RAMDEOBABA UNIVERSITY, NAGPUR–440013

Established by the Maharashtra Private Universities (Establishment and Regulation) Act 2023 (Mah. Act No VIII of 2024)
Formerly, Shri Ramdeobaba College of Engineering and Management, Nagpur 440013

School of Electrical and Electronics Engineering

Department of Electronics Engineering

PROGRAMME SCHEME & SYLLABI

of First Year as per National Education Policy (NEP)

(With effect from Academic Year 2026-27)

B.Tech. ELECTRONICS AND COMPUTER SCIENCE

Semester I

SN	Course Type	Code	Course	Hours/ week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	BSC	26EE01TP0101	Basic Electronics	4	2	5	20/25	30	50	25	150	3
2	BSC	26HS03TH0103	Probability and statistics	3	0	3	20	30	50	-	100	3
3	PCC	26EE01TP0102	Digital Logic Design	3	2	4	20/25	30	50	25	150	3
4	ESC	26EE01TP0103-1 / 26EE01TP0103-2	Python Programming / Fundamentals of Programming	4	2	5	20/25	30	50	25	150	3
5	AEC	26EE01TP0104	Design Thinking and Innovation	1	2	2	20/25	30	-	25	100	-
6	VSEC	26EE01PR0105-1 / 26EE01PR0105-2	C Programming Lab/ Python Programming Lab	0	2	1	25	-	-	25	50	-
7	CCA	26HS02PR0102-2 to 25	Liberal / Performing Art Lab	0	2	1	25	-	-	25	50	-
TOTAL				**15**	**12**	**21**						

Semester II

SN	Course Type	Code	Course	Hours / week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PCC	26EE01TH0201	Digital Signal Processing	3	0	3	20	30	50	-	100	3
2	BSC	26HS03TP0213	Calculus & Linear Algebra	3	2	4	20/25	30	50	25	150	3
3	PCC	26EE01TP0202	Object Oriented Programming with Java	3	2	4	20/25	30	50	25	150	3
4	ESC	26EE01TP0203-1 26EE01TP0203-2	AI and ML Essentials/Fundamentals of Artificial Intelligence	3	2	4	20/25	30	50	25	150	3
5	PCC	26EE01TH0204	Computer Architecture and Organization	3	0	3	20	30	50	-	100	3
6	VSEC	26EE01PR0205	Prompt Engineering	0	2	1	25	-	-	25	50	-
7	VSEC	26HS02TP0201	Foundations of Business English	2	2	3	20/25	30	50	25	150	2
8	AEC	26HS04PR0201	Health-Fitness-Wellbeing (HFW)	0	2	1	25	-	-	25	50	-
TOTAL				**17**	**12**	**23**						

Exit option: Award of UG Certificate with additional 8 credits			
Exit Courses			
1	IT Support Engineer	Online/Offline Certification Course	8
2	Web Designer		8
3	UI/UX Design		8

Semester III

SN	Course Type	Code	Course	Hours/ week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PCC	26EE01TP0301	Data Structures and Algorithm	3	2	4	20/25	30	50	25	150	3
2	PCC	26EE01TP0302	Database Management	3	2	4	20/25	30	50	25	150	3
3	PCC	26EE01TP0303	Machine Learning Engineering	3	2	4	20/25	30	50	25	150	3
4	PCC	26EE01TP0304	Foundation of Firmware Development	1	2	2	20/25	30	-	25	100	-
5	MDM	26EE01TH0305	MDM Course-I	3	0	3	20	30	50	-	100	3
6	OE	26EEOEC01TH0306	Open Elective- I	2	0	2	50		50	-	100	2
7	BSC	26HS01TP0301	Environmental Science	1	2	2	20/25	30	-	25	100	-
TOTAL				**16**	**10**	**21**						
8#	PEC	26EE01TP0502	Program Elective-I	3	2	4	20/25	30	50	25	150	3
9#	PRJ	26EE01PR0504	Capstone Project I	0	4	2	25	-	-	25	50	-

#Accelerated Degree Program

Semester IV

	Course Type	Code	Course	Hours / week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PCC	26EE01TP0401	Deep Learning	3	2	4	20/25	30	50	25	150	3
2	PCC	26EE01TP0402	Computer Network	3	2	4	20/25	30	50	25	150	3
3	PCC	26EE01TP0403	Embedded Hardware and Software	3	6	6	20/25	30	50	25	150	3
4	PCC	26EE01TP0404	Operating System	3	2	4	20/25	30	50	25	150	3
5	MDM	26EE01TH0405	MDM Course-II	3	0	3	20	30	50	-	100	3
6	OE	26EEOEC01TH0406	Open Elective- II	2	0	2	50	-	50	-	100	2
7	VSEC	26EE01PR0407	Algorithmic Problem Solving -I	0	2	1	25	-	-	25	50	-
8	AEC	26HS04PR0401	Self Defence and Indian Martial Art	0	2	0	25	-	-	25	50	-
TOTAL				**17**	**16**	**24**						
9#	PEC	26EE01TP0602	Program Elective-II	3	2	4	20/25	30	50	25	150	3
10#	PRJ	26EE01PR0606	Capstone Project	0	4	2	25	-	-	25	50	-

Accelerated Degree Program

Exit option: Award of UG Diploma with additional 8 credits			
Exit Course			
1	Android Application Development	Online/Offline Certification Course	8
2	Python Programming		8
3	PCB Design		8

Semester V

SN	Course Type	Code	Course	Hours /week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PCC	26EE01TP0501-1/ 26EE01TP0501-2	Computer Vision / Firmware Development Testing and Validation	3	6	6	20/25	30	50	25	150	3
2	PEC	26EE01TP0502	Program Elective-I	3	2	4	20/25	30	50	25	150	3
3	PCC	26EE01TP0503-1/ 26EE01TP0503-2	Natural Language processing /Internet of Things/	3	2	4	20/25	30	50	25	150	3
4	PRJ	26EE01PR0504	Capstone Project I	0	4	2	25	-	-	25	50	-
5	MDM	26EE01TH0505	MDM Course-III	3	0	3	20	30	50	-	100	3
6	OE	26EEOEC01TH0506	Open Elective-III	2	0	2	50		50	-	100	2
TOTAL				**14**	**14**	**21**						
8#	PEC	26EE01TP0702	Program Elective-III	3	2	4	20/25	30	50	25	150	3
9#	VSEC	26EE01PR0706	*Participative Learning	0	2	1	25	-	-	25	50	-
10#	AEC	26HS02TP0701	Business Communication	1	2	2	10/25	15	25	25	100	-

#Accelerated Degree Program

Semester VI

SN	Course Type	Code	Course	Hours/ week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PCC	26EE01TP0601-1/ 26EE01TP0601-2	Multimodal AI and Language Visual Models / Edge AI	3	2	4	20/25	30	50	25	150	3
2	PEC	26EE01TP0602	Program Elective-II	3	2	4	20/25	30	50	25	150	3
3	PCC	26EE01TP0603-1/ 26EE01TP0603-2	Applied Large Language Model Development and Deployment /Firmware Application/	3	6	6	20/25	30	50	25	150	3
4	VSEC	26EE01PR0604	Algorithmic Problem solving-II	0	2	1	25	-	-	25	50	-
5	MDM	26EE01TH0605	MDM-IV	3	0	3	20	30	50	-	100	3
6	VEC	26HS02TH0601	Foundational Course in Universal Human Values	1	0	1	25	15	-	10	50	-
7	PRJ	26EE01PR0606	Capstone Project -II	0	4	2	25	-	-	25	50	-
TOTAL				**13**	**16**	**21**						
8#	PEC	26EE01TH0802	Program Elective-V	3	0	3	20	30	50	-	100	3
9#	VEC	26EE01TH0804	Cyber Laws and ethics in IT	2	0	2	20	30	50	-	100	2

#Accelerated Degree Program

Exit option: Award of BSc Degree with additional 8 credits			
Exit Course			
1	TBI/Industry/Research Internship	Online/offline Certification Course	8
2	AI & ML on Cloud Platform		8
3	HLS Design		8

Semester VII

SN	Course Type	Code	Course	Hours/week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PCC	26EE01TP0701-1 /26EE01TP0701-2	Explainable AI /Smart Sensor Networks and Edge Gateways	4	2	5	20/25	30	50	25	150	3
2	PEC	26EE01TP0702	Program Elective-III	3	2	4	20/25	30	50	25	150	3
3	PEC	26EE01TP0703	Program Elective-IV	3	2	4	20/25	30	50	25	150	3
4	PRJ	26EE01PR0704	BEST Centre Project	0	6	3	25	-	25	-	50	2
5	FP	26EE01PR0705	Internship Evaluation	0	2	0	25	-	-	25	50	-
6	VSEC	26EE01PR0706	*Participative Learning	0	2	1	25	-	-	25	50	-
7	AEC	26HS02TP0701	Business Communication	1	2	2	10/25	15	25	25	100	-
TOTAL				**11**	**18**	**19**						
8#	PRJ	26EE01PR0801	Project	0	6	3	25	-	-	25	50	-
9#	IKS	26HS02TH0801	Foundational Literature of Indian Civilization	1	0	1	25	15	--	10	50	-
10#	HSSM	26EE01TH0803	Finance and Project Management	3	0	3	20	30	50	-	100	3

#Accelerated Degree Program

***Floating Credit: To be acquired before VI Semester**

Semester VIII

SN	Course Type	Code	Course	Hours / week			Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks	ESE Duration (Hrs)
				L	P	C						
1	PRJ	26EE01PR0801	Project	0	6	3	25	-	-	25	50	-
2	PEC	26EE01TH0802	Program Elective-V	3	0	3	20	30	50	-	100	3
3	IKS	26HS02TH0801	Foundational Literature of Indian Civilization	1	0	1	25	15	--	10	50	-
4	HSSM	26EE01TH0803	Finance and Project Management	3	0	3	20	30	50	-	100	3
5	VEC	26EE01TH0804	Cyber Laws and ethics in IT	2	0	2	20	30	50	-	100	2
TOTAL				**9**	**6**	**12**						
OR												
1	Internship	26EE01PR0804	Industry Internship / TBI Internship / Research Internship	0	24	**12**	50	-	-	50	100	-
TOTAL				**0**	**24**	**12**						

HONORS Specialization in DevOps Engineering

SN	Sem	Code	Course	Hours /week		C	Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks
				L	P						
1	III	26EE01HT0301-2	Introduction to DevOps and Version Control	3	0	3	20	30	50		100
2	IV	26EE01HT0401-2	Continuous Integration and Continuous Delivery (CI/CD)	3	0	3	20	30	50		100
3	V	26EE01HT0501-2	Containerization and Orchestration	4	0	4	20	30	50		100
4	VI	26EE01HT0601-2	Cloud Infrastructure and Automation	4	0	4	20	30	50		100
5	VII	26EE01HP0701-2	Project	0	8	4	25		50	25	100
TOTAL				14	8	18					

HONORS Specialization in Research

SN	Sem	Code	Course	Hours /week		C	Internal Evaluation (Th/Lab)	Mid Sem Exam (Th)	End Sem Exam (Th)	Continuous Evaluation (Lab)	Total Marks
				L	P						
1	V	26EE01HT0501-3	Research Methodology / MOOC's	3	0	3	20	30	50	-	100
2	VI	26EE01HP0601-3	Research Project Phase -I	0	6	3	25	-	-	25	50
3	VII	26EE01HP0701-3	Research Project Phase-II	0	24	12	25	-	-	25	50
TOTAL				**3**	**30**	**18**					
				33 Hrs.							

Program Elective Basket

Specialization	Program Elective-I (V Sem)	Program Elective-II (VI Sem)	Program Elective-III (VII Sem)	Program Elective-IV (VII Sem)	Program Elective-V (VIII Sem)
AIML (for ECS)	26EE01TP0502-1	26EE01TP0602-1	26EE01TP0702-1	26EE01TP0703-1	26EE01TH0802-1
	NLP	LLM & Generative AI System	Computer Vision	Multimodal AI System Development	Agentic AI
VLSI Design	26EE01TP0502-2	26EE01TP0602-2	26EE01TP0702-2	26EE01TP0703-2	26EE01TH0802-2
	Digital System Design	Advanced Digital System Design	System Verification	SOC Design	Design for Testability
Cloud Computing	26EE01TP0502-3	26EE01TP0602-3	26EE01TP0702-3	26EE01TP0703-3	26EE01TH0802-3
	Cloud Fundamentals	Distributed Systems	Big Data Analytics	Cloud Security	Cloud-Native Application Development

Multidisciplinary Minor (MDM) Track-1: Integrated Circuit Design (IC design)

Sr. No.	Semester	Course Code	Course Name
1	III	26EE01TH0305-1	Basics of Chip Design using Verilog HDL
2	IV	26EE01TH0405-1	MIPS Processor Design and Testing
3	V	26EE01TH0505-1	Chip Verification using System Verilog
4	VI	26EE01TH0605-1	VLSI Physical Design

Multidisciplinary Minor (MDM) Track-2: IoT for Environmental Sustainability

Sr. No.	Semester	Course Code	Course Name
1	III	26EE01TH0305-2	Introduction to IoT system Design
2	IV	26EE01TH0405-2	Programming for Environmental IoT
3	V	26EE01TH0505-2	IoT Privacy and Security
4	VI	26EE01TH0605-2	Use cases of Environmental IoT

SYLLABUS OF SEMESTER I

Course Code	26EE01TP0101			
Category	Basic Science Course			
Course Title	Basic Electronics			
Scheme & Credits	L	P	Credits	Semester
	4	2	5	I

Course Outcomes

On successful completion of the course, students will be able to

1. Apply the knowledge of basic laws to analyze simple DC circuits.
2. Design and analyze simple diode and transistor circuits.
3. Design amplifiers and switching circuits with diodes, BJTs, and MOSFETs for signal processing and power applications
4. Build operational amplifier circuits for signal conditioning, arithmetic operations, and advanced analog applications

Syllabus

Module I: (7 hours)

Basic circuit elements and RLC Circuit: circuit elements resistor, inductor and capacitor, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel circuits excited by independent voltage sources; energy sources, dependent sources, star- delta transformation.

Module II: (7 hours)

Semiconductors and p-n junction diode: Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Current flow in semiconductors, diffusion and drift, p-n junction diode, forward bias, reverse bias, Applications of diode

Module III: (7 hours)

Bipolar Junction Transistor: Introduction, Input / Output Characteristics, BJT as an Amplifier and Switch

Module IV: (7 hours)

MOSFET: Introduction, Input / Output Characteristics, AC/DC load line concept, Operating Point Analysis, biasing techniques, bias stabilization, Application of MOSFET, compensation techniques

Module V (7 hours)

Operational Amplifiers (Op-Amps): Introduction, Characteristics, Inverting and Non-Inverting Amplifiers, Summing and Difference Amplifiers, Cascaded Op-Amp Stages, Comparator and Instrumentation Amplifier, Non-Ideal Op-Amp

Textbooks

1. Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar: Microelectronic Circuits: Theory and Applications: Seventh Edition, Oxford University Press, 2017.

Re**ference Books**

1. Donald Neamen "Electronic Circuits: Analysis and Design" Third Edition, McGraw-Hill Publication
2. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 10th Edition, Pearson Education, 2009
3. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education India Publications.

LIST OF EXPERIMENTS:

1. To identify basic electronic components and understand the operation and handling of laboratory instruments such as CRO, DSO, Digital Multimeter (DMM), DC Power Supply, Resistors, Capacitors, Diodes, LEDs, and Transistors.

2. To implement simple DC circuits on breadboard and verify Ohm's Law, Kirchhoff's Voltage Law (KVL), and Kirchhoff's Current Law (KCL).

3. To plot the V-I characteristics of a p-n junction and Zener diode.

4. Implementation of Half-Wave and Full-Wave (Bridge) Rectifiers on a breadboard and observation of output waveforms on the CRO.

5. To study and analyze the input/output characteristics of Bipolar Junction Transistor (BJT).

6. To study and analyze the input/output characteristics of Enhancement Type MOSFET (n-channel and p-channel).

7. Implementation of Inverting and Non-Inverting Amplifiers using the IC 741 Operational Amplifier.

8. Implementation and verification of an Adder (Summing Amplifier) and a Subtractor (Difference Amplifier) circuit.

9. Design the PCB layout of a simple electronic circuit using PCB design software such as KiCad, Proteus, or EasyEDA and apply basic PCB layout and routing techniques.

10. Fabricate the designed PCB and perform component mounting and soldering and test the implemented circuit for proper operation.

Course Code	26HS03TH0103			
Category	Basic Science Course			
Course Title	Probability and statistics			
Scheme & Credits	L	P	Credits	Semester
	3	0	3	I

Course Outcomes:

On successful completion of the course, student shall be able to

1. Identify and differentiate between discrete and continuous random variables, and interpret probabilities obtained from standard probability distributions.
2. To Analyze and interpret stochastic models, including calculating probabilities, transition probabilities, and steady-state probabilities within stochastic systems.
3. Grasp the fundamental concepts of curve fitting like regression techniques, model selection, and the use of different types of curves or functions to approximate data.
4. Explain the fundamental concepts of hypothesis testing, including significance levels, p-values, and the underlying logic of hypothesis testing.
5. To apply MLE to various statistical models, such as linear regression, exponential distribution, etc.

Syllabus:

Module 1(8 hours)

Measure of central tendency, quartile, inter quartile range and outliers**,** Probability spaces, conditional probability, independence, Discrete random variables, Continuous random variables, Expectation and variances, Binomial distribution, Poisson distribution, Normal distribution and their applications.

Module 2:(7 Lectures)

Joint probability function, Introduction to stochastic process, random walk, stationary and auto regressive process, transition probability Matrix, Discrete time Markov chain and its applications in queueing problems.

Module 3: (**7 hours)**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation, Multiple regression and correlation and its application in analysis of data.

Module 4: (7 Lectures)

Sampling Distributions, Point and Interval Estimations, Testing of Hypothesis for single mean and proportion.

Module 5: (7 Lectures):

Testing of Hypothesis for difference of mean and proportion, Test for ratio of variances - Chi-square test for goodness of fit and independence of attributes, maximum likelihood estimation

Text Books:

1. M R. Spiegal , Theory and Problems of probability and statistics :,2nded :,Schaum series
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Reference Books:

1. MaurtisKaptein, Statistics for data science, An introduction to probability, statistics and Data Analysis, Springer 2022.
2. Jay L Devore, Probability and Statistics for Engineering and sciences, 8th edition, Cenage learning.

Course Code	26EE01TP0102			
Category	Programme Core Course			
Course Title	Digital Logic Design			
Scheme & Credits	L	P	Credits	Semester
	3	2	4	I

Course Outcomes

Course Outcomes

Upon the completion of this course, students will demonstrate the ability to

CO1: Apply number systems, Boolean algebra, and logic simplification techniques.

CO2: Design and analyze combinational logic circuits.

CO3: Design and analyze sequential logic circuits.

CO4: Design finite state machines using Moore and Mealy models.

Module-I (9 Hours)

Introduction, Number System, Boolean Algebra, Combinational function minimization – K Map, Boolean identities, Logic Gates, Logic families and Timing issues in digital circuits.

Module-II (6 Hours)

Combinational Circuits: Arithmetic circuits, Code converters, Multiplexers, Demultiplexers, Decoders, Encoders, Comparators

Module-III (6 Hours)

Sequential Circuits - Latches and Flip-flops: JK, SR, D, T Flip-flops, level triggered and edge triggered, Master Slave Flip-flop, Flip-flop conversion, timing analysis.

Module-IV (8 Hours)

Counters: Asynchronous and Synchronous Design, Shift Registers

Module-V (6 Hours)

Finite State Machines: Moore and Mealy machine.

Textbooks

1. Digital Design – M. Morris Mano & Michael D. Ciletti (Pearson), 2017, 6th Edition
2. Digital Fundamentals – Thomas L. Floyd (Pearson), 2015, 11th Edition

Reference Books

1. Digital Principles and Applications – Malvino, Leach & Saha (McGraw-Hill), 2014
2. Digital Systems: Principles and Applications – Tocci, Widmer & Moss (Pearson), 2017
3. Digital Logic and Computer Design – M. Morris Mano (Pearson), 2016

List of Experiment:

1. Study and Verification of Logic Gates and Implementation of Boolean Functions using Universal Gates.
2. Study of Logic Families and measurement of Propagation Delay using Digital ICs.
3. Minimization of Boolean Expressions using K-Maps and Implementation of Simplified Circuits.
4. Design and Implementation of 4-bit Parallel Adder/Subtractor.
5. Design and Implementation of 4:1 Multiplexer using 2:1 Multiplexers.
6. Design and Verification of Code Converter (BCD ↔ Excess-3).
7. Conversion of SR Flip-Flop to JK Flip-Flop and Timing Analysis of Flip-Flops.
8. Design and Implementation of Mod-6 Synchronous Counter using Flip-Flops.
9. Design and Implementation of Shift Registers (SISO, SIPO, PISO, PIPO) and Sequence Generation.
10. Design and Implementation of Finite State Machine (Moore and Mealy) for Sequence Detector.

Course Code	26EE01TP0103-1			
Category	Engineering Science Course			
Course Title	Python Programming			
Scheme & Credits	L	P	Credits	Semester
	4	2	5	I

Upon successful completion of the course, students will be able to:
CO1: Demonstrate understanding of Python programming fundamentals, including data types, variables, operators, control structures, and functions.
CO2: Develop Python programs using modular programming concepts and built-in libraries to solve computational problems.
CO3: Apply object-oriented programming concepts, exception handling, file handling, and regular expressions to build reliable software applications.
CO4: Design and develop GUI-based and web-based applications using Python tools and frameworks.

Syllabus:
Module 1: Introduction to Python Programming (8Hrs)
Python Fundamentals, Python Basics Variables and Data Types, Operators and Expressions, Input and Output Operations, Control Statements: Conditional Statements (if, elif, else), Switch-Case (if-elif-else), Loops (For, While, For loops)

Module 2: Object-Oriented Programming (OOP) in Python (9 Hrs)

OOP Principles: lasses and Objects, Inheritance and Polymorphism, Encapsulation and Abstraction
Advanced OOP Concepts: Constructors and Destructors, Method Overloading and Overriding, Class Variables and Instance Variables

Module 3: Error Handling, Exception Handling and Libraries (9 Hrs)

Exception Handling: Common Built-in Exceptions, Handling Exceptions with try and except, Custom Exceptions, File Handling (I/O), Regular Expressions: Introduction to Regular Expressions, Pattern Matching and Text Processing, Regular Expressions, Modules and Libraries: Creating and Using Modules, Third-party Libraries and Packages

Module 4: Graphical User Interfaces (GUI) and Web Programming (9 Hrs)

GUI Development: Introduction to GUI Programming, Widgets and Event Handling, Creating Widgets (Buttons, Labels), Handling User Events (Clicks, Input), Web Programming with CGI: Introduction to CGI, CGI in Web Development, Handling HTTP Requests, Building Interactive Web Applications, Implementing Data Processing

Module 5: Python Applications (10 Hrs)

Networking and Serialization, Networking Basics in Python, Networking Protocols, Creating Client and Server Sockets, Socket Programming, Serialization (JSON and Pickle), Data Processing and Analysis: Introduction to NumPy and Pandas, Data Manipulation with NumPy, Array Operations and Manipulation, Data Analysis with Pandas, Database Applications, SQL Queries and Database Operations, Building Database-driven Applications

Text Books

1. Reema Thareja, Python Programming: Using Problem Solving Approach, 2nd Edition, Oxford University Press, 2023.
2. R. Nageswara Rao, Core Python Programming, 2nd Edition, Dreamtech Press, 2019.
3. E. Balagurusamy, Introduction to Computing and Problem-Solving Using Python, 1st Edition, McGraw Hill Education, 2016.

Reference Books

1. Mark Lutz, Learning Python, 5th Edition, O'Reilly Media, 2013.
2. Eric Matthes, Python Crash Course, 3rd Edition, No Starch Press, 2023.

3. Allen B. Downey, Think Python, 2nd Edition, O'Reilly Media, 2016.

Experiment List:

Lab Exercises 1 -

Hello, World! Program

Write a Python program that prints "Hello, World!" to the console.

Interactive Mode Basics

Use Python's interactive mode to perform basic arithmetic operations like addition, subtraction, multiplication, and division.

User Input and Display

Create a Python script that takes user input for their name and displays a personalized greeting.

Calculate Rectangle Area

Write a Python program that calculates and prints the area of a rectangle. Prompt the user for the length and width.

Temperature Conversion

Create a Python script that converts a temperature from Fahrenheit to Celsius. Prompt the user for the temperature in Fahrenheit and display the result in Celsius.

Lab Exercises 2-

Even or Odd Checker

Implement a Python program that checks if a given number is even or odd and prints the result.

Largest among Three Numbers

Write a Python script that finds and prints the largest among three numbers entered by the user.

Factorial Calculation with a While Loop

Create a Python program that calculates and prints the factorial of a number entered by the user using a while loop.

Fibonacci Sequence with For Loop

Use a for loop to generate and print the Fibonacci sequence up to a specified number of terms. Prompt the user for the number of terms.

Sum of Prime Numbers

Write a Python program that calculates and prints the sum of all prime numbers in a given range. Prompt the user for the range.

Lab Exercises 3

Simple Calculator Class

Define a Python class for a simple calculator that has methods for addition and subtraction. Allow the user to perform calculations using objects of this class.

Class Inheritance Hierarchy

Create a class hierarchy with a base class and two derived classes. Demonstrate inheritance by accessing attributes and methods of each class.

Lab Exercises 4

Method Overriding

Implement method overriding in a Python class. Create a base class with a method and override it in a derived class.

Encapsulation Demonstration

Use encapsulation to restrict access to class attributes. Create a class with private attributes and demonstrate encapsulation principles.

Abstract Geometric Shape Class

Create an abstract class representing a geometric shape with abstract methods like area and perimeter. Define derived classes (e.g., Circle, Rectangle) to implement these methods.

Lab Exercises 5

Custom Exception Handling

Write a Python program that raises and handles a custom exception. Define a custom exception class and demonstrate its usage.

File Exception Handling

Implement a function that reads data from a file and handles file-related exceptions such as FileNotFoundError and

PermissionError.

Division by Zero Handling

Create a Python program that simulates division by zero and handles the ZeroDivisionError exception gracefully.

File Handling with Multiple Exceptions

Modify a file reading program to handle both FileNotFoundError and PermissionError exceptions.

Finally Block Usage

Develop a program that demonstrates the use of the finally block in exception handling. Open a file and ensure it is properly closed even if exceptions occur.

Lab Exercises 6

Email Validation with Regular Expressions

Write a Python program that validates email addresses using regular expressions. Prompt the user for an email address and validate it.

Phone Number Extraction

Create a Python script that extracts phone numbers from a given text using regular expressions.

Custom Python Module

Develop a Python module with functions to perform basic arithmetic operations. Import this module into another script and use its functions.

Exploring Built-in Modules

Explore Python's built-in modules like math and datetime. Use them to perform mathematical operations and work with date and time.

Lab Exercises 7

Simple tkinter GUI

Design a simple tkinter GUI application with buttons and labels. Implement functionality to update labels when buttons are clicked.

GUI Button Actions

Create a Python program that responds to user button clicks in a tkinter GUI. Perform actions like displaying messages when buttons are clicked.

HTML Form Handling

Build an HTML web form with input fields and a submit button. Create a Python CGI script to handle form submissions and display the entered data.

Form Data Validation

Extend the previous exercise to validate form data in the Python CGI script. Check for required fields and display validation messages.

Dynamic Web Content with CGI

Implement a Python CGI script that generates dynamic web content based on user requests. Create a simple web application that displays different content based on URL parameters.

Lab Exercises 8

Client-Server Communication

Create a simple client-server program using socket programming in Python. Implement basic communication between the client and server.

Enhanced Client-Server Communication

Extend the client-server program to support data transfer between the client and server. Implement sending and receiving data between the two.

JSON Serialization and Deserialization

Serialize Python objects into JSON format and then deserialize them back into Python objects. Demonstrate data interchange between JSON and Python.

Pickle Serialization

Use Pickle to serialize and deserialize Python objects. Save Python objects to a file using Pickle and then load them back.

Networked Data Exchange

Develop a Python script that simulates data exchange over a network using sockets and serialization. Send and receive data between client and server.

Lab Exercises 9

Basic NumPy Operations

Create a NumPy array and perform basic operations like addition, subtraction, multiplication, and division.

Data Filtering and Selection

Implement data filtering and selection using NumPy arrays. Filter data based on specific conditions and criteria.

Data Analysis with Pandas

Use Pandas to read data from a CSV file and perform data analysis. Calculate statistics like mean, median, and standard deviation on the dataset.

Lab Exercises 10

Data Frame Manipulation

Explore Data Frame manipulation in Pandas. Sort, filter, and perform various operations on a dataset loaded into a Data Frame.

Database CRUD Operations

Connect to a SQLite database in Python and perform CRUD (Create, Read, Update, Delete) operations using SQL queries. Create a Python script that interacts with a database.
that interacts with a database.

Course Code	26EE01TP0103-2			
Category	Engineering Science Course			
Course Title	Fundamentals of Programming			
Scheme & Credits	L	P	Credits	Semester
	4	2	5	I

Course Outcomes
On successful completion of the course, students will be able to
CO1: Apply and Implement Fundamental Programming Constructs
CO2: Analyze and Design Solutions Using Advanced Data Structures
CO3: Evaluate and Optimize Program Performance Through Algorithmic Techniques
CO4: Design and Develop Object-Oriented Solutions Using C++

Module I: Fundamentals of C Programming (10 hours)
Evolution and features of C language, Structure of a C program, Compilation and execution process, Writing, compiling, and running a simple C program, Basic data types: int, float, double, char, Type modifiers: signed, unsigned, short, long, Variable declaration and initialization, Constants and literals
Input/output functions: printf(), scanf(), Arithmetic operators, Relational and logical operators, Assignment operators, Increment and decrement operators, Bitwise operators, Conditional (ternary) operator, Operator precedence and associativity, Decision making: if, if-else, nested if-else, else-if ladder, Switch-case statement, Looping constructs: for, while, do-while, Nested loops, Break, continue, and goto statements

Module II: Functions and Storage Classes (10 hours)
Introduction to functions and modular programming, Function declaration, definition, and calling, Function arguments and return values, call by value and call by reference, Function prototypes
Library functions vs. user-defined functions, Concept of recursion, Recursive vs. iterative approach
Applications: factorial, Fibonacci series, Tower of Hanoi, Advantages and limitations of recursion,
Automatic (auto) storage class, External (extern) storage class, Static storage class, register storage class, Scope and lifetime of variables, Introduction to arrays, One-dimensional arrays: declaration, initialization, and accessing, Basic array operations

Module III: Advanced Topics (10 hours)
Two-dimensional arrays, Matrix operations: addition, multiplication, transpose, Multidimensional arrays, Passing arrays to functions, String declaration and initialization, String input/output functions
String manipulation functions: strlen(), strcpy(), strcat(), strcmp(), Array of strings, Introduction to pointers and memory addressing, Pointer declaration and initialization, Pointer operators: *(indirection) and & (address-of), Pointer arithmetic, Pointers and arrays, Pointers and functions
Pointer to pointer, Introduction to structures, Structure declaration and initialization, Accessing structure members, Array of structures, Structures and functions, Nested structures, Pointers to structures

Module IV: Introduction to C++ and Object-Oriented Programming (10 hours)
Evolution of C++ and comparison with C, Object-oriented programming concepts: encapsulation, abstraction, polymorphism, inheritance, Structure of a C++ program, Basic input/output: cin, cout, cerr, Namespace and scope resolution operator, Reference variables and const keyword, Inline functions and function overloading, Introduction to classes and objects, Class declaration and definition, Access specifiers: private, public, protected, Member functions and data members
Creating and accessing objects, Constructors: default, parameterized, copy constructor, Destructors
Static members and friend functions, this pointer, Concept of operator overloading, overloading unary operators, Overloading binary operators, Rules and restrictions for operator overloading, Type conversion in C++, Concept of inheritance and code reusability, Types of inheritance: single, multiple, multilevel, hierarchical, hybrid, Base class and derived class, Access control in inheritance,
Constructor and destructor in derived classes, Virtual base classes and Function overriding

Module V: Problem-Solving and Practice (10 hours)

This unit focuses on applying the concepts learned in Units 1-4 through hands-on problem-solving on the

LeetCodeplatform. Students will work through 20 carefully selected problems that progressively build problem-solving skills and reinforce programming concepts.

References and Resources

Textbooks for C Programming:

1. Kernighan, B. W., & Ritchie, D. M. (1988). The C Programming Language (2nd ed.). Prentice Hall.
2. Balagurusamy, E. (2019). Programming in ANSI C (8th ed.). McGraw Hill Education.
3. Kanetkar, Y. (2020). Let Us C (17th ed.). BPB Publications.

Textbooks for C++ Programming:

4. Balagurusamy, E. (2017). Object-Oriented Programming with C++ (7th ed.). McGraw Hill Education.
5. Lafore, R. (2002). Object-Oriented Programming in C++ (4th ed.). Pearson Education.
6. Stroustrup, B. (2013). The C++ Programming Language (4th ed.). Addison-Wesley.

Online Resources for Problem Solving:

7. LeetCode Platform - https://leetcode.com/
8. GeeksforGeeks - Data Structures and Algorithms tutorials
9. HackerRank - Programming challenges and competitions

Reference Books:

10. Gottfried, B. S. (2010). Programming with C (3rd ed.). Tata McGraw Hill.
11. Forouzan, B. A., & Gilberg, R. F. (2007). Computer Science: A Structured Programming Approach Using C (3rd ed.). Cengage Learning.
12. Deitel, P., & Deitel, H. (2015). C: How to Program (8th ed.). Pearson.
13. Deitel, P., & Deitel, H. (2016). C++ How to Program (10th ed.). Pearson.
14. Lippman, S. B., Lajoie, J., & Moo, B. E. (2012). C++ Primer (5th ed.). Addison-Wesley.
15. Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to Algorithms (3rd ed.). MIT Press.

List of Experiments

1) Write a C program that accepts two numbers from the user, performs all arithmetic operations (addition, subtraction, multiplication, division, and modulus), and displays the results with appropriate labels.

2) Write a C program to create a simple calculator that accepts two numbers and an operator (+, -, *, /, %) from the user. Use switch-case to perform the operation and display the result. Also, implement a grade calculator that accepts marks and displays the grade (A, B, C, D, F) using if-else statements.

3) Write C programs to:
(a) Print the Fibonacci series up to n terms,
(b) Check if a number is prime,
(c) Print a pyramid pattern of stars with n rows,
(d) Calculate the factorial of a number using different loop types.

4) Create a menu-driven program with functions to:
(a) Find the largest of three numbers,
(b) Check if a number is Armstrong number,
(c) Calculate nCr (combination),
(d) Convert decimal to binary.
Use function prototypes and implement each operation as a separate function.

5) Write recursive functions to:
(a) Calculate factorial of a number,
(b) Generate Fibonacci series,
(c) Solve Tower of Hanoi problem,
(d) Find GCD of two numbers using Euclidean algorithm.
Compare execution time with iterative versions for factorial and Fibonacci.

6) Write C programs to:
(a) Find the largest and smallest elements in an array,
(b) Implement linear search and binary search,
(c) Sort an array using bubble sort,
(d) Perform matrix addition and multiplication for two matrices,
(e) Find the transpose of a matrix.

7) Write C programs to:
(a) Find the length of a string without using strlen(),
(b) Copy one string to another without using strcpy(),
(c) Concatenate two strings without using strcat(),
(d) Check if a string is palindrome,
(e) Count vowels and consonants in a string,
(f) Sort an array of strings alphabetically.

8) Write C programs to:
(a) Swap two numbers using pointers (call by reference),
(b) Find the largest element in an array using pointers,
(c) Reverse an array using pointers,
(d) Implement a function to sort an array using pointers,
(e) Demonstrate pointer to pointer concept with examples.

9) Create a student management system using structures that:
(a) Stores information of n students (roll number, name, marks in 3 subjects),
(b) Calculates total and percentage for each student,
(c) Finds the student with highest percentage,
(d) Sorts students by roll number,

(e) Searches for a student by name.
Use array of structures and appropriate functions.

10) Create a C++ program for a bank account management system:
(a) Define a class Account with data members (account number, name, balance) and member functions (deposit, withdraw, display),
(b) Implement constructors (default and parameterized) and destructor,
(c) Create a derived class Savings Account that inherits from Account and adds interest calculation,
(d) Demonstrate operator overloading by overloading + operator to transfer amount between accounts.

Course Code	26EE01TP0104			
Category	Ability Enhancement Course			
Course Title	Design Thinking and Innovation			
Scheme & Credits	L	P	Credits	Semester
	1	2	2	I

Course Outcomes:
Upon successful completion of this course, learners will be able to:
CO1: Apply the Design Thinking process to identify, analyze, and define real-world problems through user research, empathy mapping, and persona development.
CO2: Generate, evaluate, and prioritize innovative solution ideas using brainstorming and other ideation techniques.
CO3: Develop and test prototypes of design solutions by incorporating user feedback to improve functionality and user experience.
CO4: Communicate and present design concepts, prototypes, and outcomes effectively to stakeholders using appropriate presentation techniques.

Syllabus:
Module I. Introduction and Background of Design Thinking
Introduction, Knowing the team and course, The strategy of Innovation in design thinking. Why is Design Thinking required? Industries in Design Thinking, what is Design Thinking? Design thinking is a way of thinking. Design Thinking Tips and Anecdotes, Design Thinking Mindset Design thinking vs Scientific approach, Analysis vs. Synthesis in design thinking, Divergent Thinking vs. Convergent Thinking in design thinking, key phases of the design thinking process, Case Studies on Design thinking, Fundamentals of Design Thinking, Stages of Design Thinking, Design Thinking Skills, The process of Design Thinking, Design thinking framework, Why Design Thinking Works, Incorporating design thinking into your work, Limitations of a design thinking process, Advantages of the design thinking approach, Examples of design thinking success, Planning a Design Thinking Project, Benefits of the design thinking approach, Applications of design thinking.

Module II. Getting started with Problem Statement
Introduction What is a Problem Statement? Initial questions, Case Studies, Problem Clarification, Role of the Stakeholders, Activities for Problem Clarification, Point-Of-View (POV) in Design Thinking, Empathy Map, Understand and Define Problem Statement, Problem Analysis, Root Cause analysis tools, Defining Metrics, Persona Identification, User Personas, Stakeholder Map, who are Stakeholders? What is their role? Stakeholders of Few Companies, Creating a Stakeholder Map, Example Scenarios, Dos and Don'ts During Problem statement identification, Reformulation of the Problem.

Module III. Identifying real problem
Introduction, what is a Design Thinking Problem Statement? steps to create a design thinking problem statement, Learn Why and How to Focus on User Problem, Observation Phase, The Power to Observe, Useful Instrument for Observation Sessions, Tips for Observing, Practice problem Identification using Empathetic Design, Methods for Empathetic Design, Inquiry Vs. Observation, Learn As -is-state, Practice problem Identification using As-is-state long answer, Point-of-View phase for defining a problem, Characterizing the target group, Top of Form, Description of customer needs.

Module IV. Deliver on Big Idea: Ideation and Prioritization
Introduction, Ideation Phase, The Ideation Funnel, Divergent and Convergent Thinking, Techniques for Clearing the Mind, The creative process and creative principles, Understanding Creativity, Creative Principles, Creativity Techniques, Brainstorming, Example of a Brainstorming Session, Mind Mapping, SCAMPER, Random Word Association, Rapid Prototyping / Design Sprint, Learn various Idea Generation Techniques, Creativity and Idea Generation, Common Techniques, Reverse Brainstorming, Role Playing, Analogies, Real-life Examples, Forced Connection, Visual Thinking, Storytelling, Practice Ideation, Overcoming Creative Blocks, Unrealistic Expectations, The Right Way to Take Risks, Examples of Creative Thinking, Evaluation of Ideas, Criteria / Metrics for Evaluation,

Testing the Ideas, Refining and Selecting the Best Ideas, Transparency in the Evaluation Process, Pass/Fail Method, Idea Evaluation Matrix, SWOT Analysis, Criteria for Prioritization, Idea Prioritization Techniques -

a. Dot Voting
b. Impact vs. feasibility matrix
c. Weighted Scoring
d. Affinity Mapping
e. Cost-Benefit Analysis (CBA)
f. MoSCoW Method
g. Kano Model
h. Eisenhower Matrix

Implementing Prioritization, Re-Prioritization, Learn To-be Scenario, To-Be Scenario Map, use a to-do list to plan, How to Write an effective to-do List, Using Technology for to-do lists, Strategies for practicing prioritization, Urgent vs. Important Matrix, ABC Analysis, Value-based prioritization, Time-based prioritization, The Pomodoro Technique, Time-Value Prioritization Funnel, Pareto Analysis, Time-blocking, Tips for maintaining focus and staying motivated when prioritizing tasks, How to adjust priorities as circumstances change.

Module V. Model creation and Idea pitching

Introduction, Prototyping Phase, Learn Wireframe and Model creation, Introduction to Minimum Viable Product, Benefits Of MVP Development, What is expected from Minimum Viable Product, Practice Wireframe creation, End to end connecting from Problem to MVP, Testing Phase, Types of Testing, White and Black Box Testing, Unit Testing, Integration testing, Unit Testing Vs Integration Testing, System Testing, System Testing Vs Functional Testing, Acceptance Testing, User Acceptance Testing (UAT), Operational Acceptance Testing (OAT), Contract Acceptance Testing, Alpha/Beta Testing, Performance Testing, Security Testing, Usability Testing, Testing Techniques, Test Cases and Test Scripts, Bug Tracking and Reporting, User Feedback and Testing, Continuous Testing, Challenges and Best Practices, Tips for Interviews and Surveys, Kano Model, Desirability testing, Storytelling and Idea Presentation.

Reference Books:

1. "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value" by Thomas Lockwood
2. "The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems" by Michael Lewrick, Patrick Link, Larry Leifer
3. "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp, John Zeratsky, Braden Kowitz
4. "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" by Tim Brown
5. "Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley, David Kelley
6. "The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm" by Tom Kelley
7. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries

List of Experiments

EXP NO 1:
(a) Classify problem as a technical and Non-technical
(b) Extract meaningful keyword from problem statements.
EXP NO. 2:
(a) Problem statement on Root cause analysis, Empathy map.
EXP NO 3:
(a) Problem statement based on observation technique that accepts two lists >
As -is and To-be. Then print a Comparison table.
EXP NO 4:
(a) Problem statement based on creative technique SCAMPER.
EXP NO 5:
(a) Problem statements based on evaluating ideas, prioritization techniques.
EXP NO 6:
(a) Build a console-based prototype of "Students notes sharing app" with basic Menu options.
EXP NO 7:
(a) Write a python program that takes problem + solution as input and auto-generates a basic pitch outline.
EXP NO 8:
(a) Python scripts that collects user rating (1-5) stores them in a file and calculates the average score. This simulates a simple feedback collection system.
EXP NO 9:
(a) Pitching ideas

Course Code	26EE01PR0105-1/26EE01PR0105-2			
Category	Vocational and Skill Enhancement Course			
Course Title	C Programming Lab/ Python Programming Lab			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

C Programming Lab
Experiment List:

1. Using Basic Data Types of C, Implement Arithmetic Expressions
    1. Write a C program to read two integers and perform basic arithmetic operations (addition, subtraction, multiplication, division, and modulus).
    2. Develop a C program to calculate the area and perimeter of a rectangle using appropriate data types.
    3. Write a C program to enter student details like name, branch, roll number, CET score, gender etc. and print it.

2. Implement Programs Using Decision Control Structures
    1. Develop a program to find the largest of three numbers using nested if–else.
    2. Write a C program to determine whether a given year is a leap year.
    3. Develop a program to determine whether a character entered is a vowel or consonant.

3. Demonstrate Use of Loop Control Structures
    1. Write a C program to print the first N natural numbers and their sum using a for loop.
    2. Write a C program to find the factorial of a number using a while and do while loop.
    3. Develop a program to find the sum of digits of a number using loops.

4. Implement Programs Using Multi-Way Decision Control Structures (Switch Case)
    1. Write a C program to implement a simple calculator using switch–case.
    2. Develop a program to display the day of the week corresponding to a given number (1–7).
    3. Write a C program to display the grade of a student based on marks using switch–case.

5. Apply Functions and Recursion to Simplify Programs
    1. Write a C program to find the sum of two numbers using a user-defined function.
    2. Write a C program to find the greatest of two numbers using a function.
    3. Write a C program to find the factorial of a number using recursion.
    4. Write a C program to generate the Fibonacci series using recursion.

6. Initialize Arrays and Apply Them to Solve Problems of 1D and 2D Arrays
    1. Write a C program to read N elements from a 1D array and find the largest element.
    2. Develop a program to perform addition of two matrices using 2D arrays.
    3. Write a C program to search for a given element in a 1D array using linear search.
    4. Develop a program to find the transpose of a given matrix using 2D arrays.

7. Demonstrate Use of Structures and Pointers
    1. Develop a program to swap two numbers using pointers.
    2. Write a C program to store and display student information using a structure.
    3. Write a C program to store employee details using structures and display them.

8. Apply File Handling Concepts in C
    1. Write a C program to count the number of characters, words, and lines in a text file.
    2. Write a C program to append data to an existing text file.
    3. Develop a program to copy the contents of one file into another file.

Python Programming Lab
Experiment List:

Lab Exercises 1 -
Hello, World! Program
Write a Python program that prints "Hello, World!" to the console.
Interactive Mode Basics
Use Python's interactive mode to perform basic arithmetic operations like addition, subtraction, multiplication, and division.
User Input and Display
Create a Python script that takes user input for their name and displays a personalized greeting.
Calculate Rectangle Area
Write a Python program that calculates and prints the area of a rectangle. Prompt the user for the length and width.
Temperature Conversion
Create a Python script that converts a temperature from Fahrenheit to Celsius. Prompt the user for the temperature in Fahrenheit and display the result in Celsius.

Lab Exercises 2-
Even or Odd Checker
Implement a Python program that checks if a given number is even or odd and prints the result.
Largest among Three Numbers
Write a Python script that finds and prints the largest among three numbers entered by the user.
Factorial Calculation with a While Loop
Create a Python program that calculates and prints the factorial of a number entered by the user using a while loop.
Fibonacci Sequence with For Loop
Use a for loop to generate and print the Fibonacci sequence up to a specified number of terms. Prompt the user for the number of terms.
Sum of Prime Numbers
Write a Python program that calculates and prints the sum of all prime numbers in a given range. Prompt the user for the range.

Lab Exercises 3
Simple Calculator Class
Define a Python class for a simple calculator that has methods for addition and subtraction. Allow the user to perform calculations using objects of this class.
Class Inheritance Hierarchy
Create a class hierarchy with a base class and two derived classes. Demonstrate inheritance by accessing attributes and methods of each class.

Lab Exercises 4
Method Overriding
Implement method overriding in a Python class. Create a base class with a method and override it in a derived class.
Encapsulation Demonstration
Use encapsulation to restrict access to class attributes. Create a class with private attributes and demonstrate encapsulation principles.
Abstract Geometric Shape Class
Create an abstract class representing a geometric shape with abstract methods like area and perimeter. Define derived classes (e.g., Circle, Rectangle) to implement these methods.

Lab Exercises 5
Custom Exception Handling
Write a Python program that raises and handles a custom exception. Define a custom exception class and demonstrate its usage.
File Exception Handling

Implement a function that reads data from a file and handles file-related exceptions such as FileNotFoundError and PermissionError.

Division by Zero Handling

Create a Python program that simulates division by zero and handles the ZeroDivisionError exception gracefully.

File Handling with Multiple Exceptions

Modify a file reading program to handle both FileNotFoundError and PermissionError exceptions.

Finally Block Usage

Develop a program that demonstrates the use of the finally block in exception handling. Open a file and ensure it is properly closed even if exceptions occur.

Lab Exercises 6

Email Validation with Regular Expressions

Write a Python program that validates email addresses using regular expressions. Prompt the user for an email address and validate it.

Phone Number Extraction

Create a Python script that extracts phone numbers from a given text using regular expressions.

Custom Python Module

Develop a Python module with functions to perform basic arithmetic operations. Import this module into another script and use its functions.

Exploring Built-in Modules

Explore Python's built-in modules like math and datetime. Use them to perform mathematical operations and work with date and time.

Lab Exercises 7

Simple tkinter GUI

Design a simple tkinter GUI application with buttons and labels. Implement functionality to update labels when buttons are clicked.

GUI Button Actions

Create a Python program that responds to user button clicks in a tkinter GUI. Perform actions like displaying messages when buttons are clicked.

HTML Form Handling

Build an HTML web form with input fields and a submit button. Create a Python CGI script to handle form submissions and display the entered data.

Form Data Validation

Extend the previous exercise to validate form data in the Python CGI script. Check for required fields and display validation messages.

Dynamic Web Content with CGI

Implement a Python CGI script that generates dynamic web content based on user requests. Create a simple web application that displays different content based on URL parameters.

Lab Exercises 8

Client-Server Communication

Create a simple client-server program using socket programming in Python. Implement basic communication between the client and server.

Enhanced Client-Server Communication

Extend the client-server program to support data transfer between the client and server. Implement sending and receiving data between the two.

JSON Serialization and Deserialization

Serialize Python objects into JSON format and then deserialize them back into Python objects. Demonstrate data interchange between JSON and Python.

Pickle Serialization

Use Pickle to serialize and deserialize Python objects. Save Python objects to a file using Pickle and then load them back.

Networked Data Exchange

Develop a Python script that simulates data exchange over a network using sockets and serialization. Send and

receive data between client and server.

Lab Exercises 9
Basic NumPy Operations
Create a NumPy array and perform basic operations like addition, subtraction, multiplication, and division.
Data Filtering and Selection
Implement data filtering and selection using NumPy arrays. Filter data based on specific conditions and criteria.
Data Analysis with Pandas
Use Pandas to read data from a CSV file and perform data analysis. Calculate statistics like mean, median, and standard deviation on the dataset.

Lab Exercises 10
Data Frame Manipulation
Explore Data Frame manipulation in Pandas. Sort, filter, and perform various operations on a dataset loaded into a Data Frame.
Database CRUD Operations
Connect to a SQLite database in Python and perform CRUD (Create, Read, Update, Delete) operations using SQL queries. Create a Python script that interacts with a database.
that interacts with a database.

Course Code	26HS02PR0102- 2 to 25			
Category	Co-Curricular Activity			
Course Title	Liberal / Performing Art			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Title: Liberal / Performing Arts

Course Code	**Course Name**	**Sem**	**Hours/ week**	**Credits**	**Continuous Evaluation Max. marks**
26HS02PR0102-02	Fundamentals of Indian Classical Dance: Bharatnatayam	I	2	1	50
26HS02PR0102-03	Fundamentals of Indian Classical Dance: Kathak	I	2	1	50
26HS02PR0102-04	Introduction to Digital Photography	I	2	1	50
26HS02PR0102-05	Introduction to Basic Japanese Language	I	2	1	50
26HS02PR0102-06	Art of Theatre	I	2	1	50
26HS02PR0102-07	Introduction to French Language	I	2	1	50
26HS02PR0102-08	Introduction to Spanish Language	I	2	1	50
26HS02PR0102-09	Art of Painting	I	2	1	50
26HS02PR0102-10	Art of Drawing	I	2	1	50
26HS02PR0102-11	Nature Camp	I	2	1	50
26HS02PR0102-12	Developing Self-awareness	I	2	1	50
26HS02PR0102-13	Art of Poetry	I	2	1	50
26HS02PR0102-14	Creative and content writing	I	2	1	50
26HS02PR0102-15	Science of life through Bhagwad Gita	I	2	1	50
26HS02PR0102-16	Sanskrit Sambhashan- Spoken Sanskrit	I	2	1	50
26HS02PR0102-17	Kirtan Kala	I	2	1	50
26HS02PR0102-18	Introduction to German Language and culture	I	2	1	50
26HS02PR0102-19	Adventure Sports	I	2	1	50
26HS02PR0102-20	Introduction to Défense Forces & Obstacle Training	I	2	1	50
26HS02PR0102-21	First Aid & Disaster Management	I	2	1	50

26HS02PR0102-22	Basic Nutritional Course	I	2	1	50
26HS02PR0102-23	Stress Management Through Yoga & Meditation	I	2	1	50
26HS02PR0102-24	Audio Recording & Dubbing	I	2	1	50
26HS02PR0102-25	Art of Basic Film Making	I	2	1	50

Course Code	26HS02PR0102-2			
Category	Co-Curricular Activity			
Course Title	Fundamentals of Indian Classical Dance: Bharatnatyam			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective

The course aims to introduce the students to Bharatnatyam, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Bharatnataym as an Indian dance form CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Pratham* (1st level formal exam of Bharatnatayam).

Syllabus

Practical -1: Orientation in Bharatnatayam

Practical-2: TattuAdavu till 8, NaattaAdavu 4 Steps, PakkaAdavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,

Practical -3: Practice sessions

Practical-4: TattaKudittaAdavu (Metta), TattaKudittaAdavu (Metta) 2 Steps, TirmanamAdavu 3 Steps, KattuAdav - 3 Steps, KattuAdav - 3 Steps

Practical-5: Practice sessions

Practical-6: Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps,

Practical-7: practice sessions

Practical – 8: final practice sessions and performances.

Recommended reading

1. *Introduction to Bharata'sNatyasastra*, AdyaRangacharya, 2011
2. *The Natyasastra and the Body in Performance: Essays on the Ancient Text*, edited by Sreenath Nair, 2015
3. *Bharatanatyam How to: A Step-by-step Approach to Learn the Classical Form*, Eshwar Jayalakshmi, 2011

Course Code	26HS02PR0102-3			
Category	Co-Curricular Activity			
Course Title	Fundamentals of Indian Classical Dance: Kathak			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective

The course aims to introduce the students to Kathak, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Kathak as an Indian dance form CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Prarambhik*(1st level formal exam of Kathak).

Syllabus

Practical -1: Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),

Practical -2: practice sessions of practical 1

Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings

Practical -4: practice sessions of practical 3

Practical -5: Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,

Practical -6: practice sessions of practical 5

Practical -7: 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions

Practical -8: Final performances.

Recommended reading

1. Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), Marami Medhi & Debasish Talukdar, 2022, Anshika Publication (13 September 2022)

Course Code	26HS02PR0102-4			
Category	Co-Curricular Activity			
Course Title	Introduction to Digital Photography			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective
The course aims to develop basic skills of students in digital photography to lay a foundation for them as a hobby and/or a profession.

Course outcome:
At the end of the course the students will be able to achieve the following:
CO1: Develop an understanding of the technical aspects and aesthetics of Photography. CO2: Apply the rules of digital photography for creating photographs.
CO3: Develop skills to enhance photographs through post processing. CO4: Create a portfolio of their photographs in selected genre.

Syllabus
Practical 1: **Orientation in digital photography:** Genres, camera handling and settings Practical 2: **Rules of Composition**
Practical 3: **Rules of Composition**: practice sessions
Practical 4: **Understanding Exposure and Art of Pre-Visualization**
Practical 5: **Rules of Composition and Art of Pre-Visualization:** practice sessions Practical 6: **Post Processing Photographs and Portfolio creation**
Practical 7: **Post Processing Photographs:** practice sessions
Practical 8: **Portfolio finalization and presentation in selected genre.**

Reference material

1. Scott Kelby (2020) *The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros*, Rocky Nook, USA
2. Larry Hall (2014) *Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography*, Speedy Publishing LLC, Newark
3. J Miotke (2010) *Better Photo Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro*, AMPHOTO Books, Crown Publishing Group, USA

Course Code	26HS02PR0102-5			
Category	Co-Curricular Activity			
Course Title	Introduction to Basic Japanese Language			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective

The course aims to develop basic communication skills in Japanese Language and help develop a basic understanding of Japanese culture for effective cross-cultural communication.

Course outcome

After the completion of the course the students will be able to achieve the following: CO1: Basic understanding about Japan as a country and Japanese culture.
CO2: Ability to use vocabulary required for basic level communication in Japanese language.
CO3: Able to frame simple sentences in Japanese for everyday conversations

Syllabus

Practical-1: Orientation about Japan, its language, and its culture
Practical-2: Communication Skills 1: Vocabulary for basic Japanese language
Practical -3: Practice sessions
Practical-4: Basic day to day greetings in Japanese language and their usage through role-play
Practical-5: Practice sessions
Practical- 6: Communication Skills 2: framing sentences
Practical- 7: Practice sessions
Practical- 8: Introduction of Japanese Culture, Arts, Traditions, Etiquettes and Manners etc.

Recommended reading

1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)

2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language Solutions (ISBN: 9788194562900)

Course Code	26HS02PR0102-6			
Category	Co-Curricular Activity			
Course Title	Art of Theatre			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objectives:
The course aims to develop in the students, an actor's craft through physical and mental training.

Course Outcomes:
On completion of the course, students will be able to achieve the following:
CO1: Understand and synthesize the working of the prominent genres of theatre across the world.
CO2: Apply the skill of voice and speech in theatre and public speaking
CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.
CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus:
Syllabus
Practical 1: **Orientation in theatre**
Practical 2: **Voice and Speech training**
Practical 3: **Voice and Speech training**: practice sessions Practical 4: **Art of acting**
Practical 5: **Art of acting:** practice sessions Practical 6: **Art of script writing**
Practical 7: **Art of script writing:** practice sessions
Practical 8: **Final performances**

Reference books:

1. Boleslavsky, R. (2022). *Acting: The First Six Lessons* (1st ed., pp. 1-92). Delhi Open Books.
2. Shakthi, C. (2017). *No Drama Just Theatre* (1st ed., pp. 1-171). Partridge.
3. Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). *A Practical Handbook for the Actor* (1st ed.). Vinatge Books New York.

Course Code	26HS02PR0102-7			
Category	Co-Curricular Activity			
Course Title	Introduction to French Language			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective:

To help build a foundation and interest in French language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following: CO1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France
CO2. Learn to use simple language structures in everyday communication. CO3. Develop ability to write in basic French about themselves and others. CO4. Develop ability to understand beginner level texts in French

Syllabus
List of Practicals

Practical-1: Orientation about France, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in French
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic French and practice

Recommended reading

1. 15-minute French by Caroline Lemoine
2. Cours de Langue et de CivilisationFrançaises by G. Mauger Vol. 1.1
3. Cosmopolite I by Natalie Hirschsprung, Tony Tricot

Course Code	26HS02PR0102-8			
Category	Co-Curricular Activity			
Course Title	Introduction to Spanish Language			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective:

To help build a foundation and interest in Spanish language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following: CO1. Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France
CO2. Learn to use simple language structures in everyday communication. CO3. Develop ability to write in basic Spanish about themselves and others. CO4. Develop ability to read and understand beginner level texts in Spanish

Syllabus
List of Practicals

Practical-1: Orientation about Spain, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in Spanish
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic Spanish and practice

Recommended reading

1. 15-Minute Spanish by Ana Bremon
2. Aula Internacional 1 by Jaime Corpas ,Eva Garcia, Agustin Garmendia.
3. ChicosChicasLibro del Alumno by María Ángeles Palomino

Course Code	26HS02PR0102-9			
Category	Co-Curricular Activity			
Course Title	Art of Painting			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective
Painting is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in painting to lay a foundation for them as a hobby and/or a profession.

Course outcome:
At the end of the course the students will be able to achieve the following: CO1: Become familiar with the basic methods, techniques & tools of painting. CO2: Train the eye and hand to develop sense of balance, proportion and rhythm. CO3: Develop the ability to observe and render simple natural forms.
CO4: Enjoy the challenging and nuanced process of painting.

Syllabus
Practical 1: **Orientation in Painting tools & basics of lines, shapes, light, shadows and textures**
Practical 2: **The art of observation -** how to see shapes in drawing
Practical 3: **Introduction Water color -** how to handle water paints Practical 4: **Introduction to acrylic colors -** how to handle acrylic paints
Practical 5: **Explore layering paint and capturing the quality of light with paint.**
Practical 6: **Create landscape painting**
Practical 7: **Create Abstract painting**
Practical 8: **Paint on Canvas** (try to recreate any famous painting)

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland
3. Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

Course Code	26HS02PR0102-10			
Category	Co-Curricular Activity			
Course Title	Art of Drawing			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective
Drawing is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in drawing to lay a foundation for them as a hobby and/or a profession.

Course outcome:
At the end of the course the students will be able to achieve the following: CO1: Become familiar with the basic methods, techniques & tools of drawing. CO2: Train the eye and hand to develop sense of balance, proportion and rhythm. CO3: Develop the ability to observe and render simple natural forms.
CO4: Enjoy the challenging and nuanced process of drawing.

Syllabus
Practical 1: **Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures**
Practical 2: **The art of observation** how to see shapes in drawing Practical 3: **One/two-point basic linear perspective**
Practical 4: **Nature drawing and landscapes**
Practical 5: **Gestalt principles of visual composition**
Practical 6: **Figure drawing**: structure and proportions of human body Practical 7: **Gesture drawing:** expression and compositions of human figures
Practical 8: **Memory drawing:** an exercise to combine the techniques learnt

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling

Course Code	26HS02PR0102-11			
Category	Co-Curricular Activity			
Course Title	Nature Camp			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective: To create an opportunity for the students to develop affinity with nature and thus subsequently impact their ability to contribute towards sustainability of nature.

Course outcome:
After the completion of the course the students will be able to do the following:
CO1: Develop an affinity with nature by observing and understanding it marvels with guidance from experts
CO2: Develop an understanding of the challenges and solutions associated with nature and its conservation.

Course content
In collaboration with the Forest Department and/or a local NGO working in the field of environment conservation, this course would be conducted in 24 hours. Students will be taken to a tiger reserve in Central Indian region or Forest fringe villages or work with an NGO from Central Indian region working on natural resource management. The camps (for 2 days) will cover any one of the following topics as decided by the course coordinator:

1. Awareness about each element of biodiversity (camps on moths, butterflies, birds, other wildlife etc)
2. Environment management (water, forest, wildlife) – practices of Forest Department in managing a tiger reserve, and other aspects of water and forest conservation.
3. Sustainable natural resource management - initiatives by rural communities and local NGOs
4. Man-animal conflict and solutions (socio-economic and technical) – role of local communities and Forest Department
5. Traditional practices in environment conservation – role of local communities and local NGOs

Course Code	26HS02PR0102-12			
Category	Co-Curricular Activity			
Course Title	Developing Self-awareness			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objectives:
The course aims to develop students in their personal as well as professional life by means of graphotherapy, NLP, and Neurobics

Course Outcomes:
On completion of the course, students will be able to achieve the following:

CO1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth
CO2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey
CO3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.
CO4: Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

Syllabus:

Practical 1: **The Power of Handwriting (Handwriting is Brainwriting)**
Practical 2: **Know yourself through handwriting**
Practical 3: **The Role of Signature in your life**
Practical 4: **Graphotherapy to enhance yourself in all ways**
Practical 5: **Neurolinguistic Programming , S.M.A.R.T Goal**
Practical 6: **Effective Communication Model, Rapport Building and Anchor**
Practical 7: **Brain Directives & Linguistic Presuppositions**
Practical 8: **Neurobics**

Course Code	26HS02PR0102-13			
Category	Co-Curricular Activity			
Course Title	Art of Poetry			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Outcomes:
To familiarize the students with the art of poetry and develop a sense of appreciation for the art

At the end of the course the student will be able to achieve the following:
CO1: Understand the origin and development of poetry
CO2: Appreciate the art of poetry in life
CO3: Develop aesthetic sense
CO4: Develop holistic perspective to their personality

Syllabus
Practical 1: **Art of poetry – orientation**
Practical 2: **Forms of poetry – orientation**
Practical 3: **Forms of poetry – recitation**
Practical 4: **Application of poetry – orientation**
Practical 5: **Application of poetry – practical session**
Practical 6: **Poetry and aesthetics**
Practical 7: **Writing poetry – orientation**
Practical 8: **Writing poetry – writing sessions**

Reading material

I. The Art of Poetry
1. Fry, S. (2005). The ode less travelled: Unlocking the poetic mind. HarperCollins.
2. Addonizio, K., & Laux, D. (1997). The poet's companion: A guide to the pleasures of writing poetry. W.W. Norton & Company.
3. Lucy, J. (Ed.). (2001). The art of poetry. Penguin Books.

II. Understanding and Interpretation of Poetry
1. Hirsch, E. (1999). How to read a poem: And fall in love with poetry. Harcourt Brace & Company.
2. Pinsky, R. (1998). The sounds of poetry: A brief history. Farrar, Straus and Giroux.
3. Meyer, M. (2005). Poetry: An introduction. Bedford/St. Martin's.

III. Writing Poetry
1. Hugo, R. (1979). The triggering town: Lectures and essays on poetry and writing. W.W. Norton & Company.
2. Bradbury, R. (1990). Zen in the art of writing: Releasing the creative genius within you. Bantam Books.
3. Behn, R., & Twichell, C. (Eds.). (1992). The practice of poetry: Writing exercises from poets who teach. HarperCollins

Course Code	26HS02PR0102-14			
Category	Co-Curricular Activity			
Course Title	Creative and Content Writing			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective:
The objective of the course is to equip students with comprehensive skills in creative and content writing through experiential learning and real-world applications.

Course outcomes:
On completion of the course, student will be able to achieve the following:
CO1: Understand and apply fundamental concepts and techniques of creative writing.
CO2: Apply storytelling techniques to create engaging narratives.
CO3: Develop and implement effective SEO and digital content strategies
CO4: Create and refine content using various tools and applying diverse writing styles and formats.
CO5: Utilize digital tools to craft multimedia narratives and create a professional portfolio.

Syllabus

Creative Writing
Practical 1: **Introduction to Creative and Content Writing**
Practical 2: **Character and Story Development**
Practical 3: **Crafting Compelling Narratives**

Content Writing
Practical 4: **SEO and Digital Content Strategies**
Practical 5**: Writing for Media**
Practical 6: **Tools**

Content Creation
Practical 7: **Digital Storytelling**
Practical 8: **Creative Portfolio Launch**

Course Code	26HS02PR0102-15			
Category	Co-Curricular Activity			
Course Title	Science of life through Bhagwad Gita			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective
The objective of the course is to seek directions from the Bhagwad Gita to garner life skills for a successful and happy life

Course Outcome
CO1: To understand the methodology to correctly interpret and analysis the scripture
CO2: To understand the application of various teaching of the Bhagwad Gita
CO3: Use meditation and breathing techniques for healthy mind and body.

Syllabus
Practical 1: **Introduction to Bhagwad Gita - methodology**
Practical 2: **Real life application of chapter 1-3**
Practical 3: **Real life application of chapter 4-6**
Practical 4: **Real life application of chapter 7-9**
Practical 5: **Real life application of chapter 10-12**
Practical 6: **Real life application of chapter 13-15**
Practical 7: **Real life application of chapter 16-18**
Practical 8: **Meditation and breathing techniques**

Course Code	26HS02PR0102-16			
Category	Co-Curricular Activity			
Course Title	Sanskrit Sambhashan- Spoken Sanskrit			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objectives:
The objective of the course is to enhance the communication skills of the students in Sanskrit

Course outcome
At the end of the course, the students will be able to achieve the following:
CO1: Enhanced writing skills in Sanskrit
CO2: Enhanced speaking skills in Sanskrit
CO3: Enhanced listening skills in Sanskrit
CO4: Enhanced writing skills in Sanskrit

Syllabus:

संस्कृतसम्भाषणशिबिरस्य पाठ्यक्रमः

प्रथमं दिनम्

- गीतम् - पठत संस्कृतम्.....।
- मम नाम -भवतः नाम किम्? भवत्याः नाम किम्? द्वयोः मध्ये परिचयः। परस्परं 5 जनान्।
- सः कः? सा का? तत् किम्?
- एषः, एषा, एतत्।
- अहम्, भवान्, भवती..... ...अभिनयः।
- आम्,न, वा/किम्.....अभिनयः।
- अस्ति × नास्ति.....अभिनयः।
- अत्र, तत्र, कुत्र, सर्वत्र, अन्यत्र, एकत्र - अभिनयः।
- षष्ठी - तस्य, एतस्य, कस्य, तस्याः, एतस्याः, कस्याः, मम, भवतः, भवत्याः.....अभिनयः।
  मम नासिका, भवतः नासिका, भवत्याः नासिका।
  एतत् कस्य? अङ्गानि प्रदर्श्य प्रश्नः।
- दशरथस्य..., सीतायाः..., लेखन्याः..., पुस्तकस्य...,। स्फोरकपत्रस्य (Flash Card) उपयोगः करणीयः। 'पुत्रः' 'पतिः' इत्यादीनां वाक्यपत्राणाम् (Charts) उपयोगः करणीयः।
- गीतम् - मनसा सततं स्मरणीयम्।
- आवश्यकम्, मास्तु, पर्याप्तम्, धन्यवादः, स्वागतम्।
- पूर्वनिश्चितसम्भाषणप्रदर्शनम्।
- क्रियापदानां पाठनम् -
  गच्छति। आगच्छति। पठति। लिखति। खादति।पिबति। क्रीडति। वदति। उत्तिष्ठति। उपविशति।
- गच्छामि। आगच्छामि.....।
- गच्छतु। आगच्छतु.....।
- सङ्ख्याः - (अ) 1, 2, 3, 4,.....10।
  (आ) 10, 20, 30,.....100।
- समयः - 5.00, 5.15, 5.30, 4.45 ।
- कथा - गतानुगतिको लोकः। (काचित् कथा सरलया भाषया वक्तव्या)।
- रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित् वाक्यानि वाचनीयानि)।
- एकं वाक्यम् (प्रत्येकं छात्रः एकं वाक्यं वदेत्।)
- सूचना।
- ऐक्यमत्यः।

द्वितीयं दिनम्

- गीतम्।
- पुनस्स्मारणम्।
- शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा कुञ्चिका, तत् पुष्पम्।
- बहुवचनपाठनम् –
  बालकाः..., बालिकाः..., लेखन्यः..., पुस्तकानि...।
- ते, के, ताः, काः, तानि, कानि, एते, एताः, एतानि, भवन्तः, भवत्यः, वयम्। (चित्राणि उपयोक्तव्यानि।)
- वचनपरिवर्तनाभ्यासः। यथा - सः बालकः - ते बालकाः।
- अस्ति - सन्ति।
- कति?
- सप्तमी - हस्ते। उत्पीठिकायाम्। लेखन्याम्। पुस्तके। (स्फोरकपत्रस्य प्रयोगः करणीयः।)
  वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि।
- कदा?
- उत्तराणां प्रश्नाः। (शिक्षकः आरम्भे उत्तरं वदेत्, अनन्तरं छात्राः तस्य प्रश्नं पृच्छेयुः।)
  यथा - रामः प्रातःकाले शालां गच्छति।
  रामः कदा शालां गच्छति?
- अद्य, श्वः, परश्वः, प्रपरश्वः, ह्यः, परह्यः, प्रपरह्यः, इदानीम्।
- गीतम्।
- गच्छन्ति। गच्छामः। गच्छन्तु।
- शिष्टाचारः - सुप्रभातम्/नमस्कारः/शुभरात्रिः/हरिः ओम्/क्षम्यताम्/चिन्ता मास्तु।
- प्रातर्विधिः - दन्तधावनम् इत्यादयः शब्दाः पाठनीयाः।
- सङ्ख्या - 1-50।
- समयः - 6.05, 6.10, 5.55, 5.50
- स्वागतसम्भाषणम्। (शिक्षकः सहशिक्षकेण सह कृत्वा प्रदर्शयेत्)
- कथा।
- रटनाभ्यासः।
- वाक्यद्वयम् (प्रत्येकम् अपि छात्रः वाक्यद्वयं वदेत्।)
- सूचनाः।
- ऐक्यमत्यः।

तृतीयं दिनम्

- गीतम्।
- पुनस्स्मारणम्।
- क्रियापदानां बहुवचनरूपाणि।
  गच्छन्ति - गच्छामः - गच्छन्तु (Chart दर्शनीयम्)
  पिबन्ति - पिबामः - पिबन्तु।
  लिखन्ति - लिखामः - लिखन्तु।
  इत्यादिपरिवर्तनाभ्यासः कारणीयः।
- द्वितीयाविभक्तिः - स्फोरकपत्राणाम् उपयोगः।
  (वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि।)
- कृपया ददातु - वस्तूनि प्रदर्श्य।
  शिक्षकः एकैकं वस्तु प्रदर्शयति।
  उदा. – ग्रन्थः, घटी,.....
  छात्राः - कृपया ग्रन्थं ददातु, कृपया घटीं ददातु इत्यादि वदेयुः। (स्फोरकपत्रस्य उपयोगः)
- पुरतः, पृष्ठतः, वामतः, दक्षिणतः, उपरि, अधः।
  (चित्रं दर्शनीयम्)
- इतः, ततः, ...तः, गृहतः, कुतः?
  (स्फोरकपत्राणाम् उपयोगः)
  वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि।
- गीतम्।
- कथम्? सम्यक्।
- शीघ्रम् × मन्दम्। उच्चैः × शनैः।
- पठनार्थम्, किमर्थम्?
- सप्तककाराः - किम्, कुत्र, कति, कदा, कुतः, कथम्, किमर्थम् (Chart प्रदर्शनीयम्)।
  एकैकम् उपयुज्य परस्परं प्रश्नाः।
- अपि।
- अस्तु।
- अहं न जानामि। - कानिचन वाक्यानि।
- भूतकालीनक्रियापदानां पाठनम्।
  गतवान् - पठितवान् - लिखितवान्।
  गतवती - पठितवती - लिखितवती।
- क्रियापदकोष्ठकस्य प्रथमपृष्ठस्य अभ्यासः।
- द्वितीयपृष्ठस्य सर्वाणि क्रियापदानि उपयुज्य छात्राः वर्तमानकाले वाक्यानि वदन्ति। (ए.व - ब.व.)
- विशिष्टक्रियापदानाम् अभ्यासः -
  करोमि - कुर्मः। करोति - कुर्वन्ति।
  ददामि - दद्मः। ददाति - ददति।
  शृणोमि – शृणुमः। शृणोति - शृण्वन्ति।
  जानामि – जानीमः। जानाति – जानन्ति।
- सम्बोधनम् - भोः !, श्रीमन् !, मान्ये !, भगिनि!, मित्र !, ...महोदय!, राम !, सीते ! इत्यादि।
- सङ्ख्या- 1-100।
- समयः - 1.00, 2.00, 3.00, 4.00।
- सम्भाषणप्रदर्शनम् (मित्रसंलापः)।
- कथा।
- वाक्यत्रयम् एकैकोऽपि छात्रः वदेत्।
- सूचना।
- ऐक्यमत्यः।

चतुर्थं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- च
- अतः
- एव
- इति
- अस्मि
- यदि -तर्हि
- यथा - तथा
- तः - पर्यन्तम् (वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि।)
- अद्य आरभ्य
- कृते (वाक्यपत्रस्य उपयोगः करणीयः)
- क्तवतुप्रत्ययान्तानाम् अभ्यासः
  गतवान् - पठितवान् - लिखितवान् (ए.व. पुंलिङ्गे)।
  गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे)।
  गतवन्तः - पठितवन्तः - लिखितवन्तः (ब.व. पुंलिङ्गे)।
  गतवत्यः - पठितवत्यः - लिखितवत्यः (ब.व. स्त्रीलिङ्गे)।
- सः गतवान् - सा गतवती - लिङ्गपरिवर्तनाभ्यासः।
- अहं गतवान् - अहं गतवती - लिङ्गपरिवर्तनाभ्यासः।
- क्रियापदानां कालपरिवर्तनाभ्यासः।
  यथा - गच्छति - गतवान्, गतवती।
- गीतम्।
- विशेषपाठनम् - आसीत्, आसन्, आसम्।
- एकः, एका, एकम् - लिङ्गभेदः ज्ञापनीयः।
  (स्फोरकपत्रस्य उपयोगः)

- भोजनसम्बन्धिशब्दाः यथा - सूपः, शाकम्, इत्यादयः।
- सङ्ख्या।
- समयः।
- ॐ – सङ्ख्याक्रीडा।
- कथा।
- सम्भाषणप्रदर्शनम्।
- चत्वारि वाक्यानि।
- सूचना।
- ऐकमत्यः।

पञ्चमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- वाहनानां नामानि।
- तृतीयाविभक्तिः - दण्डेन, मापिकया, लेखन्या, पुष्पेण।
  (वाक्यपत्रस्य आधारेण वाक्यानि वाचनीयानि।)
- सह, विना।
- अद्यतन, ह्यस्तन, श्वस्तन, पूर्वतन, इदानीन्तन
- भविष्यत्कालीनक्रियापदानां पाठनम्।
  गमिष्यति, पठिष्यति, लेखिष्यति।(कोष्ठकस्य साहाय्येन)
- गत,आगामि।
- गीतम्।
- स्म।
- अभवत्।
- क्त्वाप्रयोगः (कोष्ठकस्य साहाय्येन)।
- यदा – तदा।
- बन्धुवाचकशब्दाः।
- वेशभूषणानां नामानि।
- वर्णाः।
- रुचयः।
- क्रीडा - एकश्वासेन सङ्ख्याकथनम्।
- कथा।
- पञ्च वाक्यानि।
- सूचना।
- ऐकमत्यः।

षष्ठं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- नूतनम् x पुरातनम्,
- बहु x किञ्चित्,
- दीर्घः x ह्रस्वः।
- उन्नतः x वामनः।
- स्थूलः x कृशः।
- एतादृश, तादृश, कीदृश?
- तुमुन् (कोष्टकस्य साहाय्येन)।
- किन्तु।
- निश्चयेन।
- बहुशः / प्रायशः।
- किल / खलु।
- शक्नोति।
- गीतम्।
- विशेषणविशेष्यभावस्य अभ्यासः।(प्रथमाविभक्तौ)
  सः उत्तमः बालकः।
  सा उत्तमा बालिका।
  तत् उत्तमं पुस्तकम्।
- इव। विनोदकणिका।(गतवान् 'इव' अभिनयं कृतवान्!)
- अपेक्षया।
- पशूनां नामानि।
- अवयवानां नामानि।
- वाक्यविस्तारणाभ्यासः।
  (सः मम पुस्तकं प्रातःकाले पञ्चवादने पठितवान्।)
- इतः पूर्वम् - इतः परम्।
- 'रामकृष्ण' सङ्ख्याक्रीडा।
- कथा।
- षट् वाक्यानि।
- सूचना।
- ऐकमत्यः।

सप्तमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- क्त्वा - तुमुन् - परिवर्तनाभ्यासः।
- बहिः x अन्तः।
- रिक्तम् x पूर्णम्।
- इतोऽपि।
- इत्युक्ते।
- अन्ते।
- चेत् - नो चेत्।

- गीतम्।
- आरोग्यसम्बन्धिशब्दाः – वैद्यरोगिसम्भाषणम्।
- प्रश्नोत्तरस्पर्धा।
- ऋषीणां नामानि।
- कथा - शिक्षकः एकां कथां वदति। अनन्तरं छात्रेषु एकैकः तस्याः कथायाः एकैकं वाक्यम् उक्त्वा कथां सम्पूर्णां करोति।
- सङ्ख्या - दीर्घसङ्ख्यापाठनम्।
- प्रश्नोत्तरम्।
- क्रीडा - (गणद्वये नामस्मरणक्रीडा)
- कथा।
- पुस्तकानां परिचयः।
- सप्त वाक्यानि।
- सूचना।
- ऐक्यमन्त्रः।

अष्टमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- वारम्।
- अतः - यतः परिवर्तनाभ्यासः।
- यद्यपि – तथापि।
- यत्र – तत्र।
- कति - कियत् - एतयोः भेदज्ञापनम्।
- यावत् – तावत्।
- यत् – तत्।
- यः - सः।
- या – सा।
- गीतम्।
- अस्माकम्।
- चर्चा।
- सङ्ख्या - 'शतायुः - गतायुः' क्रीडा।
- विनोदकणिकाकथनम्।
- कथा।
- अष्ट वाक्यानि।
- समाजनिधिविषये सूचना।
- ऐक्यमन्त्रः।

नवमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- चित्।
- ....द्वयम्।
- सङ्ख्यासु लिङ्गभेदः।
  एकः - एका - एकम्
  द्वयम् - द्वयम् - द्वयम्
  त्रयः - तिस्रः - त्रीणि
  चत्वारः - चतस्रः - चत्वारि
- शिश्रकः - अहं वैद्यः - मम नाम सुरेशः
  (छात्राः तमुद्दिश्य प्रश्नान् पृच्छेयुः।)
- ..... अर्थम् (समाजार्थम्, संस्कृतकार्यार्थम्...)।
- गीतम्।
- तव्यत् – अनीयर्।
- अनन्त्यकथारचना।
- सङ्ख्यान्वेषणम् (क्रीडा)।
- छात्रैः सह प्रश्नोत्तरम्।
- समाजनिधिविषये पुनःस्मारणम्।
- ऐक्यमन्त्रः।

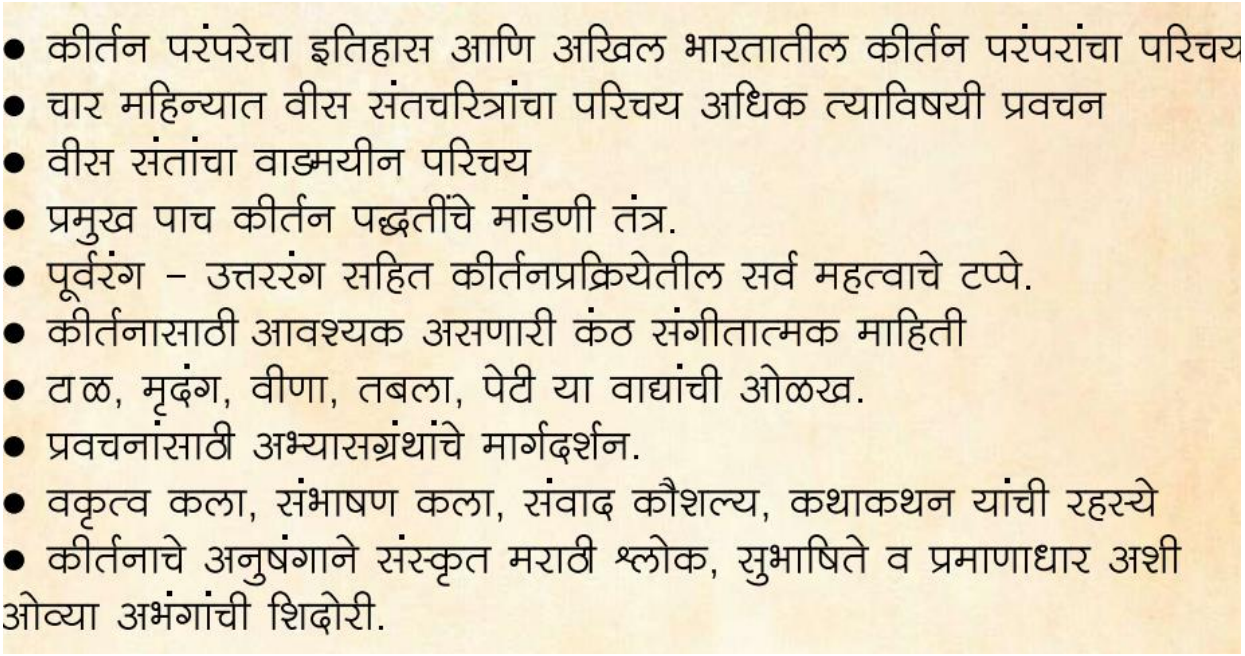
दशमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- पत्रलेखनम्।
- दूरवाणीसम्भाषणम्।
- मार्गनिर्देशः – कुत्र गन्तव्यम् इत्यादि।
- तव्यत् अभ्यासार्थम् – अद्य किं किं करणीयम् ?
- सान्दर्भिकभाषणम् –
  1. प्रवासात् प्रतिनिवर्तनस्य।
  2. आपणिकस्य इत्यादि।
- क्रीडा – सङ्ख्यायोजनम् (गणद्वये)।
- शुभाशयाः।
- असत्यकथनम् / कल्पनाकथनम्।
- समारोपः (सर्वैः शिक्षार्थिभिः भारतमातुः पूजां कृत्वा निधिसमर्पणं करणीयम्।)
- पत्राचारप्रगतशिक्षणादिविषये सूचना।
- ऐक्यमन्त्रः।

Course Code	26HS02PR0102-17			
Category	Co-Curricular Activity			
Course Title	Kirtan Kala			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objectives:
The objective of the course is to provide the students with a spiritual experience as well as its benefits to them in the form of better abilities to concentrate and develop the ability to create a peaceful mind.

Course outcome
At the end of the course, the students will be able to achieve the following:
CO1: Learn from the inspiring spiritual journey of the saints and the history of Kirtan tradition
CO2: Learn about the musical instruments used in the art of Kirtan
CO3: Develop communication skills



Course Code	26HS02PR0102-18			
Category	Co-Curricular Activity			
Course Title	Introduction to German Language and culture			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course objective:

To help build a foundation and interest in German language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:
CO1. Demonstrate basic knowledge about Germany, the culture and similarities/differences between India and Germany
CO2. Learn to use simple language structures in everyday communication.
CO3. Develop ability to write in basic German about themselves and others.
CO4. Develop ability to read and understand beginner level texts in German.

Syllabus
List of Practicals

Practical-1: Orientation about Germany, the language, and culture
Practical-2: Vocabulary building for everyday conversations
Practical -3: Numbers, days and time
Practical-4: Introducing Oneself & Others
Practical-5: Reading Skills: Reading simple text in German language
Practical-6: Basic Verbs & Sentence Construction
Practical-7: Food & Dining, Giving Directions & Transportation
Practical-8: Writing Skills: Write basic German and practice

Recommended reading

1. German Made Easy by Diego A. Agundez
2. Teach Yourself Complete German: Learn to Read, write, Speak and Understand A new Language by Paul Coggle, Heiner Schenke
3. Netzwerk A1 by Helen Smitz, Stefanie Dengler and Paul Rusch
4. Deutsche Welle (DW) – www.dw.com/learngerman
5. BBC Languages – German – www.bbc.co.uk/languages/german
6. Goethe-Institut – www.goethe.de

Course Code	26HS02PR0102-19			
Category	Co-Curricular Activity			
Course Title	Adventure Sports			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective:

This course introduces adventure sports, emphasizing experiential learning through participation in various activities. The course will cover the fundamentals, safety procedures, and physical and mental benefits of adventure sports. Students will engage in outdoor activities such as wall climbing, rappelling, and more, fostering a connection with nature and understanding the principles of risk management.

Course Outcome: By the end of this course, students will:

- Understand the principles and benefits of adventure sports.
- Develop basic skills in selected adventure sports.
- Learn and apply safety measures and risk management techniques.
- Foster teamwork, leadership, and problem-solving skills.
-

Syllabus:

- Tent pitching, knot practice session and Tent allotment
- Activities like Jumarring and Climbing
- Individual challenge like Burma bridge, ladder bridge, multi vine
- Group Task like improvise raft making and Kayaking
- Activities like Archery rifle shooting, cycle ride

Pattern of Classes: 30 Hrs. Camp (2 Days and 1 Night)

Assessment Pattern:

Assessment Type	**Weightage in Marks**	**Total Marks**
Practical 26HS02PR0102-19	Internal Marks – 25 Marks External Marks – 25 Marks	50
	Total – 50 Marks	

Course Code	26HS02PR0102-20			
Category	Co-Curricular Activity			
Course Title	Introduction to Defense Forces & Obstacle Training			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective:

- Understand the Structure and Function of Defense Forces
- Familiarize with Defense Force Training and Discipline
- Learn Basic Obstacle Course Techniques
- Apply Problem-Solving and Teamwork in Obstacle Training
- Explore the Role of Obstacle Training in Defense Preparedness
-

Course Outcome:

Upon successful completion of the course, students should be able to:

- Describe the Structure and Functions of Defense Forces
- Demonstrate Knowledge of Defense Training Protocols
- Navigate Basic Obstacle Courses & Connect Obstacle Training to Defense Preparedness
- Collaborate and Problem-Solve in Team-Based Exercises

Syllabus:

- Knot and Hitch practice session
- Activities like Rappelling & Wall Climbing
- Burma bridge & ladder bridge
- First Aid
- Rifle Shooting
- Horse riding
- Group Task and Team building activities

Pattern of Classes: 30 Hrs Camp (2 Days and 1 Night Camp)

Assessment Pattern:

Assessment Type	**Weightage in Marks**	**Total Marks**
Practical 26HS02PR0102-20	Internal Marks – 25 Marks External Marks – 25 Marks	50
	Total – 50 Marks	

Course Code	26HS02PR0102-21			
Category	Co-Curricular Activity			
Course Title	First Aid & Disaster Management			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective:

- Understand Disaster Types and Characteristics
- Learn Risk Assessment and Management
- Master Emergency Preparedness and Response
- Explore Recovery and Reconstruction
- Develop Skills in Communication and Coordination
- Understand Legal and Ethical Considerations

Course Outcome:

Upon successful completion of the disaster management course, students should be able to:

- Identify and Categorize Disasters
- Conduct Risk Assessments
- Develop Emergency Plans
- Implement Response Strategies

Syllabus:

- Basic First Aid
- Transportation of Casualty
- Injury Prevention & Cure
- Various Types of Knots & Hitches
- Various team building activities
- Fire emergencies & use of extinguishers (Optional)
- Snake Bite & Environmental emergencies.

Assessment Pattern:

Assessment Type	**Weightage in Marks**	**Total Marks**
Practical 26HS02PR0102-21	Internal Marks – 25 Marks External Marks – 25 Marks	50
	Total – 50 Marks	

Course Code	26HS02PR0102-22			
Category	Co-Curricular Activity			
Course Title	Basic Nutritional Course			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective:

In the "Basics of Nutrition" course, students will develop a comprehensive understanding of essential nutrients and their roles in supporting overall health. They will learn to apply dietary guidelines effectively, tailoring recommendations to various age groups and health conditions. Additionally, students will cultivate the skills needed to assess and improve their own and others' eating habits for better health outcomes.

Course Outcome:

By the end of the course, students will be able to

- Accurately describe the functions of key nutrients and their impact on health,
- create balanced meal plans based on established dietary guidelines,
- critically evaluate nutrition information to distinguish between credible and misleading sources.

Syllabus:

Module I

- Introduction to Nutrition – Define Balanced Diet, Nutrition, Optimum Nutrition, Nutrients, Concept of Health, Recommended Dietary Allowances (RDA)
- Carbohydrates (sources, functions and digestion)
- Proteins (sources, functions and digestion)
- Fats (sources, functions and digestion)
- Micronutrients (vitamins and minerals-sources, functions and digestion)

Practical I

- Display of all the foods with the help of students and while demonstrating teacher will again explain role and importance of nutrition in daily life. Deficiency will lead to chronic diseases and its prevention is very necessary for the quality of life.

Module II

- What is Body Mass Index?
- What is Basal Metabolic Rate?
- What is Ideal Body Weight? (Male/Female)
- How to read labels on Food Packets?
- How to choose smart food and Concept of Rainbow diet, My Food Pyramid or My plate given by ICMR- NIN.

Practical II

- Calculation of Body Mass Index, Basal Metabolic Rate, Ideal Body Weight (Male/Female) with the use of self-body measurements.
- Demonstration of Rainbow diet, My Food Pyramid or My plate in a class.

Assessment Pattern:

Assessment Type	**Weightage in Marks**	**Total Marks**
Practical 26HS02PR0102-22	Internal Marks – 25 Marks External Marks – 25 Marks	50
	Total – 50 Marks	

Course Code	26HS02PR0102-23			
Category	Co-Curricular Activity			
Course Title	Stress Management Through Yoga & Meditation			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course Objective: Mental health is one of the most important facets of human life. Academic learning has emerged as a major source of stress among young students worldwide. Promoting mental well-being among students in India is a crucial step toward achieving Sustainable Development Goal 3 (Good Health and Well-being). Stress management involves using various techniques and strategies to control stress levels, improve how you react to stressful situations. Yoga combines physical movement with deep breathing and meditation, providing a holistic approach to stress relief.

Course Outcome:

Upon successful completion of the course, students should be able to:

- Understand the basics of stress management.
- Analyze stress triggers and to manage them.
- Evaluate the responses to stressful situations.
- Apply the techniques of Yog & Meditation for stress management in day-to-day life.

Syllabus:

Unit-1

Introduction to Stress: The Meaning of Stress, types of stress: distress, eustress Stress Management Techniques I:
Treatment 1- (Asanas): Tadasana, Trikonasana, Vrikshasana, Garudasana,, Ardha-Padamasana, Padamasana, Vajarasana, Ushtrasana, Gomukhasna,, Paschimottanasan, ,ArdhaHalasana, ,Setu- Bandhanasa,Naukasana, Bhujangasana, and Dhanurasana; along with relaxing asanas

Unit-2

Spiritual approach to stress management. Stress Management Techniques II
Treatment 2 – (Prananyam) Deep breathing, Yoga, Mindfulness meditation
Rechak, Purak, Kumbhak, Nadi Suddhi and Bhramari Pranayama.
Measuring Academic stress- It can be measure using questionnaire: Academic stress Scale (Sun .et al 2011**).**

Assessment Pattern:

Assessment Type	**Weightage in Marks**	**Total Marks**
Practical 26HS02PR0102-23	Continuous Assessment – 25 Marks Internal Test Evaluation – 25 Marks	50
	Total – 50 Marks	

Course Code	26HS02PR0102-24			
Category	Co-Curricular Activity			
Course Title	Audio Recording & Dubbing			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course delivery: VMV Commerce, JMT Arts & JJP Science, B.Voc. Department

Course Outcomes:
CO1: Develop a Comprehensive Understanding of Audio in Content Creation
CO2: Equip students with in-depth knowledge of the role, benefits, and applications of audio in enhancing digital content across various platforms.
CO3: Design and Implement a Personalized Audio Setup. Enable students to build and optimize their own audio recording setups tailored for platforms such as YouTube, Instagram, podcasts, and other digital media outlets.
CO4: Enhance Presentation and Marketing Skills Through Audio Integration. Demonstrate how high-quality audio contributes to effective communication, audience engagement, and brand marketing in both professional presentations and promotional content.

Syllabus:

Practical 1: Orientation in Sound and Basics of Audio **Practical 2:** Orientation in Input and Output
Practical 3: Orientation in Audio Devices (Hardware & Software)
Practical 4: Audio Recording: Song, Voiceover, Dubbing **Practical 5:** Audio Editing
Practical 6: Audio Session I
Practical 7: Audio Session II
Practical 8: Audio Session III

References books

1. Sound and Recording: Applications and Theory – Francis Rumsey & Tim McCormick (Focal Press)
2. Practical Recording Techniques – Bruce Bartlett & Jenny Bartlett (Routledge)
3. Mixing Audio: Concepts, Practices and Tools – RoeyIzhaki (Focal Press)
4. The Art of Sound Recording – David Moulton
5. Digital Audio Editing: Correcting and Enhancing Audio – Simon Langford (Focal Press)
6. Mixing Secrets for the Small Studio – Mike Senior (Focal Press)
7. The Mixing Engineer's Handbook – Bobby Owsinski (Hal Leonard)
8. Audio Engineering 101 – Tim Dittmar (Focal Press)

Course Code	26HS02PR0102-25			
Category	Co-Curricular Activity			
Course Title	Art of Basic Film Making			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	I

Course delivery: VMV Commerce, JMT Arts & JJP Science, B.Voc. Department

Course Objectives:
The course aims to introduce students to the fundamentals of filmmaking, nurturing creativity and technical understanding through hands-on practical sessions. Students will learn the visual language of cinema and explore storytelling through the medium of film.

Course Outcomes (COs)
On completion of the course, students will be able to:
CO1: Understand the basic concepts, history, and evolution of film as an art form. CO2: Apply principles of visual storytelling, framing, and composition in short film projects.
CO3: Develop creative and technical skills related to camera handling, lighting, sound, and editing.
CO4: Work collaboratively to conceptualize, plan, shoot, and edit a short film, demonstrating teamwork, creativity, and problem-solving skills.

Syllabus:

- **Practical 1** Introduction and Orientation to Film Making
- **Practical 2** Basics of Visual Storytelling and Cinematic Language
- **Practical 3** Camera Handling and Shot Composition
- **Practical 4** Lighting and Sound Techniques
- **Practical 5** Scripting and Storyboarding
- **Practical 6** Shooting Exercises and On-Set Practice
- **Practical 7** Basics of Editing and Post-Production
- **Practical 8** Final Short Film Project and Screening

SYLLABUS OF SEMESTER II

Course Code	26EE01TH0201			
Category	Programme Core Course			
Course Title	Digital Signal Processing			
Scheme & Credits	L	P	Credits	Semester
	3	0	3	II

Course Outcomes:

On successful completion of the course, students will be able to:

- **CO1:** Apply fundamental concepts of continuous-time and discrete-time signals and systems, including sampling and signal transformations, for digital representation of real-world signals.
- **CO2:** Analyze discrete-time LTI systems using Z-transform, pole-zero representation, and frequency-domain techniques.
- **CO3:** Implement and evaluate DFT and FFT algorithms for spectral analysis and efficient digital signal processing applications.
- **CO4:** Design and realize FIR and IIR digital filters using standard techniques and evaluate their performance for practical signal processing applications.
- **CO5:** Apply spatial- and frequency-domain image processing techniques for image enhancement and edge detection applications.

Syllabus

Module I: Fundamentals of Signals and Systems:

Introduction to continuous-time and discrete-time signals and systems, classification of signals (energy/power, periodic/aperiodic, deterministic/random), basic operations on signals, elementary signals, system properties (linearity, causality, time invariance, stability), convolution of continuous and discrete signals, correlation, impulse and step response of LTI systems. Frequency-domain representation of signals, sampling theorem, aliasing, reconstruction of signals, quantization and A/D–D/A conversion fundamentals.

Module II: Z-Transform and Discrete-Time System Analysis:

Need for Z-transform, relation with Fourier and Laplace transforms, Region of Convergence (ROC), properties of Z-transform, pole-zero plots, system function representation, analysis of causality and stability of LTI systems, difference equations, Inverse Z-transform, partial fraction expansion, power series method, frequency response of discrete-time systems, realization of digital systems.

Module III: DFT and FFT Algorithms Discrete-Time Fourier Transform (DTFT), frequency domain sampling, Discrete Fourier Transform (DFT), DFT properties, circular convolution, linear convolution using DFT, computation efficiency, Fast Fourier Transform (FFT), Decimation-In-Time (DIT), Decimation-In-Frequency (DIF), Radix-2 FFT algorithms. Computational complexity and applications of FFT in signal analysis.

Module IV: IIR Filter Design and Realization Analog filter approximations (Butterworth, Chebyshev), IIR design via Impulse Invariance, Bilinear Transformation Method (BTM), frequency warping, IIR realization structures, Direct Form I, Direct Form II, Cascade form, Parallel form, finite word-length effects.

Module V: FIR Filter Design: FIR vs IIR comparison, Linear phase FIR filters, symmetry and antisymmetric conditions, Gibbs phenomenon, windowing techniques (Rectangular, Hamming, Hanning, Blackman), frequency sampling method, FIR realization, Direct form, Cascade form, Lattice structures.

Module VI: Fundamentals of Digital Image Processing:
Introduction to digital image processing, image acquisition and representation, basic properties of images, point processing operations and gray-level transformations. Histogram processing and histogram equalization techniques for image enhancement.
Spatial domain filtering techniques, 2D convolution, smoothing and sharpening filters. Edge detection fundamentals. Frequency-domain image enhancement, 2D Fourier Transform, 2D FFT for image processing, frequency-domain filtering, low-pass and high-pass filters, and basic applications of frequency-domain enhancement.

Text Books:

1. Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis & Dimitris G. Manolakis, Pearson Education, 2007.
2. Digital Image Processing by Rafael C. Gonzalez & Richard E. Woods, Pearson Education, 2018.

Reference Books:

1. Signals and Systems by Alan V. Oppenheim, Alan S. Willsky, & S. Hamid Nawab, Pearson Education, 1997.
2. Discrete-Time Signal Processing by Alan V. Oppenheim & Ronald W. Schafer, Pearson Education, 2010.
3. Digital Signal Processing by S. Salivahanan, A. Vallavaraj, & C. Gnanapriya, McGraw Hill Education, 2018.
4. Digital Image Processing Using MATLAB by Rafael C. Gonzalez, Richard E. Woods, & Steven L. Eddins, McGraw Hill Education, 2020.
5. Digital Signal Processing: A Computer-Based Approach by Sanjit K. Mitra, McGraw Hill Education, 2011.

Course Code	26HS03TP0213			
Category	Basic Science Course			
Course Title	Calculus & Linear Algebra			
Scheme & Credits	L	P	Credits	Semester
	3	2	4	II

Course Outcomes

On successful completion of the course, student shall be able to

CO1: Apply the concepts of continuity and differentiability to derive Taylor's and Maclaurin series, and use mathematical software to visualize function approximations.

CO2: Compute and analyze partial derivatives, Jacobians, and determine extreme values of functions of two variables; validate optimization results using software-based visualization techniques.

CO3: Interpret vector fields by evaluating gradient, divergence, and curl, and use computational tools to plot and explore these vector functions in 2D and 3D.

CO4: Solve systems of linear equations and perform eigenvalue and eigenvector analysis to diagonalize matrices and reduce quadratic forms, demonstrating select applications using computational methods.

CO5: Evaluate convergence of sequences and series using standard tests, and implement recurrence relations in computational settings to solve problems in mathematics and algorithms

Theory Syllabus:

Module 1 : (6 Lectures)

Differential Calculus: Functions of univariate , Mean value theorems: Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's theorem, Taylor's and Maclaurin series.

Module 2: (10 Lectures)

Partial Differentiation: Partial derivatives, Euler's Theorem, chain rule, application of partial differentiation: total derivative, Jacobians, Maxima, Minima for the functions of two variables., Extrema of function of multivariable,

Module 3: (6 Lectures)

Vector Calculus: Scalar and vector fields, gradient of scalar point function, directional derivatives, divergence and curl of vector point function, application of vector calculus: Line integral, Gradient Descent method.

Module 4: (8 Lectures)

Rank-nullity theorem; Consistency of system of linear equations and its solution , Orthogonal matrices, Eigen values and eigenvectors, Cayley Hamilton theorem, Diagonalization of matrices, Orthogonal transformation and quadratic to canonical forms, Introduction to n-dimensional vector spaces, Singular value decomposition and its applications.

Module 5: (6 Lectures)

Infinite series: Sequences, Infinite series of real and complex numbers, Cauchy criterion, tests of convergence, absolute and conditional convergence, uniform convergence, power series, radius of convergence and Introduction and application of recurrence relation.

Lab Syllabus:

Exp. No.	Name of Experiments	Mapped COs
1	To use mathematical software as an advance calculator .	CO1,CO4
2	2D Plotting and data visualization	CO 3
3	3D-plotting and vector calculus	CO 3
4	Curve Fitting to identify trends and patterns within dataset .	CO2
5	Applied optimization (Maxima, minima and Gradient descent method)	CO3
6	Matrix Computations and Eigenvalue Analysis	CO4
7	Linear Algebra with Various applications (computer Graphix, cryptography ,stochastic process, image processing)	CO4
8	Exploring Recurrence Relations in Computational Algorithms	CO5

Textbooks/References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
6. Paul Zimmermann, Computational Mathematics with Sagemath , siam publisher.

Course Code	26EE01TP0202			
Category	Programme Core Course			
Course Title	Object Oriented Programming using JAVA			
Scheme & Credits	L	P	Credits	Semester
	3	2	4	II

Course Outcomes:

On successful completion of the course, students will be able to:

1. Explain the principles of object-oriented programming and develop Java programs using classes, objects, methods, constructors, and inheritance concepts.
2. Apply generics and collection framework concepts to develop reusable, scalable, and efficient Java applications.
3. Implement multithreading and exception handling techniques to develop synchronized, reliable, and error-free Java programs.
4. Utilize modern Java programming features and design concepts to develop solutions for real-world software problems.

Module 1: (8 Hrs)

Features of Object-Oriented Programming languages, Abstraction, Encapsulation, Inheritance, Polymorphism and Late Binding. Concept of Class and Object, Access Control of Members of a Class, instantiating a Class, Constructors, Method Overloading and Method Overriding.

Module 2: (8 Hrs)

Concept of Inheritance, Methods of Derivation, Use of super Keyword and final Keyword in Inheritance, Run Time Polymorphism, Abstract Classes and Methods, Interface and Implementation of Interface, Creating Packages, Importing Packages, Static and Non-static Members.

Module 3: (7 Hrs)

Exceptions and Types of Exceptions, Use of try-catch Block, Handling Multiple Exceptions, Using finally, throw and throws Clauses, User Defined Exceptions, File Handling in Java, Serialization, Introduction to Lambda Expressions, Lambda Expression Block, Passing Lambda Expressions as Arguments.

Module 4: (5 Hrs)

Generics, Generic Class with Two Type Parameters, Bounded Generics, Collection Framework, ArrayList, LinkedList, HashSet, TreeSet, HashMap.

Module 5: (7 Hrs)

Multithreading: Java Thread Models, Creating Thread using Runnable Interface and Extending Thread Class, Thread Priorities, Thread Synchronization, Inter Thread Communication. Introduction to Design Patterns, Need of Design Patterns, Classification of Design Patterns.

Text Books

1. Herbert Schildt; JAVA The Complete Reference; Ninth Edition, Tata McGraw- Hill Publishing Company Limited.

Reference Books

1. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw- Hill Education Private Ltd 2013.

2. Core Java Volume I – Fundamentals" by Cay S. Horstmann and Gary Cornell 3. Design Patterns By Erich Gamma, Pearson Education

Experiment List

Experiment 1: Student Class Implementation

- Create a **Student class** and demonstrate:
  - Main method within a class
  - Main method outside the class
  - Initialization using reference object
  - Multiple objects for storing data
  - Initialization using method

Experiment 2: Constructors and Object Initialization

- Write a Java program to demonstrate:
  - No-argument constructor
  - Parameterized constructor
  - Default constructor behavior
- Apply constructors in a real example (e.g., area of circle / student details)

Experiment 3: Input Handling using Scanner Class

- Develop programs using Scanner class for:
  - Array-based sum calculation
  - Simple calculator using switch case
  - Calculator using methods
  - Basic bank system simulation

Experiment 4: Electric Bill Generation System

- Design a Java program to:
  - Calculate electricity bill based on units consumed
  - Apply control statements and methods
  - Display formatted bill output

Experiment 5: Interface Implementation

- Create an interface Calculation with method calc()
- Implement multiple subclasses using the interface
- Demonstrate runtime behavior

Experiment 6: Abstract Class Implementation

- Create an abstract class with:
  - calculateVolume()
  - calculateSurfaceArea()
- Implement subclasses:
  - Cube
  - Sphere

Experiment 7: Thread Creation using Thread Class

- Implement multithreading using:
  - Extending Thread class
- Demonstrate:
  - Single task single thread
  - Single task multiple thread
  - Multiple task multiple thread

Experiment 8: Runnable Interface and Thread Priorities

- Implement multithreading using Runnable interface
- Set thread priorities using getter and setter methods
- Observe execution behavior

Experiment 9: Exception Handling in Java

- Perform programs using:
  - ArrayIndexOutOfBoundsException
  - Try-catch-finally block
  - Throw and throws keyword
  - Arithmetic exception handling

Experiment 10: File Handling and Serialization

- Implement file operations:
  - File creation
  - FileWriter and BufferedWriter
  - FileReader and BufferedReader
  - Serialization and Deserialization of objects

Course Code	26EE01TP0203-1			
Category	Engineering Science Course			
Course Title	AI and ML Essentials			
Scheme & Credits	L	P	Credits	Semester
	3	2	4	II

Course Outcomes: After successful completion of the course, students will be able to:
CO1: Explain the fundamental concepts, principles, and applications of Artificial Intelligence and Machine Learning.
CO2: Apply supervised and unsupervised machine learning techniques for simple data analysis.
CO3: Apply basic ML tools and platforms for model development.
CO4: Apply knowledge of ANN models to simple computational problems.

Module 1: (05 Hrs)
Overview of Artificial Intelligence (AI): Definition and core concepts of Artificial Intelligence, AI vs Machine Learning vs Deep Learning, Types of AI: Narrow AI, General AI and Super AI, Key components of AI: data, algorithms and computing power, Evolution and milestones in Artificial Intelligence, Applications of AI in everyday life, Basics of machine learning paradigms and NLP, AI ethics, bias and future trends

Module 2: (09 Hrs)
Introduction to Machine Learning (ML): Fundamentals of machine learning, Supervised learning: regression and classification, Unsupervised learning, Reinforcement learning concepts and applications, Machine learning terminologies: features, labels and datasets, Overview of machine learning algorithms- linear regression, multiple linear regression, Decision Tree , K means clustering and their Applications

Module 3: (07 Hrs)
Key Concepts in AI and ML: Importance of data in AI and ML, Types of data: structured, unstructured and semi-structured, Data preprocessing and feature engineering, Machine learning algorithms and learning mechanisms, Model training and optimization techniques, Overfitting, underfitting and evaluation metrics, ML development lifecycle

Module 4:(06 Hrs)
Tools and Platforms for AI and ML: Python programming for AI and ML, NumPy and Pandas for data handling, Data visualization using Matplotlib and Seaborn, Scikit-learn for machine learning models, TensorFlow and Keras for deep learning, Data preprocessing techniques in machine learning

Module 5: (08 Hrs)
Deep learning basics and Future Trends: Fundamentals of neural networks and deep learning, Artificial Neuron model, Components of a neural network: Input layer, Hidden layers, Output layer, Weights, bias, and activation function, Concept of forward and backward propagation, applications, emerging Trends in AI and Deep Learning

Textbook(s):
1.Russell, S. and Norvig, P., Artificial Intelligence: A Modern Approach, 4th Edition, Pearson Education, 2021.
2.Doing Data Science: Straight Talk from the Frontline, Cathy O'Neil, Rachel Schutt, O'Reilly publication, 2020
Reference Books:
1.Rich E., Knight K. and Nair S. B., Artificial Intelligence, 3rd Edition, Tata McGraw-Hill, New Delhi.
2. Machine Learning, Tom Mitchell, McGraw Hill Publication, 1992
3.Hands-On Machine Learning with Scikit-Learn, Keras&TensorFlow(2nd/3rd Edition) O'Reilly.

List of Experiments:

Experiment 1

Data Handling using NumPy and Pandas

Creation and manipulation of arrays, dataframes, importing datasets, indexing, filtering, statistical operations and handling missing values using NumPy and Pandas.

Experiment 2

Data Visualization using Matplotlib and Seaborn

Plotting line graphs, bar charts, histograms, scatter plots, heatmaps and visualization of datasets for understanding trends and patterns.

Experiment 3

Data Preprocessing and Feature Engineering

Data cleaning, normalization, encoding categorical data, feature selection and train-test splitting for machine learning applications.

Experiment 4

Implementation of Simple Linear Regression

Building and evaluating a linear regression model using Scikit-learn for prediction-based applications.

Experiment 5

Implementation of Multiple Linear Regression

Developing multiple linear regression models using multiple features and analyzing prediction accuracy using evaluation metrics.

Experiment 6

Classification using Decision Tree Algorithm

Implementation of Decision Tree classifier for simple classification problems and analysis of model performance using confusion matrix and accuracy score.

Experiment 7

Unsupervised Learning using K-Means Clustering

Implementation of K-Means clustering algorithm for grouping unlabeled data and visualization of clusters.

Experiment 8

Introduction to Artificial Neural Networks (ANN)

Implementation of a simple ANN using TensorFlow/Keras for basic pattern recognition or classification tasks.

Experiment 9

Mini Project: AI/ML Application Development

Development of a small AI/ML application integrating preprocessing, model training, prediction and result visualization on a real-world dataset.

Experiment 10

Exploratory Data Analysis (EDA) on Real-World Dataset

Perform statistical analysis, identify patterns, correlations and trends in datasets using visualization and descriptive statistics techniques.

Course Code	26EE01TP0203-2			
Category	Engineering Science Course			
Course Title	Fundamentals of Artificial Intelligence			
Scheme & Credits	L	P	Credits	Semester
	3	2	4	II

Course Outcomes

On successful completion of the course, students will be able to:
CO1: Explain the fundamental concepts of Artificial Intelligence, intelligent agents, and AI applications for solving real-world problems.
CO2: Apply search strategies, problem-solving methods, knowledge representation, and reasoning techniques to formulate AI-based solutions.
CO3: Analyze datasets using data preprocessing, exploratory data analysis, and visualization techniques to derive meaningful insights.
CO4: Differentiate and interpret machine learning paradigms, datasets, learning workflows, and data-driven decision-making processes.
CO5: Apply mathematical foundations including vectors, matrices, statistical concepts, and optimization principles required for Artificial Intelligence and Machine Learning applications.

Syllabus

Module 1: (6 Hrs)
Foundations of Artificial Intelligence: Introduction to Artificial Intelligence: definition, history, evolution, characteristics, and applications of AI. Foundations and scope of Artificial Intelligence. AI, Machine Learning, and Deep Learning: relationships and distinctions. Types of AI: Narrow AI, General AI, and Super AI. Intelligent agents: agents and environments, rationality, agent architectures, reactive, goal-based, utility-based, and learning agents. AI development lifecycle and real-world AI applications.

Module 2: (8 Hrs)
Problem Solving, Search and Knowledge Representation: Problem formulation, state-space representation, search trees, and problem characteristics. Search strategies: Breadth First Search (BFS), Depth First Search (DFS), Uniform Cost Search, Greedy Best-First Search, and A* Search. Heuristic functions and informed search. Performance comparison of search strategies, time and space complexity; Constraint Satisfaction Problems. Adversarial search concepts and game playing. Knowledge representation techniques: semantic networks, frames, production rules, ontologies, and knowledge graphs. Logical reasoning, inference mechanisms, forward chaining, and backward chaining.

Module 3: (8 Hrs)
Reasoning, Decision Making and Expert Systems: Knowledge-based systems and intelligent decision-making. Propositional and predicate logic. Rule-based reasoning systems. Reasoning under uncertainty: probability fundamentals, Bayesian reasoning, and decision making under uncertainty. Expert systems: architecture, components, development process, applications, and limitations. Introduction to planning and decision support systems.

Module 4: (8 Hrs)

Data Understanding, Preprocessing and Exploratory Data Analysis: Introduction to data for AI: structured, semi-structured, and unstructured data. Data acquisition, data quality issues, and data preparation. Data preprocessing techniques: data cleaning, handling missing values, noise and outlier detection, data transformation, normalization, and feature representation, introduction to feature selection and feature extraction.Statistical foundations for AI: mean, median, mode, variance, standard deviation, correlation, covariance, and introduction to probability distributions. Exploratory Data Analysis (EDA): histograms, box plots, scatter plots, correlation matrices, pattern discovery, trend analysis, anomaly detection, and feature understanding. Introduction to data-centric AI systems.

Module 5: (6 Hrs)

Mathematical Foundations of AI: scalars, vectors, matrices, matrix notation, vector operations, matrix operations, matrix transpose, identity matrix, matrix multiplication, dot product, vector norms, Euclidean distance, cosine similarity, feature vectors and feature spaces. Fundamentals of optimization: objective functions, cost functions, optimization problems, local and global optima, derivatives, gradients, and introduction to gradient-based optimization. Introduction to Machine Learning: datasets, features, labels, training, validation, and testing datasets. Learning paradigms: supervised learning, unsupervised learning, semi-supervised learning, and reinforcement learning.

Text Book:

1. Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig, Fourth Edition, Pearson Education, 2021.
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking — Foster Provost and Tom Fawcett, First Edition, O'Reilly Media, 2013.

Reference Books:

1. Artificial Intelligence: Foundations of Computational Agents by David L. Poole and Alan K. Mackworth, Third Edition, Cambridge University Press, 2023.
2. Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python by Peter Bruce, Andrew Bruce, and Peter Gedeck, Second Edition, O'Reilly Media, 2020.
3. Think Stats: Exploratory Data Analysis by Allen B. Downey, Third Edition, O'Reilly Media, 2024.
4. Mathematics for Machine Learning by Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, Cambridge University Press, 2020.
5. Introduction to Machine Learning with Python by Andreas C. Müller and Sarah Guido, First Edition, O'Reilly Media, 2016.
6. Introduction to Artificial Intelligence by Wolfgang Ertel, Third Edition, Springer, 2023.

List of Experiments

Lab 01: Introduction to Jupyter Notebook and Google Colab environment; execution of Python programs for AI applications and visualization of results.

Lab 02: Implementation and comparative analysis of Breadth First Search (BFS) and Depth First Search (DFS) algorithms for state-space search problems.

Lab 03: Implementation of A* Search algorithm using heuristic functions for path-finding and optimization problems.

Lab 04: Solving Constraint Satisfaction Problems (CSPs) such as N-Queens and Map Coloring problems.

Lab 05: Development of a rule-based expert system using production rules and implementation of Forward Chaining and Backward Chaining inference mechanisms.

Lab 06: Implementation of Bayesian reasoning for decision making under uncertainty and simple decision support applications.

Lab 07: Data acquisition, preprocessing, and cleaning using NumPy and Pandas, including handling missing values, noisy data, and outliers.

Lab 08: Exploratory Data Analysis (EDA) of real-world datasets using descriptive statistics, correlation analysis, and feature exploration.

Lab 09: Data visualization using histograms, box plots, scatter plots, pair plots, and correlation heatmaps for pattern discovery and anomaly detection.

Lab 10: Vector and matrix operations using NumPy; demonstration of vectorized computations and comparison with iterative (for-loop based) implementations to illustrate computational efficiency in AI and Machine Learning applications.

Lab 11: Demonstration of supervised learning, unsupervised learning, and reinforcement learning paradigms using existing machine learning libraries and benchmark datasets.

Course Code	26EE01TH0204			
Category	Programme Core Course			
Course Title	Computer Architecture and Organization			
Scheme & Credits	L	P	Credits	Semester
	3	0	3	II

Course Outcomes (COs):
On successful completion of the course, students will be able to:

CO1: Analyze computer performance metrics and translate high-level programming constructs into RISC-V assembly language.

CO2: Analyze the arithmetic algorithms, datapath architecture, and pipeline hazard mitigation strategies of a RISC-V processor.

CO3: Evaluate the organization and performance of memory systems, including cache memory and virtual memory.

CO4: Analyze Input/Output subsystems, focusing on interface mechanisms, interrupt handling, and Direct Memory Access (DMA) data transfer modes.

CO5: Evaluate advanced parallel computing paradigms, including Flynn's Taxonomy, multicore processing, and GPU architectures.

Syllabus:
Module I (03 Hrs.): Introduction
Basics of Computer Architecture and Organization, Evolution of Computing System, Performance Metrics (MIPS, FLOPS, CPI, IPC, Execution time), the CPU performance equation, CPU performance equation, and Amdahl's Law, RISC Vs. CISC

Module II (08 Hrs.) : Instruction set architecture and algorithms:
Instruction Execution cycle, RISC V ISA, translating a program (C to ALP), procedure calls. Multiplication: Booth Algorithm, Integer Division- restoring and non-restoring division. Floating-Point (IEEE 754) representation

Module III (10 Hrs.): Processor Design and Pipelining
Datapath and control unit design, Performance Consideration, Single Cycle CPU, Motivation for Pipelining, Clock period and CPI, Pipelined data path, graphical representation, Pipelining Hazards.

Module IV (06 Hrs.): Memory Hierarchy and Management:
Memory hierarchy, Types of memory in computer System and Their Characteristics, Cache memory: Mapping functions, Replacement policies, Virtual Memory.

Module V: System Interfacing and Advanced Architectures [08 Hrs]
I/O Organization and Data Transfer: Introduction to I/O systems, bus systems, and I/O interface design. I/O addressing techniques (Memory-mapped vs. Isolated I/O). Interrupts and DMA: Modes of data transfer: Programmed I/O, Interrupt-driven I/O, and Direct Memory Access (DMA). Interrupts, prioritizing, and interrupt handling mechanisms. Instruction-Level Parallelism: Pipelining basics and superscalar execution (issuing multiple instructions per clock cycle). Advanced Computing Trends: Flynn's Taxonomy for parallel architectures. The shift to parallel processing, Multicore Architecture, and the architecture and role of GPUs in modern computing.

Reference Books

1. Computer Organization and Design RISC-V Edition: The Hardware Software Interface (2nd Edition) by David A. Patterson and John L. Hennessy, Morgan Kaufmann, 2020.
2. Computer Organization and Embedded Systems (6th Edition) by Carl Hamacher, ZvonkoVranesic, SafwatZaky, and NaraigManjikian, McGraw-Hill Education, 2011.
3. Computer Architecture: A Quantitative Approach (6th Edition) by John L. Hennessy and David A. Patterson, Morgan Kaufmann, 2017.

Course Code	26EE01PR0205			
Category	Vocational and Skill Enhancement Course			
Course Title	Prompt Engineering			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	II

List of Experiments:

Experiment 1: Introduction to Prompt Engineering

Explore Large Language Models (LLMs), understand prompt engineering concepts, prompt components, and compare AI responses to different prompt styles.

Experiment 2: Zero-Shot and Few-Shot Prompting

Design and evaluate zero-shot and few-shot prompts for different tasks and compare their effectiveness in generating accurate AI responses.

Experiment 3: Role-Based Prompting

Create prompts by assigning AI different roles (teacher, engineer, programmer, interviewer, etc.) and analyze the generated responses.

Experiment 4: Prompt Optimization Techniques

Refine prompts using specificity, context, constraints, and examples to improve response quality, accuracy, and consistency.

Experiment 5: Prompting for Content Generation

Generate technical reports, emails, summaries, presentations, and documentation using effective prompt engineering techniques.

Experiment 6: Chain-of-Thought and Step-by-Step Reasoning

Develop prompts that encourage logical reasoning, structured problem-solving, and multi-step decision making using Chain-of-Thought prompting.

Experiment 7: Prompting for Coding and Debugging

Use AI to generate, explain, optimize, and debug programs in Python or C using advanced prompting techniques.

Experiment 8: AI-Assisted Data Analysis and Visualization

Design prompts to analyze datasets, generate tables, charts, visualizations, and derive meaningful insights using AI tools.

Experiment 9: Ethical AI and Responsible Prompting

Explore AI limitations, hallucinations, prompt injection attacks, bias, privacy concerns, and responsible use of Generative AI.

Experiment 10: Mini Project – AI-Based Prompt Engineering Application

Develop a real-world AI application using prompt engineering, such as a chatbot, content assistant, educational tutor, coding assistant, business automation tool, or domain-specific AI assistant.

Course Code	26HS02TP0201			
Category	Vocational and Skill Enhancement Course			
Course Title	Foundations of Business English			
Scheme & Credits	L	P	Credits	Semester
	2	2	3	II

Course outcomes:

On successful completion of the course, the students will be able to achieve the following:

CO1: Apply and demonstrate active listening techniques and grammatical rules to construct accurate, coherent, and contextually appropriate communication.

CO2: Analyse and apply verbal aptitude strategies, business vocabulary, and reading comprehension techniques to interpret written communication effectively.

CO3: Demonstrate and adapt public speaking techniques and professional etiquette to deliver structured and audience-centric oral communication in workplace scenarios.

CO4: Evaluate and apply employability communication strategies by actively participating in group discussions, mock interviews, and résumé-building exercises to meet professional standards.

CO5: Create and justify professional documents using appropriate formats and ethically integrate AI-assisted tools to enhance clarity, accuracy, and effectiveness in communication.

Module 1 Listening Comprehension and Remedial Grammar 5 Hours Listening Comprehension: Active listening, Reasons for poor listening, Barriers to effective listening, Traits of a good listener, Note-making
Remedial Grammar: Common Errors in Indian English, Subject-verb agreement, Tenses

Module II: Structural Communication and Reading Comprehension 5 Hours
Verbal Aptitude: Para-jumbles, Analogies, Sentence completion, Syllogisms
Business Vocabulary: Use of power verbs, power adjectives and power adverbs, Common technical affixes, Avoiding corporate jargons
Reading Comprehension: Types and Strategies

Module III: Speaking Skills 5 Hours
Public Speaking: Mechanics of Public Speaking, Five-C model of storytelling (audience-centric), principles of effective introductions and welcome addresses, and questioning techniques.
Professional Oral Communication: Meetings, Seeking and giving feedback,
Professional Etiquette: greetings, introductions, politeness strategies, telephone and virtual communication

Module IV: Communication for Employment 5 Hours
Group Discussions: concepts, types, roles, and evaluation parameters Résumé Building: structure, content, and formatting techniques
Introduction to Interview Skills: types of interviews, commonly asked questions, and response strategies

Module V: Professional Communication 6 Hours
Principles of professional document design
Academic and professional email writing (format, tone, etiquette) Instruction writing (clarity, sequencing, audience awareness)
Statement of Purpose (SOP): structure and content
Introduction to AI-assisted communication (AI prompts and applications) and Ethical considerations in the use of AI in professional communication

Books

1. *Communication Skills*. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
2. *Practical English Usage.* Michael Swan. OUP. 1995.
3. *Remedial English Grammar.* F.T. Wood. Macmillan.2007

4. *On Writing Well.* William Zinsser. Harper Resource Book. 2001
5. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. *The AI Prompt Handbook for Business Writing: 50+ Prompts for Professionals, Managers & Entrepreneurs (The AI Prompt Handbook Series)*, Maxwell Striling, 2026

Foundations of Business English Lab

Syllabus
List of practicals

Computer Assisted + Activity Based Language Learning
Practical 1: Everyday Situations: Conversations and Dialogues – Listening Skills
Practical 2: Reading Skills
Practical 3: Everyday Situations: Conversations and Dialogues – Speaking Skills
Practical 4: Pronunciation, Intonation, Stress, and Rhythm

Activity Based Language Learning
Practical 5: Public Speaking
Practical 6: Presentation Skills: Orientation
Practical 7: Presentation Skills: Mock **Practical 8:** Group Discussions: Practice **Practical 9:** Group Discussions: Mock

Reference Books

1. *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press.
2. *Practical English Usage.* Michael Swan. OUP. 1995.

Course Code	26HS04PR0201			
Category	Ability Enhancement Course			
Course Title	Health-Fitness-Wellbeing (HFW)			
Scheme & Credits	L	P	Credit	Semester
	0	2	1	II

Aim of the Course: The course aims to foster Health and wellness through Healthy and Active Lifestyle and creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness through practical experiences and hands on activities.

Objectives of the Course:

1. To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.
2. To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.
3. To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.
4. To create Environment for better interaction and recreation among students as neutralizer for stress through various minor and recreational games.

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

1. Understand fundamental skills, basic principle and practices of sports and Yoga.
2. Practically learn the principles of implementing general and specific conditioning of physical exercises and yoga.
3. Develop Health-related fitness and Body-mind co-ordination through various fitness activities, sports, recreational games and yoga.
4. Practice Healthy & active living with reducing Sedentary Life style.

Course Content:

Module I:

- Warm up and Cool Down and Stretching Exercises.
- General and Specific Exercises.
- Calculation of BMI & Resting Pulse Rate.
- General and Specific exercises for strength, Speed, Agility, Cardiovascular Endurance, Flexibility, Coordinative abilities.
- Practice of Fundamental Skills of Volleyball, Table Tennis and Chess, etc.
- Knowledge and practice of the Equipment used in a Gymnasium and its application.

Module II:

- Yoga: Standing, Sitting, Prone & Supine positions.
- Suryanamaskar.
- Pranayama, Meditation and Relaxation Techniques.
- Recreational Games.
- Practice of Fundamental Skills of Basketball, Football, Carrom, etc.
- Health related Physical Fitness Test.

Assessment Pattern:

Assessment Type	**Weightage in Marks**	**Total Marks**
Practical	Physical Efficiency Test – 30 Marks Sports/Games skill Activity/Project – 10 Marks Yoga Activities – 10 Marks	50
	Total – 50 Marks	

References:

1. Russell, R.P. (1994). Health and Fitness Through Physical Education. USA: Human Kinetics.
2. Uppal, A.K. (1992). Physical Fitness. New Delhi: Friends Publication.
3. AAPHERD "Health related Physical Fitness Test Manual."1980 Published by Association drive Reston Virginia
4. Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: RashtrothannaPrakashana.
5. Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS 'Science)