)
1	The objectives of the training were clearly defined.	
2	The content was organized and easy to follow.	
3	This training experience will be useful to me.	
4	The trainer was knowledgeable about the training topics.	
5	The training objectives were met	

Evaluation Scheme:

Continuous Assessment (A):

Term Work: - 25 marks, distribution as herewith:

1. **Rubric for Open Ended Activity (10 marks)**

   - Activity Conduction Report

2. **Rubric for Technical Activity (15 marks)**

Sr. No.	Performance Indicators (Maximum marks per indicator are given in bracket)	Marks
1	Pre-requisite documents (permission letter, presentation material, permission letters, etc.) [05 marks]	
2	Participant Feedback [05 marks]	
3	Participant attendance [05 marks]	
	TOTAL	

OR

3. **Rubric for Field Survey Activity:**

Sr. No.	Performance Indicators (Maximum 03 marks per indicator)	Marks
1	Topic selection	
2	Survey preparation	
3	Field work	
4	Analysis	
5	Report writing	
	TOTAL	

Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)

Syllabus Booklet
Electronics and Telecommunication Engineering

Second Year B.Tech. Semester- IV

With Effect from Academic Year 2024-25

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

Signals and Systems (RCP23ECPC401)

Teaching Scheme	**Examination**
Lectures: 02 Hrs./Week	Term Test: 20 Marks
Credit: 02	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Course Pre-requisite:

1. Engg. Mathematics-II

2. Foundation of Signal Processing

Course 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.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Perform mathematical operations on signals to construct complex signals using basic elementary signals.	L3	Apply
CO2	Classify signals and systems on the basis of their properties and analyze the implications in the context of practical signals and systems.	L2,L4	Understand, Analyze
CO3	Represent signals in the time and frequency domain using multiple representations and analyze LTI systems using convolution in the frequency domain.	L3,L4	Apply,Analyze
CO4	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.	L5	Evaluate

Course Contents

Unit-I   **Classification of Signals and Systems**   **06 Hrs.**

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 (time shift, time reversal, time scaling), 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.

Unit-II   **Continuous Time and Discrete Time Linear Time Invariant(LTI) Systems**   **05 Hrs.**

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 convolution sum, Properties of convolution summation, Impulse response of DT-LTI system and its properties, step response, system stability.

Unit-III   **Fourier Transform (FT)**   **06 Hrs.**

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.

Unit-IV   **Laplace Transform(LT) & Vector Integral**   **05 Hrs.**

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. Analysis of continuous time LTI systems using Laplace Transform: Transfer Function, causality and stability of systems

Unit-V   **Analysis of Discrete Time Signals and Systems**   **04 Hrs.**

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 ZTransform.

Text Books

1. A. Nagoor Kani, Signals and Systems, 2nd 2nd Edition, McGraw Hill India, 2018.

2. Hwei Hsu, Signals and Systems, Schaums outlines, 2nd 2nd Edition, 2010.

3. Rodger E Ziemer, William H. Tranter and D. Ronald Fannin, Signals and Systems, Pearson Education, Fourth Edition 2009..

Reference Books

1. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley and Sons, Second Edition, 2004.

2. Alan S. Willsky, Alan V. Oppenheim, and Ian T. Young, "Signals and Systems," Prentice Hall Signal Processing Series, 2nd Edition, 1996.

3. B. P. Lathi, "Signals Processing and Linear Systems," Berkeley Cambridge Press, 1998.

Suggested MOOCs:

1. Signals and Systems by Prof. Kushal K. Shah (IISER Bhopal)
   https://archive.nptel.ac.in/courses/108/106/108106163

2. Principles of Signals Systems by Prof. Aditya K. Jagannatham (IIT Kanpur)
   https://archive.nptel.ac.in/courses/108/104/108104100/

3. Signals and Systems Laboratory: Virtual Laboratory
   http://ssl-iitg.vlabs.ac.in/

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Signals & Systems Tutorial (RCP23ETPC401)

Teaching Scheme
Tutorial: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment CA: 25 Marks
Total: 25 Marks

Course Pre-requisite:

1. Engg. Mathematics-II

2. Foundation of Signal Processing

Course 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.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Perform mathematical operations on signals to construct complex signals using basic elementary signals.	L3	Apply
CO2	Classify signals and systems on the basis of their properties and analyze the implications in the context of practical signals and systems.	L2,L4	Understand, Analyze
CO3	Represent signals in the time and frequency domain using multiple representations and analyze LTI systems using convolution in the frequency domain.	L3,L4	Apply,Analyze
CO4	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.	L5	Evaluate

Course Contents

Signals and Systems Tutorial :

1. Classification of CT/DT Signals and Systems.

2. IOperations on CT/DT Signals

3. Sampling and Quantization

4. Analyze Linear Time Invariant (LTI) Continuous Time Systems

5. Perform convolution of continuous and discrete time signals.

6. Fourier Transform

7. Laplace Transform and Inverse Transform

8. Z-Transform and Inverse Transform

9. Analysis of continuous time LTI systems

10. Analysis of discrete time LTI systems

    Tutorial Assessment:

    Batchwise tutorial work of minimum eight tutorials from the above suggested list or any other tutorial 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.

Integrated Circuits (RCP23ECPC402)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 20 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 60 Marks
Total: 100 Marks

Course Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics

2. Electronic Devices and Circuits

3. Digital System Designs

Course Objectives

1. To understand the concepts, and working principle of integrated circuits.

2. To design and analyze different circuits as well as systems for various applications using integrated circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the physical operation of integrated circuits using Op-Amps.	L2	Understand
CO2	Analyse linear and non-linear Op-Amp applications.	L4	Analyze
CO3	Design various applications using Op-Amps, Timers, and special ICs.	L6	Create
CO4	Implement different types of applications using various Analog ICs with proper justifications.	L5	Evaluate

Course Contents

Unit-I   Introduction to Operational Amplifiers   08 Hrs.

Block diagram of Op-Amp, analysis of basic differential amplifier circuit configurations using MOS-FETs (DIBO, DIUO, SIBO, SIUO), MOSFET differential amplifier with active load, Op-Amp symbol and terminals, ideal Op-Amp and practical Op-Amp characteristics, Op-Amp parameters, open loop and closed loop configurations.

Unit-II   Linear and Non-linear Applications of Operational Amplifier   10 Hrs.

Amplifiers: Inverting, non-inverting, buffer, summing, difference, integrator, differentiator, 3-Op-Amp Instrumentation Amplifier, Log and Antilog amplifier. Comparators: Inverting and non-inverting comparator, zero crossing detector, window detector, Inverting and non-inverting Schmitt trigger, Waveform generator: Square wave generator, triangular wave generator. Precision rectifier: Half wave and full wave. Active Filters: First and second order active LPF and HPF.

Unit-III   Analog to Digital and Digital to Analog Converters   07 Hrs.

Performance parameters of ADC, single ramp ADC, ADC using DAC, dual slope ADC, successive approximation ADC, flash ADC, Performance parameters of DAC, binary weighted register DAC, R/2R ladder DAC, inverted R/2R ladder DAC.

Unit-IV   Special Purpose Integrated Circuits   06 Hrs.

IC 555(timer): Internal block diagram and working principle of IC 555, IC 555 as Astable and Monostable Multivibrator (Design and Working principle), Internal block diagram and working principle of IC 566 (VCO), Internal block diagram and working principle of IC 565 (PLL).

Unit-V   Voltage Regulators   08 Hrs.

Three terminal regulators: Functional block diagram, working and design of three terminal fixed (78XX, 79XX series) and three terminal adjustable (LM 317, LM 337) voltage regulators; General purpose voltage regulator: Functional block diagram, working and design of general purpose 723 (LVLC, LVHC, HVLC and HVHC) with current limit and current fold-back protection .

Text Books

1. Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits, Pearson Prentice Hall, 4th Edition, 2000.

2. K. R. Botkar, Integrated Circuits, Khanna Publishers, 5th Edition, 2010.

3. D. Roy Choudhury and S. B. Jain, Linear Integrated Circuits, New Age International Publishers, 4th Edition, 2009.

Reference Books

1. Sergio Franco, Design with operational amplifiers and analog integrated circuits, Tata McGraw Hill, 3rd Edition, 2003.

2. R. F. Coughlin and F. F. Driscoll, Operation Amplifiers and Linear Integrated Circuits, Prentice Hall, 5th Edition, 1997.

3. David A. Bell, Operation Amplifiers and Linear Integrated Circuits, Oxford University Press, 3rd Edition, 2011.

Evaluation Scheme:

Continuous Assessment (A):

Course teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Integrated Circuits Laboratory (RCP23ELPC402)

Teaching Scheme

Practical: 02 Hrs/Week

Credit: 01

<div align="right">

Examination Scheme

Teacher Assessment: 25 Marks

End Sem Exam : 25 Marks

Total: 50 Marks

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Course Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics

2. Electronic Devices and Circuits

3. Digital System Designs

Course Objectives

1. To understand the concepts, and working principle of integrated circuits.

2. To design and analyze different circuits as well as systems for various applications using integrated circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the physical operation of integrated circuits using Op-Amps	L2	Understand
CO2	Analyse linear and non-linear Op-Amp applications.	L4	Analyze
CO3	Design various applications using Op-Amps, Timers, and special ICs.	L6	Create
CO4	Implement different types of applications using various Analog ICs with proper justifications.	L5	Evaluate

Course Contents

List of Laboratory Experiments: (Any Eight)

1. Design Inverting and Non-inverting amplifier using Op-Amp (IC 741).

2. Design Integrator and Differentiator using Op-Amp (IC 741).

3. Design Summing /Difference amplifier using Op-Amp (IC 741).

4. Second Order Low Pass filter using Op-Amp (IC 741).

5. Design Square wave and Triangular wave generator using Op-Amp (IC 741).

6. Design Schmitt trigger using Op-amp (IC 741).

7. Design Half wave and Full wave Precision Rectifier using Op-Amp(IC 741).

8. Design R-2R Ladder DAC using Op-Amp(IC 741).

9. Design Astable Multivibrator using IC 555.

10. Design Voltage Regulator using IC 723.

11. To perform AC and DC analysis of MOSFET based differential amplifier using Spice Tool.

12. Instrumentation Amplifier using Spice Tool.

    (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.)

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project. The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

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

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Microcontroller & Applications (RCP23ECPC403)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

<div align="right">

Examination

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Course Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics

2. Digital System Designs

Course Objectives

1. To develop background knowledge and core expertise in microcontrollers.

2. To understand peripheral devices and their interfacing to microcontrollers.

3. To write programs for microcontrollers and their applications in Assembly language.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe functionalities of different component of 8051 microcontroller architecture.	L2	Comprehension
CO2	Identify different hardware and use relevant software for programming of microcontroller-based development system.	L4	Analyze
CO3	Write assembly language programs for microcontroller-based systems using instruction set.	L4	Analyze
CO4	Interface different input/output devices with microcontroller for various applications.	L5	Evaluate

Course Contents

Unit-I Introduction to Microcomputer System 05 Hrs.

Block diagram of microprocessor- based system: CPU, I/O Devices, Clock, Memory, Concept of Address, Data and Control Bus and Tristate logic, Need of Assembly Language and its Comparison with higher level languages, Need of Assembler and Compiler and their comparison.

Unit-II 8051 Microcontroller 10 Hrs.

Features, architecture and pin configurations, CPU timing, Input/Output ports, Memory organization, Counters and timers, Interrupts, Serial Communication.

Unit-III 8051 Programming 12 Hrs.

Instruction set, Addressing mode, Assembler Directives Programs related to: arithmetic, logical, delay, input, output, timer, counters, port, serial communication, and interrupts.

Unit-IV Memory interfacing with 8051 05 Hrs.

RAM, ROM, EPROM and Memory mapping.

Unit-V Interfacing and Applications 07 Hrs.

Interfacing of Display: LED, Seven Segment display, and LCD, DC Motor, Stepper motor Relay and UART.

Text Books

1. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay, The 8051 Microcontroller Embedded systems, Pearson Education India, 1st 1st Edition, 2007.

2. Lyla Das, Embedded Systems: An Integrated Approach, Pearson Publication, 1st Edition, 2012.

Reference Books

1. C. Kenneth J. Ayala and D. V. Gadre, The 8051 Microcontroller Embedded system Using assembly & C, Cengage Learning Publication, 1st Edition, 2010.

2. I. Scott Mackenzie, Raphael C. W. Phan, The 8051 Microcontroller, Pearson International Publication, 4th Edition, 2007.

3. Ajay Deshmukh, Microcontrollers, Tata McGraw Hill Publication, 2nd Edition, 2006.

Evaluation Scheme:

Continuous Assessment (A):

Course teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Microcontroller & Applications Laboratory (RCP23ELPC403)

Teaching Scheme

Practical: 02 Hrs/Week

Credit: 01

Examination

Teacher Assessment: 25 Marks

End Sem Exam : 25 Marks

Total: 50 Marks

Course Pre-requisite:

1. Basic Electrical Engineering & Digital Electronics

2. Digital System Designs

Course Objectives

1. To develop background knowledge and core expertise in microcontrollers.

2. To understand peripheral devices and their interfacing to microcontrollers.

3. To write programs for microcontrollers and their applications in Assembly language.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe functionalities of different component of 8051 microcontroller architecture.	L2	Comprehension
CO2	Identify different hardware and use relevant software for programming of microcontroller-based development system.	L4	Analyze
CO3	Write assembly language programs for microcontroller-based systems using instruction set.	L4,	Analyze
CO4	Interface different input/output devices with microcontroller for various applications.	L5	Evaluate

Course Contents

List of Laboratory Experiments: (Any Eight)

1. To find smallest and largest number from given data string using 8051.

2. To perform addition, subtraction, multiplication division of 8-bit numbers.

3. To exchange data blocks using 8051.

4. To arrange data series in ascending & descending order.

5. To find even and odd numbers from data string.

6. To blink LED and generate various pattern using 8051.

7. To interface 7-segment display with 8051.

8. To display the message on LCD using 8051.

9. To transfer and receive data serially using 8051.

10. To generate waveform using 8051.

11. To measure pulse width using 8051.

12. To interface temperature sensor and display room temperature on display.

13. To interface DC motor using 8051.

14. To interface relay and turn ON/OFF the bulb using 8051.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

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

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Data Structures and Algorithms (RCP23ECMD401)

Teaching Scheme   **Examination**

Lectures: 02 Hrs./Week   Term Test: 20 Marks

Credit: 02   Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Pre-requisite:

1. Structure Programming Using C

2. Structure Programming Using C Laboratory

Course Objectives

1. To introduce the concept of data structures.

2. To design and implement various data structure through abstract data type.

3. To develop application using data structure algorithms.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Implement linear data structures using array and linked list.	L4	Analyze
CO2	Solve problems using non-linear data structures.	L3	Apply
CO3	Analyze the performance of sorting and searching algorithms.	L4	Analyze

Course Contents

Unit-I   **Introduction to Data structures**   **04 Hrs.**

Introduction to Data structures, Types of Data structures: Linear and nonlinear data structures, Arrays, Stacks, Queue, Linked list Tree and Graph, Recursion, Introduction to Analysis, Algorithms, characteristics of an algorithms, Time and Space complexities, Order of growth functions, Asymptotic notations.

Unit-II   **Stack and Queue data structure**   **05 Hrs.**

Introduction to Stack, Stack as ADT, Operations on Stack, Application of stack: reversing string, Polish notations, Introduction to Queue, Queue as ADT, Operations on Queue, Linear representation of queue.

Unit-III   **Linked List data structure**   **05 Hrs.**

Introduction to Linked List, Singly Linked list, Doubly Linked list, Operations on linked list, Linked representation of stack, Linked representation of Queue .

Unit-IV   **Sorting and Searching**   **06 Hrs.**

Introduction to Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort. Analysis of Sorting Techniques. Comparison of sorting Techniques Introduction to Searching: Linear search, Binary search, Hashing Techniques, Different Hash functions, Collision & Collision resolution techniques, Analysis of searching Techniques.

Unit-V   **Tree**   **06 Hrs.**

Introduction to Trees, Definitions & Tree terminologies, Binary tree representation, Operations on binary tree, Traversal of binary trees, Binary search tree Introduction to Graph, Introduction Graph Terminologies, Graph Representation, Type of graphs, Graph traversal: Depth first search(DFS) & Breadth First search(BFS), Minimum Spanning Tree: Prims & Kruskals Shortest Path Algorithm.

Text Books

1. Tenenbaum, Langsam, Augenstein, Data structures using C,1st Edition,Pearson Education,2019.

2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Edition, W. H. Freeman and Company, 2008.

3. Reema Thareja, Data Structures using C, 2nd Edition, Oxford, 2017.

Reference Books

1. Mark A. Weiss, Data Structures and Algorithm Analysis in C, 4th Edition, Pearson Education, 2014. .

2. M. T. Goodritch, R. Tamassia, D. Mount, Data Structures and Algorithms in C++, 2nd Edition, Wiley, 2011.

3. Kruse, Leung, Tondo, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2013.

4. Seymour Lipschutz, Data Structures, Schaum's Outline Series, 1st Edition, Tata McGraw-Hill, 2014.

Evaluation Scheme:

Continuous Assessment (A):

Course teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Data Structures and Algorithms Laboratory (RCP23ELMD401)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam : 25 Marks
Total: 50 Marks

Course Pre-requisite:

1. Structure Programming Using C

2. Structure Programming Using C Laboratory

Course Objectives

1. To introduce the concept of data structures.

2. To design and implement various data structure through abstract data type.

3. To develop application using data structure algorithms.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Implement linear data structures using array and linked list.	L4	Analyze
CO2	Solve problems using non-linear data structures.	L3	Apply
CO3	Analyze the performance of sorting and searching algorithms.	L4	Analyze

Course Contents

List of Laboratory Experiments: (Any Eight)

1. To implement stack.

2. To implement parenthesis checker using stack.

3. To Implement Infix to Postfix conversion.

4. To evaluate prefix and postfix expression.

5. To implement Linear queue.

6. To implement various operations on linked list copy, concatenate, split, reverse, count no. of nodes.

7. To implement various operations on doubly linked list.

8. To implement Stack using Linked List.

9. To implement Queue using Linked List.

10. To implement Sorting algorithms.

11. To implement Searching algorithms.

12. To create a binary tree and traverse it in Inorder, preorder and Postorder.

13. To implement binary search tree.

14. To implement DFS and BFS in graph theory

    (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.)

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project. The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

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

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Project Management (RCP23OCOE401)

Teaching Scheme	**Examination Scheme**
Lectures: 03 Hrs./Week	Term Test: 20 Marks
Credit: 03	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Course Pre-requisite:

1. Basic Concept of Management

Course Objectives

1. To familiarize the students with the use of a structured methodology/approach for every unique project undertaken, utilizing project management concepts, tools and techniques.

2. To appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain project management life cycle and the various project phases as well as the role of project manager.	L2	Understand
CO2	Apply selection criteria and select an appropriate project from different options.	L3	Apply
CO3	Create a work break down structure for a project and develop a schedule based on it. Manage project risk strategically.	L6	Create
CO4	Use Earned value technique and determine and predict status of the project. Capture lessons learned during project phases and document them for future reference.	L6	Create
CO5	Differentiate between traditional waterfall approach and agile scrum methodology for software development projects.	L4	Analyze

Course Contents

Unit-I **Project Management Foundation** **07 Hrs.**

Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical atypical). Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Introduction to project leadership, ethics in projects, Multicultural and virtual projects, Project management in various organization structures, PM knowledge areas as per Project Management Institute (PMI).

Unit-II **Initiating Projects** **08 Hrs.**

How to get a project started, selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter, Effective project team, Stages of team development growth (forming, storming, norming performing), team dynamics.

Unit-III **Project Planning** **08 Hrs.**

Work Breakdown structure (WBS) and linear responsibility chart, Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques, PERT, CPM. Crashing project time & Resource loading and levelling (Only Theory), Project Stakeholders and Communication plan. Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability, and impact matrix. Risk response strategies for positive and negative risks.

Unit-IV **Monitoring and Controlling Projects** **08 Hrs.**

Planning monitoring and controlling cycle, Information needs and reporting, engaging with all stakeholders of the projects, communication and project meetings. Earned Value Management techniques for measuring value of work completed, using milestones for measurement, change requests and scope creep, Project audit, Project Contracting: Project procurement management, contracting and outsourcing. Closing the Project: Customer acceptance, Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report, doing a lessons learned analysis, acknowledging successes and failures.

Unit-V **Agile project management** **08 Hrs.**

Agile principle, Agile Manifesto, Agile process framework, Characteristics of Agile Approaches and Scrum, Benefits of Agile project management, Implementing Agile project management. Agile Project Planning: Comparison of Agile Project Management with Traditional Waterfall Approach, Project Planning with Scrum, Scrum Artifacts Supporting Project Planning , Scrum Events for Project Plan-

ning. Scheduling with scrum, Techniques for scrum scheduling- Poker estimation. Agile Tools for Tracking Project Progress: Task Boards, Burnup and Burndown Charts.

Text Books

1. Project Management: A managerial approach, Jack Meredith & Samuel Mantel,11th Edition, Wiley India. ,

2. Project Management: The Managerial Process, 8th edition, Erik Larson, Clifford Gray, McGraw Hill Education.

3. Agile Project Management, Jim Highsmith, Pearson Education, Low Price Edition, India.

Reference Books

1. A Guide to the Project Management Body of Knowledge (PMBOK Guide), 7th Edition, Project Management Institute PA, USA.

2. Project Management, Gido Clements, Cengage Learning.

3. Project Management, Gopalan, Wiley India.

4. Project Management, Dennis Lock,9th Edition, Gower Publishing England.

5. Agile Essentials You Always Wanted to Know, Kalpesh Ashar, Vibrant Publishers U.S.A.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Cyber Security, Policies and Laws (RCP23OCOE402)

Teaching Scheme	**Examination Scheme**
Lectures: 03 Hrs./Week	Term Test: 20 Marks
Credit: 03	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Course Pre-requisite:

1. Fundametals of Computers

Course Objectives

1. Familiarize with the provisions and implications of the Digital Personal and Data Protection Act, the obligations of data fiduciaries, the rights and duties of data principals, and mechanisms for resolving breaches.

2. Equip individuals and organizations with the knowledge and tools to create secure cyber ecosystems, strengthen regulatory frameworks, and develop incident response plans.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand and describe the major types of cybercrime and navigate legal frameworks and regulations concerning digital personal and data protection.	L2	Understand
CO2	Implement strategies for cybersecurity outlined in the National Cyber Security Policy.	L3	Apply
CO3	Apply appropriate law enforcement strategies to both, prevent and control cybercrime.	L3	Apply
CO4	Comprehend regulations and strategies pertaining to AI (Artificial Intelligence) and large language models.	L2	Understand

Course Contents

Unit-I   **Cyber Crime**   **08 Hrs.**

Definition and Origin of the Word, Cyber Crime and Information Security, who are Cyber Criminals, Classification of Cybercrimes, E-mail Spoofing, Spamming, Cyber Defamation, Internet Time Theft, Salami Attack, Salami technique Data Diddling, Forgery, Newsgroup Spam, Online Frauds, Pornographic Offenders, Email Bombing, Password Sniffing, Credit Card Frauds.

Unit-II   **Cyber Offenses**   **08 Hrs.**

How Criminals plan them, Categories of Cyber Crimes, How Criminal Plans the Attack: Active Attacks, Passive Attacks, Social Engineering, Classification of Social Engineering, Cyber Stalking: types of Stalkers, Cyber Cafe and Cyber Crimes, Botnets, Attack Vectors, Cyber Crime and Cloud Computing.

Unit-III   **Indian IT Act .**   **08 Hrs.**

Cyber Crime and Criminal Justice, Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments Security aspect in Cyber-Law, The Contract Aspects in Cyber Law, The Security Aspect of Cyber Law, Security Standards: SOX,GLBA, HIPAA, NIST Cyber Security Framework (CSF).

Unit-IV   **India's Digital Personal and Data Protection Act (2023)**
                                                      07 Hrs

Preliminary, Obligations of Data Fiduciary, Rights and Duties of Data Principal, Special Provisions, Data Protection Board of India, Powers, Functions and Procedure to Be Followed by Board, Appeal and Alternate Dispute Resolution, Penalties and Adjudication.

Unit-V   **India's AI Regulation and Strategy**   **08 Hrs.**

Privacy, Security and Artificial Intelligence, Differential Privacy, Security in AI. National Artificial Intelligence Strategy, Principles for Responsible AI, Information Technology (Intermediary Guidelines and Digital Media Ethics Code-2021), Draft National Data Governance Framework Policy (NDGFP), Rules against Deepfakes, Due diligence advisory for AI, AI regulations framework (June 2024).

Text Books

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole, Sunit Belapur, Wiley-2011.

2. Understanding Cybersecurity Management in Decentralized Finance: Challenges, Strategies, and Trends by Gurdip Kaur, Springer-2023.

Reference Books

1. The Information Technology Act, 2000; Bare Act- Professional Book Publishers, New Delhi.

2. Izzat Alsmadi , The NICE Cyber Security Framework: Cyber Security Intelligence and Analytics, Springer-2023.

References (Web Resources):

1. Digital Personal data Protection act 2023.pdf (meity.gov.in)

2. National cyber security (draft v1) (meity.gov.in)

3. CISCO roles responcibility.pdf

4. Standrads (bis.gov.in)

5. ai-machine-learning-and-big-data-laws-and-regulations/india

Evaluation Scheme:
Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

1. Two term tests of 20 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 60 marks.

2. Total duration allotted for writing the paper is 2 hrs.

Advanced Operations Research (RCP23OCOE403)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

<div align="right">

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Course Pre-requisite:

1. Operation Research

2. Mathematics (Calculus)

Course Objectives

1. To develop an ability to analyse the structure and mathematical model of various complex system occurring in manufacturing system, service system, and business applications.

2. To develop knowledge of the mathematical structure of linear and nonlinear optimization models.

3. To develop an understanding of the techniques used to solve linear and nonlinear optimization models using their mathematical structure.

4. To develop an understanding of the use of modelling languages for expressing and solving optimization models.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply Duality theory to solve linear programming problem and analyse optimum solution.	L3	Apply
CO2	Construct linear integer programming models and apply the O.R. algorithms and techniques to solve linear integer programming problems	L3	Apply
CO3	Determine best satisfying solution under a varying quantity of resources and priorities of the goals.	L5	Evaluate
CO4	Set up decision models and solve nonlinear programming- unconstrained optimization problems	L3	Apply
CO5	5. Set up decision models and solve nonlinear programming- constrained optimization problems.	L3	Apply

Course Contents

Module 1   **Dual Linear Programs**   **06 Hrs.**

Primal, dual, and duality theory - The dual simplex method -The primal-dual algorithm-Duality applications. Post optimization problems: Sensitivity analysis.

Module 2   **Integer Programming**   **06 Hrs.**

Pure and mixed integer programming problems, Solution of Integer programming problems Gomory's all integer cutting plane method and mixed integer method, branch and bound method, Zero-one programming.

Module 3   **Goal Programming.**   **05 Hrs.**

Concept of Goal Programming, GP model formulations, Graphical method of GP, The simplex method of GP, Application areas of GP.

Module 4   **Nonlinear Programming- Unconstrained optimization 11 Hrs**

Minimization and maximization of convex functions- Local & Global optimum- Convergence-Speed of convergence. one-dimensional unconstrained optimization Newton's method Golden-section search method , multidimensional unconstrained optimization Gradient method steepest ascent (descent) method Newton's method .

Module 5 Nonlinear Programming- Constrained optimization 11 Hrs.

Constrained optimization with equality and inequality constraints. Constrained optimization: Lagrangian method - Sufficiency conditions - Kuhn-Tucker optimality conditions Rate of convergence - Engineering Applications Quadratic programming problems-convex programming problems.

Text Books

1. Operations Research, Gupta, P. K. and Hira, D. S., S. Chand Publications, 2014.

2. Operations research: Principles and applications, Srinivasan, G., Prentice Hallof India, 2007 .

3. Non-Linear Programming-A Basic Introduction, Nita H. Shah, Poonam Prakash Mishra, CRC Press, 2020.

Reference Books

1. Introduction to Operations Research, Frederick S. Hillier Gerald J. Lieberman, McGraw-Hill: Boston MA; 8th. (International) Edition, 2005.

2. Operations Research Principle and Practice Ravindran, Philips and Soleberg, Second Edition, John Wiley, and sons, 2007.

3. Operations Research - An Introduction: Taha, H. A., Pearson Education, 2022.

4. Operations Research: models and methods, Paul A. Jensen, Jonathan F. Bard, Wiley Publications, 2003.

5. Optimization Techniques in Operation Research, C. B Gupta, I.K. International Publishing House Pvt. Limited, 2008.

Evaluation Scheme:

Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.

Corporate Finance Management (RCP23OCOE404)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Objectives

(a) Overview of Indian financial system, instruments and market.

(b) Basic concepts of value of money, returns and risks, corporate finance, working capital and its management.

(c) Knowledge about sources of finance, capital structure, dividend policy.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand Indian finance system.	L2	Understand
CO2	Apply concepts of time value money and risk returns to product, services and business.	L3	Apply
CO3	Understand corporate finance and working capital management.	L2	Understand
CO4	Take Investment and finance decisions.	L3	Apply
CO5	Take dividend decisions.	L3	Apply

Course Contents

Unit-I   Overview of Indian Financial System   08 Hrs.

Characteristics, Components and Functions of Financial System. Financial Instruments: Meaning, Characteristics and Classification of Basic Financial Instruments Equity Shares, Preference Shares, Bonds-Debentures, Certificates of Deposit, and Treasury Bills. Financial Markets: Meaning, Characteristics and Classification of Financial Markets Capital Market, Money Market and Foreign Currency Market. Financial Institutions: Meaning, Characteristics and Classification of Financial Institutions Commercial Banks, Investment-Merchant Banks and Stock Exchanges.

Unit-II   Concepts of Returns and Risks   08 Hrs.

Measurement of Historical Returns and Expected Returns of a Single Security and a Two-security Portfolio; Measurement of Historical Risk and Expected Risk of a Single Security and a Two-security Portfolio. Time Value of Money: Future Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Continuous Compounding and Continuous Discounting.

Unit-III   Overview of Corporate Finance .   07 Hrs.

Objectives of Corporate Finance; Functions of Corporate Finance-investment Decision, Financing Decision, and Dividend Decision.: Working Capital Management: Concepts of Meaning Working Capital; Importance of Working Capital Management; Factors Affecting an Entity's Working Capital Needs; Estimation of Working Capital Requirements; Management of Inventories; Management of Receivables; and Management of Cash and Marketable Securities.

Unit-IV   Capital Budgeting   08 Hrs

Meaning and Importance of Capital Budgeting; Inputs for Capital Budgeting Decisions; Investment Appraisal CriterionAccounting Rate of Return, Payback Period, Discounted Payback Period, Net Present Value (NPV), Profitability Index, Internal Rate of Return (IRR), and Modified Internal Rate of Return (MIRR)

Unit-V   Capital Structure   08 Hrs.

Factors Affecting an Entity's Capital Structure; Overview of Capital Structure Theories and Approaches Net Income Approach, Net Operating Income Approach; Traditional Approach, and Modigliani-Miller Approach. Relation between Capital Structure and Corporate Value; Concept of Optimal Capital Structure Dividend Policy: Meaning and Importance of Dividend Policy; Factors Affecting an Entity's Dividend Decision; Overview of Dividend Policy Theories and Approaches

Gordon's Approach, Walter's Approach, and Modigliani-Miller Approach.

Text Books

(a) Financial Management, Theory Practice 8th Edition (2011), by Prasanna Chandra: Tata Mc-Graw Hill Education Private Limited, New Delhi.

(b) Indian Financial System, 9th Edition (2015) by M. Y. Khan; Publisher: McGraw Hill Education, New Delhi.

(c) Financial Management, 11th Edition (2015) by I. M. Pandey; Publisher: S. Chand (G/L) Company Limited, New Delhi.

Reference Books

(a) Fundamentals of Financial Management, 13th Edition (2015) by Eugene F. Brigham and Joel F. Houston; Publisher: Cengage Publications, New Delhi.

(b) Analysis for Financial Management, 10th Edition (2013) by Robert C. Higgins; Publishers: McGraw Hill Education, New Delhi.

Evaluation Scheme:

Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.

Corporate Social Responsibility (RCP23OCOE405)

Teaching Scheme	**Examination Scheme**
Lectures: 03 Hrs./Week	Term Test: 20 Marks
Credit: 03	Teacher Assessment: 20 Marks
	End Sem Exam: 60 Marks
	Total: 100 Marks

Course Objectives

(a) To make students understand the concept, theories and application of CSR for the Development of the Society.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyse and critique the ethical dimensions of Corporate Social Responsibility initiatives, demonstrating a comprehensive understanding of CSR principles and their ethical underpinnings.	L4	Analyze
CO2	Demonstrate an understanding of the legislative frameworks shaping Corporate Social Responsibility both in India and globally, alongside recognizing the key drivers fostering CSR practices within the Indian context.	L2	Understand
CO3	Identify and discuss the significance of social responsibility and community engagement initiatives, demonstrating an understanding of their impact on both businesses and society.	L2	Understand

Course Contents

Unit-I Introduction to Corporate Social Responsibility (CSR) 07 Hrs.

Understanding the concept of CSR, Historical evolution and development of CSR, Importance and benefits of CSR for businesses and society, Stakeholder theory and its relevance to CSR.

Unit-II   Ethical Foundations of CSR   08 Hrs.

Ethical theories relevant to CSR (Utilitarianism, Deontology, Virtue Ethics), Ethical decision-making frameworks in business, Corporate governance and ethics, Ethical issues in supply chain management .

Unit-III   CSR-Legislation in India and the World   08 Hrs.

Section 135 of Companies Act 2013, Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profits Implementing Process in India

Unit-IV   The Drivers of CSR in India   08 Hrs

Market based pressure and incentives, civil society pressure, the regulatory environment in India Counter trends, Review of current trends and opportunities in CSR, Review of successful corporate initiatives and challenges of CSR. Case Studies of Major CSR Initiatives Corporate Social Responsibility and Public-Private Partnership (PPP)

Unit-V Social Responsibility and Community Engagement 08 Hrs.

Social issues and challenges in contemporary society,Corporate philanthropy and community development initiatives, Stakeholder engagement strategies,Corporate volunteering and employee engagement programs, CSR as a strategic business tool vital for sustainable development

Text Books

(a) Andrew Crane, Dirk Matten , "Corporate Social Responsibility: Definition, Core Issues, and Recent Developments" Oxford University Press.

(b) O. C. Ferrell, John Fraedrich, Linda Ferrell , "Business Ethics: Ethical Decision Making Cases", Cengage Learning .

(c) Corporate Social Responsibility in India, Sanjay K Agarwal, Sage Publications, 2008.

(d) Corporate Social Responsibility in India, Bidyut Chakrabarty, Routledge, New Delhi, 2015.

Reference Books

(a) Corporate Social Responsibility: An Ethical Approach, Mark S. Schwartz, Broadview Press, 2011.

(b) Attaining Sustainable Growth through Corporate Social Responsibility, George Pohle and Jeff Hittner, IBA Global Business Services, 2008 .

(c) Strategic Corporate Social Responsibility: Stakeholders in a Global Environment, William B. Werther Jr. and David Chandler, 2nd Edition, Sage Publications, 2011 .

Evaluation Scheme:

Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.

Bio informatics (RCP23OCOE406)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Objectives

(a) To provide an overview of bioinformatics and its significance in modern biological research.

(b) To enable students to apply bioinformatics methods in practical scenarios for biological data analysis and interpretation.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the structure and function of cells, organelles, and biomolecules.	L2	Understand
CO2	Understand the types of data stored in bioinformatics databases and their relevance to biological research.	L2	Understand
CO3	Explore genomic databases and understand the structure and content of protein databases.	L2	Understand
CO4	Understand system biology concepts and molecular evolution.	L2	Understand
CO5	Apply knowledge of cellular and molecular biology concepts to analyze a biological problem.	L3	Apply

Course Contents

Unit-I   Foundations of Molecular and Cellular Biology   08 Hrs.

Introduction to molecular biology: DNA, RNA, proteins, and their roles in cellular processes Cell structure and function: Organelles, membrane structure, and cellular transport Cell cycle regulation: phases of the cell cycle, checkpoints, and cell cycle control mechanisms .

Unit-II   Genetics and Genomics   08 Hrs.

Mendelian genetics: Inheritance patterns, Punnett squares, and genetic crosses Chromosome structure and organization: karyotyping, gene mapping, and genetic linkage Introduction to genomics: genome structure, organization, and variation Techniques in molecular genetics: PCR, DNA sequencing, and gene cloning.

Unit-III   Genomic and Protein Databases   08 Hrs.

Types of genomic databases such as GenBank, Ensemble, and UCSC Genome Browser, Understand the structure and content of protein databases such as UniProt and Protein Data Bank (PDB), Searching, Retrieving, and Analysing Genomic and Protein data from online databases.

Unit-IV   Systems Biology   08 Hrs

Introduction to Systems Biology: Modeling biological systems and network analysis, Bioinformatics tools for systems biology and modeling complex biological processes. Principles of molecular evolution: Mutation, Selection, and genetic drift. Phylogenetic analysis: Tree construction, sequence alignment, and molecular clock.

Unit-V   Applications and Case Studies   07 Hrs.

Applications of Bioinformatics in Medicine, Agriculture, and Biotechnology, Case Studies (Integrating Cellular and Molecular Biology with Bioinformatics) and Research Examples, Ethical and Legal Issues in Bioinformatics, Future Trends and Emerging Technologies in Bioinformatics.

Text Books

(a) Bioinformatics For Dummies, Jean-Michel Claverie and Cedric Notredame, For Dummies. (2019)
(b) Bioinformatics Algorithms: An Active Learning Approach by Phillip Compeau and Pavel Pevzner, Active Learning Publishers (2019).

Reference Books

(a) Introduction to Bioinformatics, Arthur Lesk, Biologist Bioinformatics Expert, 2019 .
(b) Introduction to Biomedical Data Science, Robert Hoyt, Informatics Education, 2019

(c) Python for Biologists: A Complete Programming Course for Beginners, Martin Jones, Oxford University Press, 2013

(d) An Introduction to Bioinformatics Algorithms, Neil C. Jones, and Pavel A. Pevzne, MIT Press,2004.

(e) Exploring Bioinformatics: A Project-Based Approach, Caroline St. Clair, and Jonathan E. Visick, Jones Bartlett Learning, 2014.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.

Human Resource Management (RCP23OCOE407)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Objectives

(a) To introduce the students with basic concepts, techniques and practices of the human resource management .

(b) To provide opportunity of learning Human resource management (HRM) processes, related with the functions, and challenges in the emerging perspective of todays organizations .

(c) To familiarize the students about the importance of the labour relations in the organization.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the changing environment of the HRM and the role of the HR managers.	L2	Understand
CO2	Understand the recruitment process and the application of the IT.	L4	Analyze
CO3	Understand the importance of the training and development.	L4	Analyze
CO4	Understand about the pay plans, performance appraisal and compensation	L4	Analyze
CO5	Understand the importance of the labour relation, the employee security and collective bargaining.	L2	Understand

Course Contents

Unit-I **Human Resource Function** **07 Hrs.**

Human Resource Philosophy Changing environments of HRM Strategic human resource management Using HRM to attain competitive advantage Trends in HRM Organisation of HR departments Line and staff functions Role of HR Managers.

Unit-II **Recruitment Placement** **10 Hrs.**

Job analysis: Methods - IT and computerised skill inventory - Writing job specification - HR and the responsive organisation. Recruitment and selection process: Employment planning and forecasting - Building employee commitment: Promotion from within - Sources, Developing and Using application forms - IT and recruiting on the internet. Employee Testing selection: Selection process, basic testing concepts, types of test, work samples simulation, selection techniques, interview, common interviewing mistakes, Designing conducting the effective interview, small business applications, computer aided interview.

Unit-III **Training Development .** **08 Hrs.**

Orientation Training: Orienting the employees, the training process, need analysis, Training techniques, special purpose training, Training via the internet. Developing Managers: Management Development - The responsive managers - On-the-job and off the-job Development techniques using HR to build a responsive organisation.Performance appraisal: Methods - Problem and solutions - MBO approach - The appraisal interviews - Performance appraisal in practice. Managing careers: Career planning and development - Managing promotions and transfers.

Unit-IV **Compensation Managing Quality** **08 Hrs**

Establishing Pay plans: Basics of compensation - factors determining pay rate - Current trends in compensation - Job evaluation - pricing managerial and professional jobs - Computerised job evaluation. Pay for performance and Financial incentives: Money and motivation - incentives for operations employees and executives - Organisation wide incentive plans - Practices in Indian organisations. Benefits and services : Statutory benefits - non-statutory (voluntary) benefits - Insurance benefits -retirement benefits and other welfare measures to build employee commitment.

Unit-V **Labour relations and employee security** **06 Hrs.**

Industrial relation and collective bargaining: Trade unions - Collective bargaining - future of trade unionism. Discipline administration - grievances handling - managing dismissals and separation. Labour Welfare: Importance Implications of labour legislations - Employee health - Auditing HR

functions, Future of HRM function.

Text Books

(a) Pattanayak, Biswajeet, Human Resource Management, 6th Edition,PHI Learning Pvt. Ltd., 1 Jul 2020.

(b) Gary Dessler, Human Resource Management, 16th Edition, Pearson Publications, 2020.

Reference Books

(a) Stephen Robbins, Organizational Behavior, 16th Edition, 2013.

(b) Aswathapa, Human resource management: Text cases, 6th Edition, 2011.

(c) C. B. Mamoria and S V Gankar, Dynamics of Industrial Relations in India, 15th Edition, 2015, Himalaya Publishing, 15th edition, 2015.

(d) P. Subba Rao, Essentials of Human Resource management and Industrial relations, 5th Edition, 2013, Himalaya Publishing.

(e) Laurie Mullins, Management Organizational Behavior, Latest Ed, 2016, Pearson Publications.

(f) Raymond J. Stone, Anne Cox, Mihajla Gavin, Human Resource Management, 10th Edition,John Wiley Sons, 14 Dec 2020.

(g) V S P Rao, Human Resource Management, 3rd Edition, 2010, Excel publishing.

Evaluation Scheme:
Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.

Digital Marketing Management (RCP23OCOE408)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Objectives

(a) Explain the evolution and technology of digital marketing, including underlying frameworks.

(b) Understand digital business strategy and emerging business structures.

(c) Cover digital marketing planning, operations setup, and implementation of search campaigns, alongside emerging concepts like Big Data, IoT, SMB, B2B marketing, and SoLoMo.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the digital marketing framework and model and consumer behaviour.	L2	Understand
CO2	Develop digital marketing strategy roadmap.	L6	Create
CO3	Explain the terminology and concepts for developing web-specific media plans.	L2	Understand
CO4	Understand concepts related to digital campaign management and revenue generation models.	L2	Understand
CO5	Get a perspective on global digital marketing technology/tools and future trends.	L3	Apply

Course Contents

Unit-I   Introduction to Digital Marketing   06 Hrs.

Emergence of Digital Marketing as a tool, media consumption drivers for new marketing environment, applications and benefits of digital marketing. Digital Marketing Framework Delivering enhanced customer value, market opportunity analysis and digital services development, ASCOR framework Digital Marketing Models Creation Factors impacting digital marketplace, value chain digitization, business models. The Consumer for Digital Marketing, Consumer behavior on the internet, evolution of consumer behavior models, managing consumer demand, integrated marketing communications (IMC)

Unit-II   Digital marketing Strategy Development   12 Hrs.

Elements of assessment phase, macro-micro environmental analysis, marketing situation analysis. Digital Marketing Internal Assessment and Objectives Planning Analyzing present offerings mix, marketing mix, core competencies analysis and internal resource mapping. Digital presence analysis, digital marketing objectives development and review. Digital Marketing Strategy Definition Understanding digital business strategy and structures, consumer development strategy, offering mix for Digital, digital pricing models, managing promotional channels and developing the extended Ps- People, process, programs and performance. Digital marketing Strategy Roadmap Developing digital marketing strategy roadmap, the 6s digital marketing implementation strategy, marketing across the product life cycle.

Unit-III   Digital Marketing Planning and Setup   08 Hrs.

Understanding digital media planning terminology and stages, steps to creating marketing communications strategy, introduction to search marketing, display marketing, social media marketing. Digital Marketing Operations Setup Basics of lead generation and conversion marketing, website content development and management, elements of user experience, web usability and evaluation.

Unit-IV   Digital marketing Execution   08 Hrs

Basic elements of digital campaign management, search execution, display execution, social media execution, content marketing. Digital marketing Execution Elements Digital revenue generation models, managing service delivery and payments, managing digital implementation challenges like e commerce, internal external and consumer specific challenges.

Unit-V   Digital Business Present and Future   05 Hrs.

Digital Marketing Global Landscape, digital marketing overview global spend, advertising spend,

and technology/tools landscape. Data technologies (Big data and IOT) impacting marketing, segment based digital marketing and SoLoMo the next level of hyperlocal marketing.

Text Books

(a) Fundamentals of Digital Marketing by Puneet Singh Bhatia, Pearson Education Limited,2017

(b) Digital Marketing by Seema Gupta- McGraw Hill Education, 2022

Reference Books

(a) Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing by Dave Chaffey and P. R. Smith, 5th Edition, Taylor Francis, 2017.

(b) Digital Marketing: Strategy, Implementation and Practice- 6th Edition by Dave Chaffey Fiona Ellis-Chadwick, Pearson Education Limited,2019

(c) Digital marketing by Vandana Ahuja, Oxford University Press, 2015.

(d) The Art of Digital Marketing by Ian Dodson, John Wiley Sons, 2016.

Evaluation Scheme:
Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.

Logistics & Supply Chain Management (RCP23OCOE409)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

Course Pre-requisite:

 (a) Latest trend of information technology in retail industry and logistic applications.

Course Objectives

 (a) To develop advanced strategic thinking skills in supply chain management and logistics to effectively analyse and optimize supply networks.

 (b) To attain proficiency in leveraging cutting-edge tools and technologies to enhance supply chain efficiency and supply chain transformation.

 (c) Design and implement collaborative supply chain and sourcing strategies to promote information sharing and optimise coordination.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Develop a sound understanding of the important role of supply chain management in todays business environment.	L2	Understand
CO2	Develop criteria and standards to achieve improved business performance by integrating and optimizing the total logistics and supply-chain process.	L6	Create
CO3	Summarize the value of focusing on information business logistics systems which drives improved accuracy and decision-making at all levels of management.	L2	Understand
CO4	Become familiar with current supply chain information technology management trends	L2	Understand
CO5	Use available technologies to enhance work performance and support supply chain functions, processes, transactions, and communications	L3	Apply

Course Contents

Module 1   **Introduction**   **05 Hrs.**

What Is Supply Chain Management? The Development Chain, Global Optimization, Managing Uncertainty and Risk, The Complexity in Supply Chain Management, Key Issues in Supply Chain Management

Module 2   **Network planning**   **06 Hrs.**

Introduction, Network Design- Data Collection, Data Aggregation, Transportation Rates, Mileage Estimation, Warehouse Costs, Warehouse Capacities, Potential Warehouse Locations, Service Level Requirements, Future Demand, Model and Data Validation, Solution Techniques, Key Features of a Network Configuration Supply Chain Planning; Inventory Positioning and Logistics Coordination -Strategic Safety Stock.

Module 3   **THE VALUE OF INFORMATION**   **08 Hrs.**

Introduction, The Bullwhip Effect-Quantifying the Bullwhip Effect, The Impact of Centralized Information on the Bullwhip Effect, Methods for Coping with the Bullwhip Effect, Information Sharing and Incentives, Effective Forecasts, Information for the Coordination of Systems, Locating Desired Products, Lead-Time Reduction, Information and Supply Chain Trade-offs-Conflicting Objectives in the Supply Chain, Designing the Supply Chain for Conflicting Goals ,Decreasing Marginal Value of Information.

Module 4   **Supply chain integration**   **08 Hrs.**

Introduction, Push, Pull, and Push-Pull Systems-Push-Based Supply Chain, Pull-Based Supply Chain, Push-Pull Supply Chain ,Identifying the Appropriate Supply Chain Strategy, Implementing a Push-Pull Strategy The Impact of Lead Time Demand-Driven Strategies The Impact of the Internet on Supply Chain Strategies-what is E-Business, the Grocery Industry , the Book Industry , the Retail Industry and Impact on Transportation and Fulfillment.

Module 5   **Information Technology and Business Process**   **06 Hrs.**

Introduction, The Importance of Business Processes, Goals of Supply Chain IT Supply Chain Management System Components, Decision-Support Systems IT for Supply Chain Excellence, Sales and Operations Planning Integrating Supply Chain Information Technology. Implementation of ERP and Decision Support System.

Module 6   **Technology standards**   **06 Hrs.**

Introduction, IT Standards, Information Technology Infrastructure Interface Devices, System Architecture and Electronic Commerce. Service-Oriented Architecture (SOA)-Technology Base: IBM and Microsoft and ERP Vendor Platform: SAP and Oracle. Radio Frequency Identification (RFID)-applications, point of sale data , business benefits and supply chain efficiency.

Text Books

(a) Supply Chain Management-Strategy, Planning, and Operation by Sunil Chopra, Peter Meindl, Pearson Publications 2016

(b) Designing and Managing the Supply Chain-Concepts, Strategies, and Case Studies by David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi , McGraw-Hill/Irwin 2008.

Reference Books

(a) Ian Sadler, Logistics and Supply Chain Integration, SAGE Publications, 2007

(b) Donald Waters, Supply Chain Management - An Introduction to Logistics, Bloomsbury Publishing, 2019.

(c) Dimitris Folinas, E-Logistics and E-Supply Chain Management-Applications for Evolving Business , IGI Global publications, 2013.

(d) Martin Christopher, Logistics Supply Chain Management, Pearson Education publications, 2016.

Evaluation Scheme:
Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

    i. Two term tests of 20 marks each will be conducted during the semester.

    ii. Total duration allotted for writing each of the paper is 1 hr.

    iii. Average of both the tests will be considered for final grading.

End Semester Examination (C):

    i. Question paper will be based on the entire syllabus summing up to 60 marks.

    ii. Total duration allotted for writing the paper is 2 hrs.

Semester Project -II (RCP23IPSC401)

Practical Scheme	**Examination Scheme**
Practical : 02 Hrs./week	Teacher Assessment : 25 Marks
Credit : 01	End Sem Exam : 25 Marks
	Total : 50 Marks

Course Pre-requisite:

   i. Electronic Devices and Circuits

  ii. Digital System Designs

 iii. Design Thinking

 iv. Semester Project-I

Course Objectives:
Students are expected to design, simulate/implement a project based on the knowledge acquired from current semester subjects.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Conduct a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	Demonstrate various/alternate approaches to complete a project.	L2	Understand
CO3	Ensure a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	Present their project work in the form of a technical report /paper and there by improve the technical communication skill	L3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	L2	Understand

Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the content of semester project report which is being submitted in partial fulfilment of the requirements of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject to the approval of the department committee and the Head of the department) shall be allotted for each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The departmental committee shall finalize one topic for every group. Semester Project Title or Theme should be based on knowledge acquired during semester. The project work shall involve sufficient work so that students get acquainted with different aspects of knowledge acquired from semester subjects.

Student is expected to:

- Select appropriate project title based on acquired knowledge from current semester subjects.
- Maintain Log Book of weekly work done(please see attached log book format).
- Report weekly to the project guide along with log book.

Assessment Criteria:

- At the end of the semester, after conformation by the project guide, each project group will submit project completion report in prescribed format for assessment to the departmental committee (including project guide)
- Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide)

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- Introduction
- Literature Survey
- Related Theory
- Implementation details

- Project Outcomes

- Conclusion

- References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment:

Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam:

Departmental committee (including project guide) will evaluate project as per Table 3.

Each group shall present/publish a paper based on the semester project in reputed/peer reviewed Conference/Journal/TechFest/Magazine/ before the end of the semester.

Table 1: Log Book Format

Sr	Week (Start Date:End Date)	Work Done	Sign of Guide	Sign of Coordinator
1				
2				

Table 2: Continuous Assessment Sheet

Sr	Exam Seat No	Name of Student	Student Attendance	Log Book Maintain	Literature Review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3: Evaluation Sheet

Sr	Exam Seat No	Name of Student	Project Selection	Design/ Simulation/ Logic	PCB/ hardware/ programming	Result Verification	Presentation	Total
			5	5	5	5	5	25

Design Thinking Laboratory (RCP23ILHSX02)

Practical Scheme

Practical : 02 Hrs./week

Credit   : 01

Examination Scheme

Term work : 25 Marks

Total : 25 Marks

Course Pre-requisite:

(a) Understanding of product/ process/ software/ service development life cycle.

(b) Knowledge of agile frameworks (or any similar iterative framework) would be added advantage but will not be mandatory.

Course Objectives

(a) To instill an innovative mindset in students to solve the digital-age business, societal and wicked type of problems using design thinking methods and tools, and its application.

(b) To equip students with techniques to empathize with user, ideate innovative and sustainable solutions for real world problems through iterative approach to design.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the importance of Human-Centric design approach for developing a solution.	L1	Understand
CO2	Generate innovative ideas to design sustainable solutions for real world problems.	L5	Synthesize
CO3	Apply design thinking principles to solve the real-world problems	L3	Apply

Course Contents

Unit-I Introduction to Design Thinking 06 Hrs.

Understanding the fundamentals of design thinking, Exploring the history and evolution of design thinking, The importance of empathy in the design thinking process. Conduct market industry research by observing and contextualizing various macro & micro trends. Case Study - conduct their own research on how Design Thinking helped solve some of the biggest and critical problems of our time.

Unit-II Empathize Phase 04 Hrs.

Techniques for conducting user research and gathering insights, Creating user personas and empathy maps, Practicing active listening and observation skills. To apply various empathizing techniques on the problem statement selected. Use walk-a-mile immersion and heuristic reviews to first empathize with end users and then to build empathy map and customer journey map.

Unit-III Define Phase 04 Hrs.

Defining problem statements and reframing challenges, Tools for synthesizing research findings, Developing a clear and actionable problem statement. Start building from Persona map and conduct interviews/ Gemba walk to plot users journeys from start to end. Define the problem space using HMW statement. Now highlight areas of opportunities in the journey map and enlist potential channels/touchpoints as well as stakeholders for proposed solution interventions.

Unit-IV Ideate Phase 04 Hrs.

Generating creative ideas through brainstorming sessions,Techniques for divergent and convergent thinking, Prototyping and experimenting with ideas. Apply suitable ideation technique to quickly generate diverse ideas that could be applied to target problem space ,either partially or in full. Brain Writing Build on each others ideas and constructively & creatively develop better ideas using SCAMPER technique.

Unit-V Prototype and Validation 06 Hrs.

Introduction to prototyping tools and techniques. - Rapid prototyping methods, Testing prototypes with users and gathering feedback, Refining solutions based on user insights. Develop user storyboard to layout solution proposition in visual and easily explainable form. Run a quick peer validation. peer-validated the storyboard. Build an interactive digital prototype using any digital rapid prototyping platform and seek user validation.

Unit-VI   Design Thinking for Strategic Innovation   02 Hrs.

Types of innovations, strategic innovation. Features of strategic innovation. Design thinking and strategic innovation. Practices of integrating design thinking in strategic innovation.

List of assignments/ activities during laboratory:

(a) Below is a list of assignments/ activities/ experiments that would be carried out by students as a mini project in groups consisting of 3-4 students.

(b) Problem statement for these assignments/ activities/ experiments will be provided by facilitator/ instructor/ faculty to the class (and teams/ batches within each class).

(c) This list of experiments will help students learn various design thinking methods and practice the corresponding tools available.

List of assignments/ activities during laboratory:

(a) To conduct market and industry research and analyze case studies demonstrating the application of design thinking. (Increased understanding of how design thinking has been applied to solve critical problems in various contexts.)

(b) To exercise empathizing techniques to understand the needs and pain points of a target audience.

(c) Developing empathy maps and customer journey maps based on collected insights.

(d) To exercise different tools and techniques (such as affinity diagrams, journey mapping, and user story mapping) for synthesizing research findings.

(e) Develop user personas to represent different user archetypes and their needs concerning the problem at hand.

(f) To practice the SCAMPER technique, Brainstorming, and brain-writing as a collaborative ideation technique to create multiple creative ideas/ solutions for the problem at hand.

(g) Create a mind map to generate a wide range of solutions to a problem at hand.

(h) To explore different prototyping tools and platforms, such as Adobe XD, Figma, Sketch, and In Vision.

(i) To Conduct rapid prototyping sessions to build low-fidelity / High fidelity prototypes based on the ideas generated in the Ideation phase and iterate based on feedback received.

(j) Develop a plan for implementing the final solution, considering factors like scalability and feasibility.

(k) Conduct usability testing to gather feedback on prototypes. Use A/B testing to compare different versions of a solution and determine which performs better.

Note: A minimum of five experiments from the above-suggested list or any other assignment based on the syllabus will be included, which would help the learner to apply the concept. The mini-project is mandatory.

Text Books

(a) I. Mootee, Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School Wiley, 2013.

(b) M. Lewrick, P. Link, and L. Leifer, The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems Wiley, 2018.

(c) T. Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press, 2010.

(d) K. T. Ulrich and S. D. Eppinger, Product Design and Development, McGraw-Hill Hill Education, 6th Edition, 2016.

(e) C. J. Meadows and C. Parikh, The Design Thinking Workbook: Essential Skills for Creativity and Business Growth, Emerald Publishing, 2022.

Reference Books

(a) T. Kelley and D. Kelley, Creative Confidence: Unleashing the Creative Potential Within Us All, HarperCollins Publisher, 2013.

(b) T. Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins, 2013.

(c) J. Knapp, J. Zeratsky, and B. Kowitz, Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days, Simon Schuster, 2016.

(d) A. Chakrabarti, Engineering Design Synthesis: Understanding, Approaches and Tools, Springer, 2002.

(e) K. Otto, and K. Wood, Product Design, Prentice Hall, 2000.

Online Reference

(a) Design and Innovation:https://openstax.org/books/entrepreneurship/pages/4-suggested-resources

(b) Overview of Design Thinking : https://www.interaction-design.org/literature/topics/design-thinking.

https://libhof.medium.com/10-models-for-design-thinking-f6943e4ee068

https://www.tcgen.com/design-thinking/

(c) Understand, observe and define the problem: https://www.nngroup.com/articles/empathy-mapping/

https://uxdesign.cc/the-purpose-of-a-journey-map-and-how-can-it-galvanize-action-9a628b7ae6e

(d) Ideation and prototyping: https://www.interaction-design.org/literature/topics/prototyping

https://www.uxmatters.com/mt/archives/2019/01/prototyping-user-experience.php

(e) Testing and implementation: https://www.nngroup.com/articles/usability-testing-101/

https://www.interaction-design.org/literature/article/test-your-prototypes-how-to-gather-feedback-and-maximise-learning

(f) Design thinking in various sectors: https://www.tutorialspoint.com/design

Web References

(a) Creative Engineering Design:https://nptel.ac.in/courses/107108010

(b) Understanding Creativity and Creative Writing :https://nptel.ac.in/courses/109101017

(c) Understanding Design Thinking People Centred Design: https://nptel.ac.in/courses/109104109

(d) Design Thinking - A Primer:https://nptel.ac.in/courses/110106124

(e) Product Engineering and Design Thinking:ttps://nptel.ac.in/courses/112105316

Evaluation Scheme:

Continuous Assessment (CA):

Term work= 25 Marks:
Shall comprise of:
Assignments (minimum 05) :15 marks
Mini Project (individual or in a group of 2-3 students): 10 marks

Universal Human Values (RCP23ICHSX04)

Teaching Scheme

Lectures: 03 Hrs./Week

Credit: 03

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Examination Scheme

Term Test: 20 Marks

Teacher Assessment: 20 Marks

End Sem Exam: 60 Marks

Total: 100 Marks

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Course Objectives

(a) To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.

(b) To help students initiate a process of dialog within themselves to know what they really want to be in their life and profession.

(c) To help students understand the meaning of happiness and prosperity for a human being.

(d) To facilitate the students to understand harmony at all the levels of human living and live accordingly.

(e) To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society	L2	Understand
CO2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.	L4	Analyze
CO3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society.	L2	Understand
CO4	Understand the harmony in nature and existence and work out their mutually fulfilling participation in the nature.	L2	Understand
CO5	Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious environment wherever they work.	L4	Analyze

Course Contents

Unit-I **Introduction** **04 Hrs.**

Understanding the need, basic guidelines, content and process for Value Education, Self-Explorationwhat is it? - its content and process; Natural Acceptance and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit-II **Understanding Harmony in the Human Being** **05 Hrs.**

Harmony in Myself Understanding human being as a co-existence of the sentient I and the material Body, Understanding the needs of Self (I) and Body. Understanding the Body as an instrument of I (I being the doer, seer and enjoyer), Understanding the characteristics and activities of I and harmony in I, Understanding the harmony of I with the Body; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Self-regulation and health.

Unit-III **Understanding Harmony in the Family and Society** **09 Hrs.**

Harmony in Human-Human Relationship : Understanding harmony in the Family- the basic unit of human interaction, understanding values in human-human relationship; meaning of Justice and program for its fulfilment. Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family

Unit-IV Understanding Harmony in the Nature and Existence 04 Hrs

Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

Unit-V   Implications of the above Holistic Understanding of Harmony on Professional Ethics   04 Hrs.

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

Text Books

(a) Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

Reference Books

(a) Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

(b) Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

(c) The Story of Stuff (Book).

(d) Mohandas Karamchand Gandhi, The Story of My Experiments with Truth.

(e) E. F Schumacher, Small is Beautiful.

(f) Cecile Andrews, Slow is Beautiful.

(g) J C Kumarappa, Economy of Permanence.

(h) Pandit Sunderlal, Bharat Mein Angreji Raj.

(i) Dharampal, Rediscovering India.

(j) Mohandas K. Gandhi, Hind Swaraj or Indian Home Rule.

(k) Maulana Abdul Kalam Azad, India Wins Freedom.

(l) Romain Rolland, Vivekananda(English).

(m) Romain Rolland, Gandhi(English).

Evaluation Scheme:

Continuous Assessment (A):
Subject teacher will declare Teacher Assessment criteria at the start of semester.
Continuous Assessment (B):

(a) Two term tests of 20 marks each will be conducted during the semester.

(b) Total duration allotted for writing each of the paper is 1 hr.

(c) Average of both the tests will be considered for final grading.

End Semester Examination (C):

(a) Question paper will be based on the entire syllabus summing up to 60 marks.

(b) Total duration allotted for writing the paper is 2 hrs.