SYLLABUS

FOR

DIPLOMA IN

WEB DESIGNING

(DIPLOMA COURSES IN ENGINEERING / TECHNOLOGY)

C23 REGULATION

TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE

(AUTONOMOUS), MADURAI – 625 011

GOVERNMENT OF TAMIL NADU

DEPARTMENT OF TECHNICAL EDUCATION

Diploma in Engineering and Technology

Web Designing
Regular Curriculum

Diploma in Web Designing

Program Outcomes (PO's)

POs are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude, and behavior that students acquire through the program.

The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of an engineering diploma graduate.

NBA has defined the following seven POs for an Engineering diploma graduate:

PO1: Basic and Discipline-specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and an engineering specialization to solve the engineering problems.

PO2: Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.

PO3: Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: Engineering Tools, Experimentation, and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: Engineering practices for society, sustainability and environment: Apply appropriate technology in the context of society, sustainability, environment and ethical practices.

PO6: Project Management: Use engineering management principles individually, as a team member or as a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

Credit Distribution

Semester	No of Courses	Periods	Credits
Semester I	9	640	20
Semester II	9	625	20
Semester III	8	625	20
Semester IV	7	640	20
Semester V	8	635	22
Semester VI	3	660	18
		Total	**120**

Semester III

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	57310	Data Structures	4-0-0	60	4	Theory
2	Program Core	Theory	57320	Web Fundamentals	4-0-0	60	4	Theory
3	Program Core	Practical	57330	Data Structures Using C	0-0-4	60	2	Practical
4	Program Core	Practical	57340	Web Fundamentals Practical	0-0-4	60	2	Practical
5	Program Core	Practicum	57350	Desktop Publishing	1-0-4	75	3	Practical
6	Program Core	Practicum	57360	Operating System	1-0-2	45	2	Practical
7	Open Elective	Advanced Skill Certification	57370	Advanced Skills Certification - 3	1-0-2	45	2	NA
8	Humanities & Social Science	Integrated Learning Experience	57380	Growth Lab	0-0-2	30	0	NA
9	Audit Course	Integrated Learning Experience	57390	Induction Program - II	-	16	0	-
10	Audit Course	Integrated Learning Experience	573A0	I&E/ Club Activity/ Community Initiatives	-	16	0	-
11	Audit Course	Integrated Learning Experience	573B0	Shop floor Immersion	-	8	0	-
12	Audit Course	Integrated Learning Experience	573C0	Student-Led Initiative	-	22	0	-
13	Audit Course	Integrated Learning Experience	573D0	Emerging Technology Seminars	-	8	0	-
14	Audit Course	Integrated Learning Experience	573E0	Health & Wellness	-	30	1	-
					Test & Revisions	75		
					Library	15		
					Total Periods	**625**	**20**	

Semester IV

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	57410	Computer Networks and Security	3-0-0	45	3	Theory
2	Program Core	Theory	57420	Database Technology	3-0-0	45	3	Theory
3	Program Core	Practical	57430	Database Technology Practical	0-0-4	60	2	Practical
4	Program Core	Practicum	57440	Python Programming	1-0-4	75	3	Practical
5	Program Core	Practicum	57450	Client Side Scripting	2-0-2	60	3	Practical
6	Program Core	Practicum	57460	Backend Technologies	2-0-4	90	4	Practical
7	Open Elective	Advanced Skill Certification	57470	Advanced Skills Certification - 4	1-0-2	45	2	NA
8	Audit Course	Integrated Learning Experience	57480	I&E/ Club Activity/ Community Initiatives	-	30	0	-
9	Audit Course	Integrated Learning Experience	57490	Shop floor Immersion	-	8	0	-
10	Audit Course	Integrated Learning Experience	574A0	Student-Led Initiative	-	24	0	-
11	Audit Course	Integrated Learning Experience	574B0	Emerging Technology Seminars	-	8	0	-
12	Audit Course	Integrated Learning Experience	574C0	Health & Wellness	-	30	0	-
13	Audit Course	Integrated Learning Experience	574D0	Special Interest Groups (Placement Training)	-	30	0	-
				Test & Revisions		75		
				Library		15		
				Total Periods		**640**	**20**	

Semester V

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	57510	Web Development Using Framework	4-0-0	60	4	Theory
2	Program Elective	Theory		Elective-1	3-0-0	45	3	Theory
3	Program Core	Practical	57530	Web Development Using Framework Practical	0-0-4	60	2	Practical
4	Program Core	Practicum	57540	Object Oriented Programming with Java	2-0-4	90	4	Practical
5	Program Elective	Practicum		Elective-2	1-0-4	75	3	Practical
6	Humanities & Social Science	Practicum	57560	Innovation & Startup	1-0-2	45	2	Project
7	Project/Internship	Project/Internship	57570	Industrial Training* [Summer Vacation - 90 Hours]	-	-	2	Project
8	Open Elective	Advanced Skill Certification	57580	Advanced Skills Certification - 5	1-0-2	45	2	NA
9	Audit Course	Integrated Learning Experience	57590	Induction program III	-	40	0	-
10	Audit Course	Integrated Learning Experience	575A0	Student-Led Initiative	-	30	0	-
11	Audit Course	Integrated Learning Experience	575B0	Health & Wellness	-	30	0	-
12	Audit Course	Integrated Learning Experience	575C0	Special Interest Groups (Placement Training)	-	40	0	-
					Test & Revisions	60		
					Library	15		
					Total Periods	**635**	**22**	

Elective – I

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Elective	Theory	57521	Machine Learning	3-0-0	45	3	Theory
2	Program Elective	Theory	57522	Data Warehousing and Data Mining	3-0-0	45	3	Theory
3	Program Elective	Theory	57523	Ethical Hacking	3-0-0	45	3	Theory
4	Program Elective	Theory	57524	Agile Product Development	3-0-0	45	3	Theory

Elective – II

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Elective	Practicum	57551	Data Analytics	1-0-4	75	3	Practical
2	Program Elective	Practicum	57552	Mobile Computing	1-0-4	75	3	Practical
3	Program Elective	Practicum	57553	Component Based Technologies	1-0-4	75	3	Practical
4	Program Elective	Practicum	57554	Multimedia Systems	1-0-4	75	3	Practical

Semester VI

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Open Elective	Theory		Electives-3 (Pathway)	3-0-0	45	3	Theory
2	Open Elective	Practicum		Elective-4 (Specialization)	1-0-4	75	3	Practical
3	Industrial Training / Project	Project/Internship		In-house Project / Internship / Fellowship	-	540	12	Project
	Total Periods					**660**	**18**	

Elective – III (Pathway)

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Elective| Higher Education	Theory	57611	Advanced Engineering Mathematics	3-0-0	45	3	Theory
2	Elective| Entrepreneurship	Theory	57612	Entrepreneurship	3-0-0	45	3	Theory
3	Elective| Technocrats	Theory	57613	Project Management	3-0-0	45	3	Theory
4	Elective| Technocrats	Theory	57614	Finance Fundamentals	3-0-0	45	3	Theory
5	Elective| Technologists	Theory	57615	5G Technology	3-0-0	45	3	Theory
6	Elective| Technologists	Theory	57616	DevOps	3-0-0	45	3	Theory

Elective – IV (Specialization)

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Elective	Practicum	57621	Data Science	1-0-4	75	3	Practical
2	Elective	Practicum	57622	Cloud Platform	1-0-4	75	3	Practical
3	Elective	Practicum	57623	Web Application Development	1-0-4	75	3	Practical
4	Elective	Practicum	57624	Advance DBMS	1-0-4	75	3	Practical
5	Elective	Practicum	57625	Mobile Application Development	1-0-4	75	3	Practical
6	Elective	Practicum	57626	UI & UX Design	1-0-4	75	3	Practical

Project/Internship

#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Project / Internship	Project / Internship	57631	Internship	-	540	12	Project
2	Project / Internship	Project / Internship	57632	Fellowship	-	540	12	Project
3	Project / Internship	Project / Internship	57633	In-house Project	-	540	12	Project

SEMESTER 3

57310	DATA STRUCTURES	L	T	P	C
Theory		4	0	0	4

Introduction:

Data structures are the techniques of designing the basic algorithms for real-life projects. In the present era, it is very essential to develop programs and organize data in such a way that it solves a complex problem efficiently. Understanding of data structures is essential and this facilitates to acquire sound knowledge of the insight of hardware requirement to any problem base. The practice and assimilation of data structure techniques is essential for programming.

Course Objectives:

The objective of this course is to enable the students to

- Define Linear and non-linear data structures.
- List and discuss the different types of linear data structures.
- Define a tree and the different terms related with trees.
- Implement linear data structure algorithms using C language.
- Implement non - linear data structure algorithms using C language.
- Write programs for traversing a binary tree.
- Write programs for searching and sorting.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Describe the basic concepts of data structures and solve basic mathematical problems by using arrays and strings.

CO2: Apply the knowledge to solve and perform various operations on Stack and Queue.

CO3: Solve and perform various operations on linked lists.

CO4: Explain the various terminologies, representation and algorithms used in Trees and Graph.

CO5: Analyze the various sorting algorithms and Hash tables.

Pre-requisites: Knowledge in C Language

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	-	-	2	3
CO2	3	3	-	-	-	1	3
CO3	3	3	-	-	-	1	3
CO4	3	2	-	-	-	1	2
CO5	3	2	-	-	-	1	2

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57310	DATA STRUCTURES	L	T	P	C
Theory		4	0	0	4

Unit I	INTRODUCTION TO DATA STRUCTURES, ARRAYS AND STRINGS	
1.1	**Introduction to Data Structures:** Introduction – Data and Information – Elementary data structure organization – Types of data structures –Primitive and Non – Primitive data structures. Operations on data structures: Traversing, Inserting, Deleting, Searching, Sorting and Merging. Different Approaches to designing an algorithm: Top - Down approach, Bottom – up approach. **Complexity: Time complexity, Space complexity – Big 'O' Notation (Concepts only not for Autonomous Exam).**	15
1.2	**Arrays** : Introduction - Characteristics of Array – One Dimensional Array – Two Dimensional Arrays– Pointer and Arrays - **Strings:** Strings and their representations – **Multi Dimensional Arrays – Advantages and Disadvantages of linear arrays – Row Major order – Column Major order – Operations on arrays with Algorithms (searching, traversing, inserting, deleting) – Pointers and Two Dimensional Arrays – Array of Pointers – Pointers and Strings – String Conversion – String manipulation, String arrays (Concepts only not for Autonomous Exam).**	

Unit II	STACKS,RECURSION AND QUEUES	
2.1	**Recursion and Queues Recursion:** Recursive definition – Factorial Function **Queues:** The queue and its sequential representation implementation of Queues and their operations **– GCD function – Properties of Recursive algorithms/functions – implementation of Circular queues and their operations – Dequeue and Priority queues (Concepts only not for autonomous exam)**	12
2.2	**Stack:** Definition of a Stack – Operations on Stack (PUSH & POP) Implementing Push and Pop Operations –Implementation of stack through arrays. Applications of Stack: Reversing a list – Conversion of infix to postfix expression **– Polish notations – Evaluation of postfix expression – Algorithm for evaluating Infix to prefix expression (Concepts only not for Autonomous Exams).**	

Unit III	LINKED LISTS	
3.1	**Terminologies:** Node, Address, Pointer, Information, Null Pointer, Empty list. Type of lists – Singly linked list, Doubly linked list, Circular list – Representation of singly linked lists in Memory – Difference between Linked & sequential List – Advantages	15

and Disadvantages of Linked list. **3.2 Operations on a singly linked list:** Traversing a singly linked list, Searching a singly linked list, Inserting a new node in a singly linked list (front, middle, end), Deleting a node from a singly linked list (front, middle, rear) - Doubly linked list, **Circular linked lists (Concepts only not for Autonomous Exam)**	
Unit IV	**TREES**
4.1 Trees Terminologies – Degree of a node, degree of a tree, level of a node, leaf node, Depth / Height of a tree, In-degree & out-Degree, Path, Ancestor & descendant nodes, siblings – Type of Trees – Binary tree - List representation of Tree. Binary tree traversal (only algorithm): In order traversal, Pre-order traversal, Post order traversal. **Graphs: Introduction – Terminologies, graph, node (Vertices), arcs (edge), directed graph, in–degree, out-degree, adjacent, successor, predecessor, relation, weight, path, length – Representations of a graph – Adjacency Matrix Representation – Adjacency List Representation. Traversal of graphs: Depth – first search (DFS), Breadth – first search (BFS) – Applications of Graph (Concepts only not for Autonomous Exam).**	9
Unit V	**SORTING AND SEARCHING**
5.1 Sorting Techniques: Introduction – Algorithms and "C" programs for Selection sort, Insertion sort, Bubble sort (Algorithms only), Merge Sort, Quick sort, **Radix sort (Concept only not for Autonomous Exam)**. **5.2 Searching and Hashing Searching:** Introduction – Algorithms and "C" programs for Linear search and Binary search. **Hashing: Hash tables – methods – Hash function – Collision resolution techniques (Concepts only not for Autonomous Exam).**	9
TOTAL PERIODS	**60**

Suggested List of Students Activity:

The following student activities or similar activities can be assigned

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class Assessments conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Textbooks:

1. Yeswanth Kanetkar, “Let us C”, BPB Publications New Delhi, Fourth Revised Edition, 2016.
2. ISRD Group, “Programming and Problem-Solving using C”, Tata Mc-GrawHill, Sixth Reprint 2010
3. D.Ravichandran, “Programming in C”, New Age International Publishers, Chennai, Revised Edition, 2021.
4. SeyMour Lipshutz Schaum, “Data Structures”, TMH Pvt. Ltd. New Delhi, Indian Adapted Edition 2006. Reprint 2011.

Reference Books:

1. Venkatesh Baitipuli, “Introduction to Data structures Using C”, University Science Press, Chennai, First Edition 2009.
2. Dharmender Singh Kushwaha and Arun Kumar Misra, “Data Structures- A Programming approach with C”, Prentice Hall of India, New Delhi, Second Edition, 2012.

57320	WEB FUNDAMENTALS	L	T	P	C
Theory		4	0	0	4

Introduction:

The main objective of this subject is to introduce the students to the building blocks of Internet and Web Design & development principles using HTML and CSS. The subject will impart knowledge to design web pages, static web sites with media elements. After completion the students will be able to independently design and develop a static websites.

Course Objectives:

The objective of this course is to enable the students to

- .Understand the Basics of Internet and HTML
- Understand Advanced HTML, tables and frames
- Understand HTML forms and basics of CSS
- Understand Advanced CSS3
- Host website on a web host.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: To impart knowledge on Internet basics and Networking concepts.

CO2: To understand the basic principles of Web Development.

CO3: To learn and implement interactive Web pages using HTML and CSS.

CO4: Analyse the elements of CSS3 in formatting and animations of web pages.

CO5: Develop Web Applications

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	3
CO2	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57320	WEB FUNDAMENTALS	L	T	P	C
Theory		4	0	0	4

Unit I	INTRODUCTION TO THE WEB AND HTML	
Introduction to the Web: Internet Basics and WWW **-** History of the Web – Web Applications – Web Architecture – Web Servers – Web Browsers **- <u>Basic concept of Networking - Internet Protocols – TCP/IP Protocol Suite –UDP – FTP- SMTP - HTTP – MIME –IP addresses (Concepts only not for Autonomous Exams).</u>** **HTML Basics**: Introduction – Structure of HTML – HTML Editors - Basic Tags of HTML: HTML Tag – Title Tag – Body Tag – Comments - Formatting of Text: Header, Bold, Italic, Underline, Paragraph, TT, Strikethrough, EM, BR and Font Tag – Working with Images – HTML emojis – META Tag.		12
Unit II	**ADVANCED HTML, TABLES AND FRAMES**	
Advanced HTML: **<u>Difference between HTML and HTML5 (Concepts only not for Autonomous Exams)</u>** – New elements in HTML5: Canvas –SVG – Media elements: Video – Audio – playing youtube video in HTML - Links – Theoretical Link using Link Tag – Hyper Link using Anchor tag – Lists – Unordered Lists – Ordered List – Definition Lists. Tables and Frames: Tables – Table, TR, TH and TD Tags – Caption – Thead - Tfoot - Colsgroup – Col – Colspan and Rowspan, Cell Padding and Cell Spacing – DIV Tag - **<u>Frames: Frameset – Frame Tag – Frame inside other frames – NoFrames Tag (Concepts only not for Autonomous Exams).</u>**		10
Unit III	**FORMS AND CSS**	
FORMS: Form and Input Tag - Label – Text field – Textbox - Check Box – Radio Button – Text area – Select Tag and Pull Down Lists – Buttons: Hidden – Submit – Reset - File upload and Image Button. **CSS**: Introduction – Features – Syntax – Types of Style Sheets: Inline, Embedded and External **CSS Selector:** Grouping – Type selectors – universal selectors – Descendant selectors – Child selectors –Dynamic Pseudo classes: hover, active, focus – Class selector – Id Selector.		12

Unit IV	ADVANCED CSS3	
CSS Formatting: Font families, Font Size Kerning, Leading and Indenting - Formatting Colors and Backgrounds: The Color Attribute - The Background Attribute - Background Colors and Images – Borders – Outline –Margin – Padding – List – Table – Forms - Links. **Advanced CSS3:** CSS Rounded Corners – Border Images –Backgrounds – Color Gradients– Shadows – Web Fonts - Text Effects - 2D Transformations - 3D Transformations - Buttons - Counters - CSS tool tips-CSS3Transition - Animations – Pagination - Multiple Column Layouts - User Interface-Filters- Layout : Box Model - Positioning – Flex Box – Grid – CSS3 Responsive – Set View Port – Fluid width – Media- Queries		14
Unit V	**WEB HOSTING**	
Writing Web projects, Web Applications and Design software: Writing web Projects – Identification of Objects – Target Users – Web Team – Planning and process development - Web Applications: Introduction to word press, Joomla, drupal, **Adobe Photoshop, Adobe XD,GIMP (Concepts only not for Autonomous Exams)** **Steps to Hosting a Website:** Types of website: Static website, Dynamic Website – Choosing hosting server: Linux hosting, Windows hosting –Web hosting plan: Shared, VPS, Dedicated, and cloud – DNS server updating– uploading the website.		12
	TOTAL PERIODS	**60**

Suggested List of Students Activity:

The following student activities or similar activities can be assigned

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class Assessments conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Textbooks:

1. Douglas E. Comer, “The Internet Book”, Pearson Education, First Edition, 2006.
2. Terry Felke-Morris, “Web Development and Design Foundations with HTML5”, Pearson, Eight Edition, 2017.
3. Thomas A. Powell, Fritz Schneider, “HTML & CSS: The Complete Reference”, Tata McGraw- Hill, Fifth Edition, 2010.

Web-based/Online Resources:

- https://www.w3schools.com
- https://html.com
- https://www.javatpoint.com/html-tutorial
- https://www.w3schools.com

57330	DATA STRUCTURES USING C	L	T	P	C
PRACTICAL		0	0	4	2

Introduction

As 'C' is the most widely used computer language in software industry to provide the hands on experience o n w r i t i n g C p r o g r a m s a n d on implementation of linear and non-linear, this course is introduced. The knowledge of 'C' language and data structures will be reinforced by practical exercises during the course of study. This course will help students to develop the capability of selecting a particular data structure.

Course Objectives:

The objective of this course is to enable the students to

- . Analyze the given problem.
- Think the logic to solve the given problem
- Write programs based on arrays.
- Write programs to manipulate strings.
- Implement linear data structure algorithms using C language.
- Implement non - linear data structure algorithms using C language.
- Write programs for traversing a binary tree.
- Write programs for searching and sorting.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Create simple programs using arrays, strings and implement linked list using C programming language.

CO2: Create programs to analyze concepts of stack, queue, tree traversal and sorting using C.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	-	2	3
CO2	3	3	3	3	-	2	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes help them learn it faster and retain it longer.
- The teacher can focus the pupils' attention on the relevant facts and introduce scientific principles and concepts with the help of demonstration.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical Test	Practical Test	Practical Document	Practical Examination
Portion	Part A / Cycle 1 Exercises	Part B / Cycle 2 Exercises	All Exercises	All Exercises
Duration	3 Periods	3 Periods	Regularly	3 Hours
Exam Marks	60	60	Each Practical 10 Marks	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	15th Week	

Note:

- **CA1 and CA2**: All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the pattern to be decided by the department.

  The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.

- **CA3:** Practical document should be maintained for every exercises / experiment immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57330	DATA STRUCTURES USING C	L	T	P	C
PRACTICAL		0	0	4	2

Part-A		
Ex.No	**Name of the Experiment**	
1	Write a program in 'C' to perform insertion and deletion operations in an array.	30
2	Write a program in 'C' to concatenate two strings using pointer.	
3	Write a program in 'C' to display the reverse of a string using stack.	
4	Write a program in 'C' to create a singly linked list containing at least five elements. Make necessary assumptions	
5	Write a program in 'C' to implement linear search.	
Part-B		
Ex.No	**Name of the Experiment**	
6	Write a program in 'C' to implement push and pop operations in stack.	30
7	Write a program in 'C' to implement queue and its operations.	
8	Write a program in 'C' to implement pre-order traversal in a binary tree.	
9	Write a program in 'C' to implement binary searching.	
10	Write a program in 'C' to read N numbers and sort them using selection sort.	
	TOTAL PERIODS	**60**

Web-based/Online Resources

- https://www.w3schools.com

Equipment/Facilities required to conduct the Practical Course

Software Requirement:

- C - Compiler

Hardware Requirement:

- Desktop Computer
- Printer

BOARD PRACTICAL EXAMINATION

PART–A

1. Write a program in 'C' to perform insertion and deletion operations in an array.
2. Write a program in 'C' to concatenate two strings using pointer.
3. Write a program in 'C' to display the reverse of a string using stack.
4. Write a program in 'C' to create a singly linked list containing at least five elements. Make necessary assumptions
5. Write a program in 'C' to implement linear search.

PART–B

6. Write a program in 'C' to implement push and pop operations in stack.
7. Write a program in 'C' to implement queue and its operations.
8. Write a program in 'C' to implement pre-order traversal in a binary tree.
9. Write a program in 'C' to implement binary searching.
10. Write a program in 'C' to read N numbers and sort them using selection sort.

57340	WEB FUNDAMENTALS PRACTICAL	L	T	P	C
PRACTICAL		0	0	4	2

Introduction

The main objective of this practical subject is to introduce the students to build a complete site, with the writing of a single web page in Web Design & Programming Practical using HTML and CSS. The subject will impart knowledge to design web pages, dynamic and interactive web sites. After completion the students will be able to independently design and develop web sites and web applications.

Course Objectives:

The objective of this course is to enable the students to

- . Develop to build a complete website using HTML.
- Create web pages using Advanced HTML and CSS.
- Develop a simple web application and host it in a free website.

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand principle of Web page design and about types of websites.

CO 2: Visualize and recognize the basic concept of HTML and application in web designing.

CO 3: Recognize and apply the elements of Creating Style Sheet (CSS).

CO 4: Understand the basic concepts of responsive web page.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	-	2	3
CO2	3	3	3	3	-	2	3
CO3	3	3	3	3	-	3	3
CO4	3	3	3	3	-	3	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes help them learn it faster and retain it longer.
- The teacher can focus the pupils' attention on the relevant facts and introduce scientific principles and concepts with the help of demonstration.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical Test	Practical Test	Practical Document	Practical Examination
Portion	Part A / Cycle 1 Exercises	Part B / Cycle 2 Exercises	All Exercises	All Exercises
Duration	3 Periods	3 Periods	Regularly	3 Hours
Exam Marks	60	60	Each Practical 10 Marks	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	15th Week	

Note:

- **CA1 and CA2**: All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the pattern to be decided by the department.

  The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.

- **CA3:** Practical document should be maintained for every exercises / experiment immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57340	WEB FUNDAMENTALS PRACTICAL	L	T	P	C
PRACTICAL		0	0	4	2

Part-A		
Ex.No	**Name of the Experiment**	
1	Design a single page website for your polytechnic containing a description of the courses offered. It should also contain some general information about the college such as its history, the campus, and its unique features and so on. The site should be colored and each section should have a different color.	30
2	Design a HTML page about computer languages. List the language. Each Language's name is a link. Prepare separate HTML documents for each language and call them in the appropriate link.	
3	Design a HTML Page by adding Media elements	
4	Develop a web page using CSS to create a time table for the class using different border style.	
5	Design a Banner Advertisement using CSS	

Part-B		
Ex.No	**Name of the Experiment**	
6	Design a responsive navigation menu that varies in design on different screen sizes using Media queries.	30
7	Design a web page to demonstrate different types of gradients using CSS	
8	Create a web page to demonstrate responsive pagination using CSS.	
9	Design a web page to demonstrate automatic numbering using CSS counters.	
10	Design a responsive image gallery using media queries suitable for desktops and smart phones.	
	TOTLA PERIODS	**60**

Web-based/Online Resources

- https://www.w3schools.com
- https://html.com
- https://www.javatpoint.com/html-tutorial
- https://www.w3schools.com

Equipment/Facilities required to conduct the Practical Course

Software Requirement:

- Notepad/Notepad++/Dreamweaver
- Any Browser

Hardware Requirement:

- Desktop Computer
- Printer

BOARD PRACTICAL EXAMINATION

PART–A

1. Design a single page website for your polytechnic containing a description of the courses offered. It should also contain some general information about the college such as its history, the campus, and its unique features and so on. The site should be colored and each section should have a different color.
2. Design a HTML page about computer languages. List the language. Each Language's name is a link. Prepare separate HTML documents for each language and call them in the appropriate link.
3. Design a HTML Page by adding Media elements.
4. Develop a web page using CSS to create a time table for the class using different border style.
5. Design a Banner Advertisement using CSS.

PART–B

6. Design a responsive navigation menu, that varies in design on different screen sizes using Media queries.
7. Design a web page to demonstrate different types of gradients using CSS
8. Create a web page to demonstrate responsive pagination using CSS.
9. Design a web page to demonstrate automatic numbering using CSS counters.
10. Design a responsive image gallery using media queries suitable for desktops and smart phones.

57350	DESKTOP PUBLISHING	L	T	P	C
Practicum		1	0	4	3

Introduction

The Desktop Publishing course will enable the students to familiarize with the features and use of application packages such as CorelDraw, Photoshop and Adobe InDesign. This subject will develop skills in handling the above packages to develop software for-publishing. It makes the students exactly suitable for DTP industry.

Course Objectives:

The objective of this course is to enable the students to

- Learn all tools and options in CorelDraw.
- Create designs like Notebook Wrapper, Invitation and Calendar in CorelDraw or any open-source software.
- Learn all tools and options in Photoshop.
- Create designs using layers, tools, text effects and filters in Photoshop or any equivalent open-source software.
- Learn to use character styles, paragraph styles, text effects and text frame in Adobe In design or any equivalent open-source software
- Create master page, multipage document and monthly calendar in Adobe Indesign.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Create graphical designs and manipulate them using various tools in e-publishing software.

CO2: Apply fundamental design principles to create designs for invitations, calendars, logos and other digital materials.

CO3: Develop skills in advanced design techniques and commands to produce e-publications.

CO4: Apply text effects, filtering effects, working with layers and table formatting commands for diverse e-publishing designs.

CO5: Demonstrate the proficiency in using table tools and formatting commands to design a stylish monthly calendar sheet.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	-	2	3
CO2	3	2	3	3	2	3	2
CO3	2	3	3	3	2	3	2
CO4	2	2	2	3	2	3	2
CO5	2	2	2	2	3	2	2

Legend: 3-HighCorrelation, 2-MediumCorrelation, 1-LowCorrelation

Instructional Strategy: Demonstration and Hands-on Training

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57350	DESKTOP PUBLISHING	L	T	P	C
Practicum		1	0	4	3

Unit I	Page Layout Applications	
Theory Introduction to Desktop Publishing - Evolution - Desktop Publishing Tools- Text Editors - Word Processors- Vector Drawing Applications- Page Layout Applications Bitmapped image Applications. Installing vector drawing application - Starting and Opening Drawings - Previewing - Viewing Modes - Saving and Closing Drawings - Workspace - Lines, Shapes, and Outlines- Working with Objects, Symbols, and Layers- Colour, Fills, and Transparencies- Exploring Special Effects- Working with Text- Templates and Styles- Pages and Layout		3
Practical Exercises 1. Create a design using all basic tools and make changes using shape tools. 2. Create a notebook wrapper design using fountain filling and pattern filling tools. 3. Transform one object into another object using a blend tool.		18
Unit II	**Text Tool Applications**	
Theory Getting started with Scribus- Opening, closing and navigating- Text Tools- Shape Tools- Image Frame Tools- Color Management Tools- Master Pages- LayersAlignment and Distribution Tools- PDF Export Options.		3
Practical Exercises 4. Create an invitation using text tools - shape tools - image tables in the page layout software.		6
Unit III	**Image Editing Applications**	
Theory Installing Image editing application- Opening, moving, editing, saving images - Essential Keyboards Shortcuts- Workspace- panels- Selection tools- Crop and slice tools- Colour selection and measuring tools- Text tools- Navigation tools Retouching tools- Painting tools- Drawing tools- Customizing Toolbars- Layers - Layer Mask- Blending modes- Filters.		3

Practical Exercises 5. Create a design by using the various Selection Tools, cutting and pasting the images. 6. Using multiple layers, create a design with the use of masking various images.		12
UNIT IV	**Canva Control Graphic Design**	
Theory Introduction to Canva- Templates- Backgrounds- Working with text- Font StylesElements- images, icons, or graphs- Shapes- Audio- Video- Animation- Applying Filters and Effects- Save- Download and share.		3
Practical Exercises 7. Create a multipage document by using character, paragraph, auto flow and text commands. 8. Create a stylish monthly calendar sheet by using table and its formatting commands.		12
UNIT V	**Text Filtering Applications**	
Theory Creating text effects using filters - Applying shadows, glows, and outlines to text - Applying texture and pattern fills to text		3
Practical Exercises 9. Create a design using text tools and apply text effects. 10. Create a design by applying the various filtering effects.		12
TOTAL HOURS		75

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Reference Books:

- Jain, S. and Geetha, M., Corel Draw Training Guide. BPB Publications, First Edition, 2018.
- Bouton, G.D., CorelDRAW X7. McGraw-Hill Education-Europe, Eleventh Edition, 2014.
- Faulkner, A. and Chavez, C., Adobe Photoshop CC classroom in a book, Adobe Press, First Edition, 2018.
- Anton, K.K. and DeJarld, T., Adobe InDesign Classroom in a Book (2021 Release). Adobe Press, First Edition, 2020.

Web-based/Online Resources:

- https://www.coreldraw.com/en/learn/tutorials/
- https://www.corelDraw.com/en/learn/webinars/
- https://www.vandelaydesign.com/free-CorelDraw-tutorial
- https://www.youtube.com/watch?v=uCcPDSE6vLw
- https://www.scribd.com/doc/13080717/CorelDraw-Course-Manual
- https://www.psdstack.com/resources/photoshop-tutorials/
- https://www.canva.com/designschool/tutorials/

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

HARDWARE REQUIREMENTS

Desktop Computers	..... 30 Nos.
Laser printer	..... 1 No
Scanner	..... 1 No

SOFTWARE REQUIREMENTS

Any Open-Source Software

- GIMP
- Scribus
- Inkscape
- Krita
- Pinta
- Shotwell or any equivalent open-source software. [or]
- Corel draw, Photoshop, Adobe indesign**. (optional)**

BOARD PRACTICAL EXAMINATION

PART–A

1. Create a design using all basic tools and make changes using shape tools.
2. Create a notebook wrapper design using fountain filling and pattern filling tools.
3. Transform one object into another object using a blend tool.
4. Create an invitation using text tools - shape tools - image tables in the page layout software.
5. Create a design by using the various Selection Tools, cutting and pasting the images.

PART–B

6. Using multiple layers, create a design with the use of masking various images.
7. Create a multipage document by using character, paragraph, auto flow and text commands.
8. Create a stylish monthly calendar sheet by using table and its formatting commands.
9. Create a design using text tools and apply text effects.
10. Create a design by applying the various filtering effects.

57360	OPERATING SYSTEM	L	T	P	C
Practicum		1	0	2	2

Introduction

Students have to be conversant with computer, its terminology and functioning. The heart of a computer is based around its Operating System. An operating system acts as an interface between the user of a computer and the computer hardware. The processor deals with request coming from all directions asynchronously. The operating system has to deal with the problems of contention, resource management and both program and user data management, and provide a useful no-wait user interface. The course provides clear vision, understanding and working of Operating Systems.

Course Objectives:

On completion of the following units of syllabus contents, the students must be able to

- To understand the purpose, goals, functions and evolution of Operating Systems. Login and logoff Procedures
- To know how to use of General purpose and communication commands
- To study the use of Search patterns, simple filters and advanced filters
- To know the details of process status
- To understand shell scripts, define the elements of the shell script and write shell script for various problems.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: understand functional architecture of an operating system.
CO2: distinguish CPU scheduling algorithms.
CO3: analyze process coordination.
CO4: classify File System and directory implementations.
CO5: Resource Management

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	2	---	---
CO2	2	3	3	2	2	---	---
CO3	2	2	2	3	3	---	---
CO4	2	2	3	2	2	---	---
CO5	2	3	2	3	3	---	---

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57360	OPERATING SYSTEM	L	T	P	C
Practicum		1	0	2	2

PART – A	INTRODUCTION TO OS	
Introduction to operating system: Basics of Operating system- types of operating system- operating system services – operating system structures – Process Management – Process scheduling Basics of Linux OS: Entering and Exiting from a Linux System – User Accounts – Different shells – Learn the syntax and usage of Directory Management Commands – Check the process status – process management commands – search patterns Deadlocks – Virtual Memory – Page Replacement Algorithms		8
Ex No:1 Write a syntax and execute the directory management commands : ls, cd, pwd, mkdir, rmdir **Ex No:2** Write a syntax and execute the file management commands such as cat, chmod, cp, mv, rm, more **Ex No:3** Write a syntax and execute the general purpose commands : wc, cal, date, who, tty, ln **Ex No:4** Using the simple filters verify pr, head, tail, cut, paste, nl, sort grep, egrep, fgrep, write and wall		15
PART – B	**SHELL SCRIPTS**	
File operations (New, Open, Close, Save, Save and Exit, Print) – Text Editing operations (inserting ,deleting ,finding, replacing, copying and moving)- use of shell scripts – Numerical operations – Looping – Swapping techniques – string operations- using command line arguments – filters-date function- Relational Operations -Logical Operations – Boolean operations – Basic Arithmetic operations – case statement – search directory or file .		7
Ex No 5: Write a shell script that accepts a numerical value N and find sum. **Ex No 6:** Write a shell script to find factorial of the given number. **Ex No 7:** Write a shell script to perform arithmetic calculator using case statement. **Ex No 8:** Write a shell script using command line arguments and reports on whether it is a directory, file or something else.		15
TOTAL PERIODS		**45**

TEXT BOOKS

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Principles, 9th Edition, John Wiley &Sons, 2018.
2. William Stallings, Operating Systems – Internal and Design Principle", 9thEdition, Pearson Education/PHI, 2018.
3. Andrew S Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson/PHI,2014.

Web Reference

1. https://nptel.ac.in/courses/106/105/106105214/
2. https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/pages/lecture-notes-and-readings/
3. https://www.geeksforgeeks.org/what-is-an-operating-system/
4. https://www.w3schools.in/operating-system/intro

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Equipment / Facilities required to conduct the Practical Portion

1. **Hardware Requirement:**
    - Desktop Computers
    - Printer

2. **Software Requirement:**
    - Linux Operating System.

BOARD PRACTICAL

EXAMINATION PART – A

Ex No:1 Write a syntax and execute the directory management commands : ls, cd, pwd, mkdir, rmdir

Ex No:2 Write a syntax and execute the file management commands such as cat, chmod, cp, mv ,rm, more

Ex No:3 Write a syntax and execute the general purpose commands : wc, cal, date, who, tty,ln

Ex No:4 Using the simple filters verify pr, head, tail, cut, paste, nl, sort, grep , egrep, fgrep, write and wall

PART – B

Ex No 5: Write a shell script that accepts a numerical value N and find sum . Ex No 6: Write a shell script to find factorial of the given number.

Ex No 7: Write a shell script to perform arithmetic calculator using case.

Ex No 8: Write a shell script using command line arguments and reports on whether it is a directory, file or something else.

SEMESTER 4

57410	COMPUTER NETWORKS AND SECURITY	L	T	P	C
Theory		3	0	0	3

Introduction:

The course aims to groom the students to gain concepts, knowledge and skills required to work on Computer Networking and Security industry. Course curriculum has-been designed to give overview and use cases of Data Communication, Layered Networks, Inter-networking technology/protocols and Computer Security is covered and this will help to prepare the students to keep pace with computer networking and security industry trends.

Course Objectives:

The objective of this course is to enable the students to

- Understand the concept of data communication
- To know the functions and protocols of each layer of OSI and TCP/IP protocol suite.
- To visualize the end-to-end flow of information.
- Understand the main principles of computer and network security.
- Know different networking devices and their practical usages.
- Know the IP addressing and its mechanisms.
- Identify the attacks and threats.
- Study about Cryptography and different Cryptography Algorithms.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Remember the fundamentals of Computer Networks.

CO2: Identify core networking and infrastructure components, and the services

CO3: Examine the different networking applications

CO4: Understand fundamental properties of computer security, such as Authentication, Authorization, and Data confidentiality and Integrity.

CO5: Identify the concept of the internet and security issues.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	1	1
CO2	3	3	3	1	1	1	2
CO3	3	3	3	1	1	1	1
CO4	3	3	3	1	1	1	2
CO5	3	3	3	1	1	1	2

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57410	COMPUTER NETWORKS AND SECURITY	L	T	P	C
Theory		3	0	0	3

Unit I	DATA COMMUNICATIONS	
Data Communication: Components of a data communication– Data flow: Simplex - Half duplex - Full duplex; Networks- Network Criteria – Types of Connections: Point to Point – Multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology. Types of Networks: Need of Computer Networks – LAN – MAN – WAN – Internet – Intranet – Internet Service Providers (ISP) – Client-server – Peer to Peer – Wi-Fi – Bluetooth – Protocols and Standards Network Devices: Switches – Bridges – Routers – Gateways;		9

Unit II	DATALINK LAYER	
Network Models: OSI Model – Layered Architecture – Function of Layers – TCP/IP Protocol Suite 802.X Protocols: Concepts and PDU format of CSMA/CD(802.3) – Token ring (802.5) – Ethernet – Types of Ethernet(Fast Ethernet, gigabit Ethernet, High speed Ethernet 10GE to 800GE) – Comparison between 802.3 and 802.5 IP Addressing: Dotted Decimal Notation		9

Unit III	NETWORK,TRANSPORT AND APPLICATION LAYER	
Network Layer Protocol: IP – Subnetting and Supernetting – Ipv4 – Ipv6 - **Interior Gateway Protocols: IGMP, ICMP, ARP, RARP (Concepts only not for Autonomous Exams)** Overview of TCP/IP - Transport Layer Protocols: Stop and wait protocol-Go Back N Protocol – Connection Oriented and Connectionless Service – Sockets – TCP and UDP Application Layer Protocols: FTP – HTTP – SMTP – POP -DNS - Telnet		9

Unit IV	NETWORK SECURITY AND IP SECURITY	
Network Security: Definition – Need of Network Security – Principles of Security – Attacks – Types of Attacks – Criminal Attacks – Legal Attacks – Passive and Active Attacks – Software Supply Chain Attacks Cryptography: Definition – Symmetric Encryption Principles – Symmetric Block		9

Encryption algorithms – DES - Digest Function – Public key cryptography principles – Digital Signature – Digital Signature – **RSA – Internet Security: Email Security: PGP – S/MIME; IP Security: Overview – Architecture (Concepts only not for Autonomous Exams)**		
Unit V	**NETWORK SECURITY APPLICATIONS**	
Hackers Techniques: Historical hacking techniques and Open sharing – Bad Passwords – Advanced techniques – Viruses – Worms – Trojan Horses – SPAM Security Mechanisms: Introduction – Types of Firewalls – Packet Filters – Application Gateways – Limitation of Firewalls .Intrusion: Intruders – Intruder detection – Classification of Intruder - Detection Systems – Honeypots		9
	TOTAL PERIODS	**45**

Textbooks for References:

1. Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw-Hill, 2007.
2. Andrew S. Tanenbaum "Computer Networks", Fifth Edition, Pearson Prentice Hall Edition, 2011.
3. William Stallings, "Data and Computer Communications", Eighth Edition, Pearson Education, 2011.

Web-based/Online Resources:

1. https://www.pynetlabs.com/network-devices-and-its-various-types/
2. https://learn.microsoft.com/enus/dotnet/fundamentals/networking/sockets/socket-services
3. https://portswigger.net/research/top-10-web-hacking-techniques-of-2021

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class Assessments conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field

57420	DATABASE TECHNOLOGY	L	T	P	C
Theory		3	0	0	3

Introduction:

The Database Management system is a collection of programs that enables to store, modify, and extract information from a database. The primary resource that fuels knowledge power is the database. Organizations are employing mechanisms to effectively manage and utilize the data stored in the databases. Relational Database Management System (RDBMS) has been developed to harness the information stored in the database. All modern database management systems like SQL, MS SQL Server, IBM DB2, ORACLE, My-SQL, and Microsoft Access are based on RDBMS. It is based on the relational model introduced by E.F. Codd. A relational database is the most commonly used database. Due to a collection of an organized set of tables, data can be accessed easily in RDBMS.

The major objectives of this subject are to provide a strong formal foundation in Database Concepts, technology, and practice to the students to enhance them into well informed application developers.

Course Objectives:

On completion subject, the students must be able to

- Describe data, database, database management systems and database models.
- To make the students to understand the concept of relational model and constraints.
- Understand Normalization and explain different types of normal form.
- To know DDL, DML, DCL and all related commands.
- Write logical and conditional statement for database query.
- Works with Procedures and functions.
- Create and use Cursors and Triggers.
- Implements Database Connection with PHP.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Understand database concepts, applications, and data models.

CO2: Demonstrate the use of relational data constraints.

CO3: Use SQL commands in querying the database.

CO4: Demonstrate Normalization process.

CO5: Create SQL procedure and function according to conditions. Apply triggers and cursor on database.

Pre-requisites: Basic Computer Knowledge

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	2	2	-	1
CO2	3	3	-	2	2	-	1
CO3	3	3	-	2	2	-	1
CO4	3	2	1	2	2	-	1
CO5	3	2	1	2	2	-	1

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**
  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57420	DATABASE TECHNOLOGY	L	T	P	C
Theory		3	0	0	3

Unit I	CONCEPTS OF DATABASES AND DATA MODELING	
1.1 Basic Concepts: Introduction – Data, Databases, Database Management System – Components of Database – Data Dictionary – **Architecture: Three level architecture – Client / Server and Distributed concept (Concepts only not for Autonomous Exams)** 1.2 Data Models: **Types of Database models: Hierarchical Database Model, Network Database Model (Concepts only not for Autonomous Exams),** Relational Database Model - ER model: Entities - Attributes – Relationships – ER diagram. 1.3 Relational data model: Table Structure – Records, rows, tuples, attributes. Keys: Primary key, foreign key, composite key. Data Integrity – Data constraints and validation – Types of constraints – Difference between SQL and MySQL.		9

Unit II	MYSQL BASIC COMMANDS	
2.1 Introduction to MySQL: Creating (CREATE cmd), Selecting (USE cmd) and Describing database (DESC cmd) – SHOW cmd – backing up and recovery of databases. 2.2 MySQL data types and Commands: Data Types: Number, String, Date/Time - Data Definition Commands – Data Manipulation Commands – Data retrieval commands. 2.3 MySQL Operators: Types of Operators – Arithmetic, Comparison and logical operators		9

Unit III	INTERACTIVE MYSQL	
3.1 Built-in Functions: Single row functions – Aggregate functions – Conversion functions. 3.2 Querying the table: Selecting rows using Where, Order by, group by & Having clauses. 3.3 Flow control: IF(), IF NULL(), CASE, LOOP, LEAVE, ITERATE, REPEAT, WHILE		9

Unit IV	MYSQL PERFORMANCE TUNING	
4.1 Views: Introduction – Advantages of views – Creating, Updating and Deleting views. 4.2 Joins: Definition - Types of Joins: natural join, inner join, self-join, outer join.		9

4.3 User and Transaction management: Creating, deleting, renaming users - grant & revoke commands – Transaction commands: commit, rollback and save points.		
Unit V	**STORED PROGRAM CONCEPTS & DEVELOPMENT**	
5.1 MySQL Procedures & Functions: Creating – Executing and Deleting stored procedures – Creating –Executing and Deleting stored functions – Advantages. 5.2 MySQL Trigger & Cursor: Use of Trigger – Creating Trigger – Types of Triggers – Cursor: Creation and Deletion. 5.3 MySQL with PHP: MySQL Application Programming Interfaces - Database connections – Performing Queries – Closing Connections.		9
	TOTAL PERIODS	**45**

Suggested List of Students Activity:

Industrial visits / Seminars / Assignment / Group Discussions

Execution Notes:

- Maximum of 3studentsineachbatchforstudentactivity
- Above activities may be distributed among different batches; Any one activity among 1 to 5 or any similar activities per batch may be assigned by the teacher based on interest of the students.

Textbooks:

1. Database System Concepts, Abraham Silberschatz, Henry F.Forth, S.Sudarshan, Mc Graw Hill Education, Seventh Edition
2. Murach's MySQL, Joel Murach, Mike Murach & Associates, Inc, 3rd Edition
3. MySQL Developers library, Paul DuBois, Addison Wesley, 4th Edition
4. The Complete Reference MySQL, Vikram Vaswami, McGraw Hill Professional, 1st Edition

Reference Books:

1. Fundamentals of Database Systems, Ramez Elmsari,Shamkant B Navathe, Pearson Education, 7th Edition
2. An Introduction to Database Systems, C J Date, A Kannan, S Swaminathan, Pearson Education, 8th Edition

Web-based/Online Resources:

1. https://docs.oracle.com/en/database/index.html
2. https://docs.oracle.com/database/121/SQLRF/toc.htm
3. www.nptel.ac.in
4. www.khanacademy.org

57430	DATABASE TECHNOLOGY PRACTICAL	L	T	P	C
PRACTICAL		0	0	4	2

Introduction

The main objective of this practical subject is to provide basic and advanced concepts of MySQL. MySQL is a relational database management system based on the Structured Query Language, which is the popular language for accessing and managing records in the database. MySQL is open-source and free software under the GNU license. This practical includes all topics of MySQL database that provide for how to manage database and manipulate data with the help of various SQL queries. By the end of this course the students will be able to write simple and advanced SQL code blocks, use advanced features such as cursors and bulk fetches and database designing with normalization. Hence students will be able to design database which will be helpful to them in the designing phase of project in the upcoming semester.

Course Objectives:

The objective of this course is to enable the students to

- . How to install, configure and connect to MySQL server and MySQL workbench in Windows.
- Understand basic concepts of how a database stores information via tables.
- Understand SQL syntax used with MySQL.
- Learn how to retrieve and manipulate data from or on more tables.
- Learn how to filter data based upon multiple conditions.
- Understand the advantages of stored functions and procedures.
- Learn way of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Perform queries on datasets using MySQL.

CO2: Implement Data Manipulation and Transactional Commands

CO3: Perform joins, views on multiple tables.

CO4: Apply various Normalization techniques.

CO5: Write PL/SQL block using concept of Procedure, Function, Cursor Management, and Triggers Implement program to connect MySQL with PHP

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	2	-	1
CO2	3	2	1	-	1	-	1
CO3	3	2	1	1	1	-	1
CO4	3	1	1	1	1	-	1
CO5	3	3	3	1	1	-	1

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes help them learn it faster and retain it longer.
- Use of Visual Aids: Utilize visual aids such as diagrams, tables, and animations to clarify complex concepts like Normalization, Joins, Views, Stored Procedures, Triggers and Cursors. Visual representations help reinforce learning and improve comprehension.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical Test	Practical Test	Practical Document	Practical Examination
Portion	Part A / Cycle 1 Exercises	Part B / Cycle 2 Exercises	All Exercises	All Exercises
Duration	3 Periods	3 Periods	Regularly	3 Hours
Exam Marks	60	60	Each Practical 10 Marks	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	15th Week	

Note:

- **CA1 and CA2**: All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the pattern to be decided by the department.

  The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** Practical document should be maintained for every exercises / experiment immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57430	DATABASE TECHNOLOGY PRACTICAL	L	T	P	C
PRACTICAL		0	0	4	2

Part-A

1. Install, configure and connect to MySQL server and MySQL workbench in windows. Create a database, backup and restore the database. 2. To study Basic MySQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands: a. Create a database named 'employee'. b. Use the database 'employee' and create a table 'emp' with attributes 'ename', 'ecity', 'salary', 'enumber', 'eaddress', 'deptname'. c. Create another table 'Company' with attributes 'cname', 'ccity', 'empnumber'in the database 'employee'. 3. To study the viewing commands and compound conditions (select, update, and, between) and execute the following queries using these commands: a. Find the names of all employees who live in Chennai. b. Increase the salary of all employees by Rs.5,000. c. Find the names of all employees who live in 'Chennai' and whose salary is between Rs.20,000 to Rs.30,000. d. Find the names of all employees whose names begin with either letter 'A' or 'B'. 4. Create a table to store the details of a customer in a Bank. Do some transactions like withdrawal, deposit. Find the Balance amount(Credit Limit). Based on customer's credit limit, write a program using IF or CASE flow control statements to find the customer levels namely SILVER, GOLD or PLATINUM. a. If the Credit limit is b. greater than 50K, then the customer level is PLATINUM c. less than 50K and greater than 10K, then the customer level is GOLD d. less than 10K, then the customer level is SILVER 5. Create a library table with proper fields. Create another table called library1 and insert rows from library table.	30

Hint: a. CREATE TABLE new_table LIKE original_table; b. INSERT INTO new_table SELECT * FROM original_table;	
Part-B	
6. Create two tables with the following structure. a) users - table name user_id - UNSIGNED, INT, AUTO INCREMENT, PRIMARY KEY username - VARCHAR (60) password - VARCHAR (128) email - VARCHAR (255) b) users_profiles user_id - FOREIGN KEY refers to user_id field of user table first_name - VARCHAR(60) last_name - VARCHAR(60) mobile - VARCHAR(15) i. SELECT all the users along with their profile details. (Hint: Use INNER JOIN) ii. SELECT the users who do not have profiles (Hint: USE LEFT JOIN and exclude the rows generated with NULL values from joining table) 7. Create an employee database and create a stored procedure that accepts employee_Id as input and returns complete details of employee as output. 8. Create two tables with the following structure a. Authors author_id - INT name VARCHAR (60) titles_count INT -- holds the total number numbers of titles authored. b. Titles author_id - INT name VARCHAR (512) -- name of the title Create a trigger to update the titles count field of respective row in authors table each time a title gets inserted into titles table. 9. Create a table to store the salary details of the employees in a company. Declare the cursor id to contain employee number, employee name and	30

net salary. Use cursor to update the employee. 10. Write a program to connect PHP with MySQL and create a database using PHP MySQL.	
TOTAL PERIODS	**60**

Equipment/Facilities required to conduct the Practical Course

Software Requirement:

- MySQL Server 5.5.1 or above

Hardware Requirement:

- Desktop Computers

BOARD PRACTICAL EXAMINATION

PART–A

1. Install, configure and connect to MySQL server and MySQL workbench in windows. Create a database, backup and restore the database.
2. To study Basic MySQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:
    a. Create a database named 'employee'.
    b. Use the database 'employee' and create a table 'emp' with attributes 'ename', 'ecity', 'salary', 'enumber', 'eaddress', 'deptname'.
    c. Create another table 'Company' with attributes 'cname', 'ccity', 'empnumber'in the database 'employee'.
3. To study the viewing commands and compound conditions (select, update, and, between) and execute the following queries using these commands:
    a. Find the names of all employees who live in Chennai.
    b. Increase the salary of all employees by Rs.5,000.
    c. Find the names of all employees who live in 'Chennai' and whose salary is between Rs.20,000 to Rs.30,000.
    d. Find the names of all employees whose names begin with either letter 'A' or 'B'.
4. Create a table to store the details of a customer in a Bank. Do some transactions like withdrawal, deposit. Find the Balance amount(Credit Limit). Based on customer's credit limit, write a program using IF or CASE flow control statements to find the customer levels namely SILVER, GOLD or PLATINUM.

a. If the Credit limit is
b. greater than 50K, then the customer level is PLATINUM
c. less than 50K and greater than 10K, then the customer level is GOLD
d. less than 10K, then the customer level is SILVER

5. Create a library table with proper fields. Create another table called library1 and insert rows from library table.

   Hint:

   a. CREATE TABLE new_table LIKE original_table;
   b. INSERT INTO new_table SELECT * FROM original_table;

PART–B

6. Create two tables with the following structure.

   c) users - table name

      user_id - UNSIGNED, INT, AUTO INCREMENT, PRIMARY KEY

      username - VARCHAR (60)

      password - VARCHAR (128)

      email - VARCHAR (255)

   d) users_profiles

      user_id - FOREIGN KEY refers to user_id field of user table

      first_name - VARCHAR(60)

      last_name - VARCHAR(60)

      mobile - VARCHAR(15)

   iii. SELECT all the users along with their profile details. (Hint: Use INNER JOIN)

   iv. SELECT the users who do not have profiles (Hint: USE LEFT JOIN and exclude the rows generated with NULL values from joining table)

7. Create an employee database and create a stored procedure that accepts employee_Id as input and returns complete details of employee as output.
8. Create two tables with the following structure

   a. Authors

      author_id - INT

      name VARCHAR (60)

      titles_count INT -- holds the total number numbers of titles authored.

b. Titles

author_id - INT

name VARCHAR (512) -- name of the title

Create a trigger to update the titles count field of respective row in authors table each time a title gets inserted into titles table.

9. Create a table to store the salary details of the employees in a company. Declare the cursor id to contain employee number, employee name and net salary. Use cursor to update the employee.
10. Write a program to connect PHP with MySQL and create a database using PHP MySQL.

57440	PYTHON PROGRAMMING	L	T	P	C
Practicum		1	0	4	3

Introduction

Being able to implement the basic logical statements in python and explore python various data structures and packages which are much useful in the fields of data science, artificial intelligence.

Course Objectives:

The objective of this course is to enable the students to

- To read and write simple python programs.
- To define strings in python and operations on string.
- Represent compound data using python lists, tuples, dictionaries.
- To define and access multi-dimensional arrays using NumPy.
- To do input/output with files in python..

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Demonstrate the installation process of python IDE and modules.

CO2: Implement the decision making and looping statements in python.

CO3: Define regular expression for the pattern and verify for the validity.

CO4: Create and access string, list, tuple, dictionary and NumPy array.

CO5: Read and write text and csv file using python.

Pre-requisites: Nil

-

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	---	---	---
CO2	3	3	3	3	---	---	---
CO3	3	3	3	3	---	---	---
CO4	3	2	3	3	---	---	---
CO5	3	3	3	3	---	---	---

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.

- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57440	PYTHON PROGRAMMING	L	T	P	C
Practicum		1	0	4	3

Unit I	INTRODUCTION TO PYTHON	
Installing and running Python in interpreter and Interactive mode, Basic Datatypes in Python: int, float, string. Storing Values in Variables, Basic functions in Python: input (), print (), str (), int (), float (). Decision Making – Simple if, if…else and if … elif statement; Control Statement: while, break, continue, for loop, range ().		4
Ex No 1: Write a python program to read three numbers and print the greatest of three numbers. **Ex No 2**: Write a python program to find the sum of N number using range() function in for loop.		12
Unit II	**STRING, LIST, TUPLE, DICTIONARY**	
Sequence Data types. Operations on sequence data types: Indexing and slicing, concatenation, and replication, in and not in operators to access elements. List: Creation, mutable property, In build methods of List: index (), append (), insert (), sort (), reverse (). Tuple: immutable property, converting types using tuple (), list (). Dictionary Data type: Creation, keys (), values () and items () methods.		4
Ex No 3: Write a python program to demonstrate the string slicing, concatenation, replication and len() method. **Ex No 4:** Write a python program to create a tuple and convert into a list and print the list in sorted order. **Ex No 5:** Write a python program to create a dictionary and check whether a key or value exist in the dictionary.		16
Unit III	**NumPy**	
Install and import NumPy module, Creation of one dimensional, 2D-dimensional NumPy array using array (), Slicing, indexing, NumPy methods: shape (), reshape(), concatenate (), where (). Arithmetic operations in NumPy, Aggregation functions in NumPy.		4

Ex No 6: Write a python program to create one dimensional array and convert into a 2D-dimensional array using reshape(), print the first two columns alone using slicing.	
Ex No 7: Write a python program to create two-dimensional array and search for an element using where () function. **Ex No 8**: Write a python program to create a 2D-dimensional array and demonstrate aggregation functions sum (), min () and max () in the row and column wise.	16
UNIT IV	**FILE HANDLING**
Text file handling: file opening mode, reading from a file: read(), readline(), readlines() and writing into a file: write(), writeline(). Pandas package: install and import pandas, read and write a csv file, pandas methods: head(), describe().	3
Ex No 9: Write a python program to read a text file and write the content in another file. **Ex No 10**: Write a python program to read a csv file using pandas and print the content.	16
TOTAL PERIODS	**75**

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

REFERENCE BOOKS

1. Al Sweigart, Automate the Boring Stuff with Python, Second Edition, No Starch Press,2019.
2. Jake Vanderplas, Python Data Science Handbook, Essential tool for working with data, First Edition, O'Reilly Media, Inc,2017.
3. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy and Ipython, Wes McKinney, Second Edition, O'REILLY, 2017.

Equipment / Facilities required to conduct the Practical Portion

1. **Hardware Requirement:**
    - DesktopComputers/ Laptop
    - Printer
2. **Software Requirement:**
    - Windows / Linux Operating System
    - Python IDLE /Spyder.

BOARD PRACTICAL

EXAMINATION PART – A

Ex No 1: Write a python program to read three numbers and print the greatest of three numbers.

Ex No 2: Write a python program to find the sum of N number using range () function in for loop.

Ex No 3: Write a python program to demonstrate the string slicing, concatenation, replication and len() method.

Ex No 4: Write a python program to create a tuple and convert into a list and print the list in sorted order.

Ex No 5: Write a python program to create a dictionary and check whether a key or value exist in the dictionary.

PART – B

Ex No 6: Write a python program to create one dimensional array and convert into a 2D-dimensional array using reshape (), print the first two columns alone using slicing.

Ex No 7: Write a python program to create two-dimensional array and search for an element using where () function.

Ex No 8: Write a python program to create a 2D-dimensional array and demonstrate aggregation functions sum (), min () and max () in the row and column wise.

Ex No 9: Write a python program to read a text file and write the content in another file.

Ex No 10: Write a python program to read **a csv file** using pandas and print the content.

57450	CLIENT SIDE SCRIPTING	L	T	P	C
Practicum		2	0	2	3

Introduction

The course aims to groom the students to enable them to work on current technology scenarios: in specific about the client-side scripting language java script and prepare the students to keep pace with the changing face of technology and the requirements of the growing IT industry. The course curriculum has been designed keeping in view the emerging trends in java script and futuristic human resource requirements of the IT industry.

Course Objectives:

The objective of this course is to enable the students to

- . To understand an overview of the basic concepts of Java script;
- To understand about how Java script provides dynamic programming that is heavily used in the modern web.
- When used as a client-side language, Java script is very fast as it runs immediately in the browser.
- To know the practical adoption of a DOM and the usage and advantages of event handling
- To understand the Concepts of jquery, Web API and JSON

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Gain a comprehensive understanding of JavaScript syntax, variables, and data types.

CO2: Analyze and solve programming problems using JavaScript functions and objects effectively.

CO3: Design and implement interactive web applications using JavaScript object models like DOM and BOM.

CO4: Develop proficiency in handling user events and creating responsive web interfaces with JavaScript event handling techniques.

CO5: Apply jQuery library and JSON for efficient client-side scripting and data exchange, enhancing web application functionality.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	3
CO2	3	1	3	2	1	2	3
CO3	2	1	2	2	2	3	3
CO4	3	3	3	3	3	3	3
CO5	3	3	3	2	3	3	3

Legend: 3-HighCorrelation, 2-MediumCorrelation, 1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57450	CLIENT SIDE SCRIPTING	L	T	P	C
Practicum		2	0	2	3

Unit I	INTRODUCTION TO JAVA SCRIPT	
INTRODUCTION TO JAVA SCRIPT: Introduction – A real programming language – History of java script–Overview of Java script Core language Features–Basic definitions- Variables and Data Types: Declaring Variables– Life span of variables-Data Types - Operators: Assignment, comparison, computational and logical operators. **ADDING JAVA SCRIPT TO HTML**– Script element– Language attribute–Type attribute – using the script element – script element in the head section – First java script Hello World example. Control Structures**:** Conditional Statements – Loop Statements: for, while, for in, break and continue statements.		6
Experiment 1: Write a Java script code that converts the entered text to uppercase. Experiment 2: Write a Java script code to validate the username and password. The username and password are stored in variables.		6
Unit II	**FUNCTIONS, OBJECTS AND ARRAYS**	
Functions: Basics–Passing parameters–Return statements–Local and global variables–Variable naming for scope—**Inner Function—Closure—Function as Objects—Function literals—Anonymous functions–Static variables–Advanced parameter passing – Advanced function properties and methods (Concepts only not for Autonomous Exams)** –Recursive functions. **Object:** Objects in Java script, Fundamentals, Object creation, **Object destruction and garbage collection, properties, methods, reference types, passing objects to functions (Concepts only not for Autonomous Exams).** **Arrays:** Accessing array elements – Adding, changing and removing array elements – Manipulating arrays – **Multidimensional arrays –Extending array with prototypes (Concepts only not for Autonomous Exams)**– Date		6
Experiment 3: Write a Java Script code to count the number of Vowels in a string.		6

Experiment 4: Write a JavaScript Code to display date and Time.		
Unit III	**JAVASCRIPT OBJECTMODELS**	
Object Model: Overview–Initial Java script object model–Window object–Screen Object-Location object–History object-Navigator object – Dialog methods: prompt box – alert box – confirms box – Java script Timings. **Cookies:** Introduction -create a cookie- read a cookie – delete a cookie – get and set a cookie – **Maps : Client side image map – server side Image map (Concepts only not for Autonomous Exams)** – Form handling: Properties - Accessing form and fields- form validation		6
Experiment 5: Write a JavaScript function that accept row, column, (to identify a particular cell) and a string to update the content of that cell. Experiment 6: Write a Java Script program to perform Form validation		6
Unit IV	**JAVASCRIPT EVENT HANDLING**	
Document Object Model: Introduction – Accessing document objects– Methods – DOM document – elements – DOM HTML – DOM forms **animations – DOM CSS (Concepts only not for Autonomous Exams)** – DOM Navigation- DOM Nodes – Node lists – collections. **Events Handling:** Overview of events and event handling – Event attributes – Binding event handler attributes with java script – Event types: Mouse events, Keyboard events, Focus events, **UI events, loading events, and custom events (Concepts only not for Autonomous Exams)** – event listeners.		6
Experiment 7: Write a Java Script program to get the width and height of the window (anytime the window is resized). Experiment 8: Write a Java Script program to find the area of rectangle on clicking the submit button.		6
Unit V	**JQUERY JSON AND API**	
Jquery: Introduction – adding jquery to web page –syntax – selectors–events – Jquery effects: hide/show, fade, slide animate, stop, call back, chaining, Jquery DOM Manipulation, CSS and dimensions. **JSON** : Introduction – Syntax- JSON vs XML – Data types – Parse – Stringify – Objects **– Server – Arrays – HTML – JSONP Web API : Introduction – Forms**		6

API – History API – Storage API –Fetch API – Geo Location API – web worker API (Concepts only not for Autonomous Exams).	
Experiment 9: Write a Jquery Program for disable/enable the form submit button & blink the text. Experiment 10: Write a function which takes in an array of arrays, and returns an object with each pair of elements in the array as a key-value pair.(convert list to JSON object) Mini Project: Create a web site using HTML, CSS and JavaScript.	6
TOTAL PERIODS	**60**

REFERENCE BOOKS

1. Thomas A. Powells Fritz Schneider, "Java Script :The Complete Reference", Standard Edition, Mc GrawHill, 2001.
2. JonDuckett, "Java script and Jquery: Interactive front End Web Development", First Edition, Wiley, 2014.
3. Eric Freeman, Elisabeth Robson, "Head First Java Programming" , Second Edition, OReily Media Inc., 2005.

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Equipment / Facilities required to conduct the Practical Portion

1. **Hardware Requirement:**
    - Desktop Computers/ Laptop
    - Printer
2. **Software Requirement:**
    - Chrome / Firefox
    - Notepad++

BOARD PRACTICAL

EXAMINATION PART – A

1. Write a Java script code that converts the entered text to uppercase.
2. Write a Java script code to validate the username and password. The username and password are stored in variables.
3. Write a Java Script code to count the number of Vowels in a string.
4. Write a JavaScript Code to display date and Time.
5. Write a JavaScript function that accept row, column, (to identify a particular cell) and a string to update the content of that cell.

PART – B

6. Write a Java Script program to perform Form validation.
7. Write a Java Script program to get the width and height of the window (anytime the window is resized).
8. Write a Java Script program to find the area of rectangle on clicking the submit button.
9. Write a Jquery Program for disable/enable the form submit button & blink the text.
10. Write a function which takes in an array of arrays, and returns an object with each pair of elements in the array as a key-value pair.(convert list to JSON object)

57460	BACKEND TECHNOLOGIES	L	T	P	C
Practicum		2	0	4	4

Introduction

The course aims to groom the students to enable them to work on current technology scenarios: in specific about the Server side scripting language PHP and sql Database MongoDB and prepare the students to keep pace with the changing face of technology and the requirements of the growing ITindustry. The course curriculum has been designed keeping in view the emerging trends in PHP and MongoDB and futuristic human resource requirements of the IT industry.

Course Objectives:

On completion of the following units of syllabus contents, the students must be able to

- Knowing the basic syntax, usage and advantages of PHP
- Understanding about how PHP provides dynamic programming that is heavily used in the modernweb.
- Knowing the practical adoption of JSON.
- Installation of PHP environment
- To understand the interface between MongoDB and PHP

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Know the syntax and structure of PHP

CO2: Develop websites using PHP

CO3: Understand JSON and its usage in transmitting data in web applications

CO4: Work with MongoDB and perform database operations in it.

CO5: Make communication with MongoDB via PHP script.

Pre-requisites: Basic Knowledge in HTML, CSS

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	2	2	3
CO2	3	3	3	1	3	3	3
CO3	3	3	3	2	3	3	3
CO4	3	3	3	2	3	3	3
CO5	3	3	3	2	3	3	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57460	BACKEND TECHNOLOGIES	L	T	P	C
Practicum		2	0	4	4

Unit I	INTRODUCTION	
INTRODUCTION TO PHP: Introduction – scripting language – Origin of PHP– Advantages and Working of PHP –Embedding PHP code in web pages – PHP Syntax, Statements, Comments, echo and print statements - Variables , constants, PHP Data Types – Operators – string Literals: Single and Double quoted strings **Control Structures**– Conditional Statements: if, if …else.., switch case – Looping Statements: for, while, do..while, for each, break and continue statements.		6
Experiment 1: Write a PHP program to find factorial of a number.		5
Unit II	**FUNCTIONS AND ARRAYS**	
PHP Standard Library Functions – String Functions: strlen(), str_rev(), strtolower(), strtoupper(), strpos(), str_word_count_(), explode(), implode(); Math Functions – sqrt(), ceil(), floor(), pow(); Date and Time Functions – User Defined Funcions. **Arrays:** Accessing array elements – Types: Indexed Array, Associative Array, Multidimensional arrays – Array functions: sort(), rsort(), count(), asort(), arsort().		6
Experiment 2: Write a PHP program to implement atleast five string functions. Experiment 3: Write a PHP program to display date and Time and implement some date functions. Experiment 4: Create a PHP script which diplays the capital and country name from an associative array. Sort the list by the capital of the country.		15
Unit III	**FILE HANDLING AND FORM PROCESSING**	
PHP File Handling: create, open, read, write, append file, delete file – manage file and directories; Dealing with multiple PHP files: include, require, include_once and require_once. **PHP Form Processing:** HTML form element, action and method attributes, submit and clear Buttons, form elements, name and id attribute; PHP Superglobals: $GLOBALS, $_SERVER, $_POST, $_GET, $_FILES, S_COOKIE,		6

$_SESSION; Server side validation, Handling Uploaded Files.	
Experiment 5:Write a PHP program that appends a string to an existing file. Experiment 6: Write a PHP program that validates the form submitted by the user.	10
Unit IV **SESSION, COOKIES AND JSON**	
HTTP Session: Use of session, start session, get session variables, destroy session; Cookies: Create cookie, Attributes of cookie, modify cookie value and delete cookies, advantages and disadvantages of cookies. **JSON:** Introduction – Syntax - Features - Encoding / decoding a JSON string – Debugging JSON errors – using JSON serializable in an object - returning JSON in response.	6
Experiment 7: Write a PHP script to check if a cookie named"visited"exists. If it does, display a welcome message; otherwise, display a default message. Experiment 8: Write a PHP script to store an array of user preferences in a session variable. Experiment 9: Write a PHP code to parse the given JSON file. Experiment 10: Generate a JSON file in PHP using an array.	15
Unit V **DATABASE OPERATIONS: MONGODB**	
MONGO DB: Introduction – advantages – MONGODB Query API: Create database, show database, create collection, insert documents, find data, update document, delete document – operators. **MONGO DB with PHP**: Using PHP connect to MongoDB and select the database – Using PHP create a collection, insert, update, delete, find the document.	6
Experiment 11: Perform the operation such as insert, update and find a document in MongoDB. Experiment 12: Write a PHP script to implement form processing controls such as insert, delete and display data from a database.	15
TOTAL PERIODS	**90**

TEXT BOOKS

1. Vickramvaswani, “PHP : A Beginners Guide”, McGraw Hill, Standard Edition, 2008.
2. LynnBeighley & MichaelMorrison, “Head First PHP & Mysql, OReily Media Inc., First Edition, 2011.
3. Michael Harrison, Liviu Nedov, Juned Hasan, “MongoDb Fundamentals”, packT, 2020.

Web-Based / Online Resources:

- https://goalkicker.com/PHPBook/
- www.w3schools.com
- www.tutorialspoints.com

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Equipment / Facilities required to conduct the Practical Portion

1. **Hardware Requirement:**
    - Desktop Computers
    - Printer
2. **Software Requirement:**
    - Notepad/Notepad++/Dreamweaver
    - Apache XAMPP
    - MongoDB
    - Any Browser

BOARD PRACTICAL

EXAMINATION PART – A

1. Write a PHP program to find factorial of a number.
2. Write a PHP program to implement atleast five string functions.
3. Write a PHP program to display date and Time and implement some date functions.
4. Create a PHP script which diplays the capital and country name from an associative array. Sort the list by the capital of the country.
5. Write a PHP program that appends a string to an existing file.
6. Write a PHP program that validates the form submitted by the user.

PART – B

7. Write a PHP script to check if a cookie named“visited”exists. If it does, display a welcome message; otherwise, display a default message.
8. Write a PHP script to store an array of user preferences in a session variable.
9. Write a PHP code to parse the given JSON file.
10. Generate a JSON file in PHP using an array.
11. Perform the operation such as insert, update and find a document in MongoDB.
12. Write a PHP script to implement form processing controls such as insert, delete and display data from a database.

SEMESTER 5

57510	WEB DEVELOPMENT USING FRAMEWORK	L	T	P	C
Theory		4	0	0	4

Introduction:

This course is designed to provide students with a comprehensive understanding of modern web development practices leveraging frameworks. Through a structured curriculum, students will delve into the intricacies of frontend and backend frameworks, exploring advanced concepts, best practices, and emerging technologies. Students will learn to architect scalable web applications, optimize performance, implement security measures, and deploy applications using industry-standard practices.

Course Objectives:

The objective of this course is to enable the students to

- Acquire knowledge about Frameworks available for Web Development.
- Understand the concepts of Frontend and Backend frameworks
- Gain insight about fundamentals of JavaScript based framework and Python based Framework.
- Ability to design single page applications.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understanding and implementation of Bootstrap Framework.

CO2: Understanding and implementation of React.js

CO3: Understanding and implementation of Vue.js

CO4: Understanding and implementation of Node.js

CO5: Understanding and implementation of Django

Pre-requisites: Basic Knowledge on HTML, CSS and JavaScript, Basic Knowledge on Python programming Language.

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	3	-	3
CO2	3	3	3	1	3	-	3
CO3	3	3	3	1	3	-	3
CO4	3	3	3	1	3	-	3
CO5	3	3	3	1	3	-	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**
  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57510	WEB DEVELOPMENT USING FRAMEWORK	L	T	P	C
Theory		4	0	0	4

Unit I	BOOTSTRAP	
Introduction, Necessary of Bootstrap, Applications, Environment Setup, Grid System, Typography, Navigation Components: Navbar, Navs and Dropdowns, Buttons Components: Buttons, Button Groups and Button Dropdowns, Form Components: Forms, Input Groups		12
Unit II	**BOOTSTRAP ADVANCED CONCEPTS**	
Bootstrap Form Validation, Bootstrap Images, Bootstrap Plug-In: Modal, Tab, Tooltip, Filters, collapse, Toast. Bootstrap Spinner, Offcanvas, scrollspy, Bootstrap Icons, Bootstrap Ratios, Bootstrap Positioning, Bootstrap Interactions.		12
Unit III	**NODE.JS**	
Introduction: What is Node.js?, Features of Node.js, Usage of Node.js, Installation, Creating Node.js application, Node.js Modules, HTTP module, URL module, File system, Events, Event emitter, Buffers, Web Module.		12
Unit IV	**REACT.JS**	
Introduction to React.js, Key Features, Virtual DOM, Setting Up Development Environment, Introduction to JSX, Creating and Structuring React Components. Props, Component State, Lifecycle Methods, User Event Handling, Conditional Rendering,		12
Unit V	**REACT.JS ADVANCED CONCEPTS**	
Event handling, Forms, Router, React CSS Styling, Understanding React Hooks, Understanding Single-Page Applications, Creating a Single-Page Application (Not for Exam)		12
	TOTAL PERIODS	**60**

Textbooks:

1. Benjamin Jakobus, "Mastering Bootstrap 4", Packt Publishing, First Edition, 2016.
2. Robin Wieruch, "The Road to React" , Kindle Edition, 2017.
3. Florin Cunstantine, "Node.js in Action", Dreamtech Press, Second Edition, 2017.

Web-based/Online Resources:

- https://www.w3schools.com/bootstrap/
- https://bootstrapbay.com/blog/
- https://reactjs.org/tutorial/tutorial.html
- https://scrimba.com/learn/learnreact
- https://www.w3schools.com/nodejs/

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class Assessments conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

57521	MACHINE LEARNING	L	T	P	C
Theory		3	0	0	3

Introduction:

With the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and

learning, covering fundamental concepts, algorithms, and applications. It provides a set of techniques that can automatically detect patterns in data which can then be utilized for predictions and for developing models.

Course Objectives:

- To learn the basic concepts of machine learning.
- To gain knowledge on supervised learning concepts and their applications.
- To understand unsupervised learning models and their applications.
- To evaluate the algorithms based on corresponding metrics identified
- To learn other learning aspects such as reinforcement learning and other technologies

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Explain the basic concepts of machine learning algorithms.

CO2: Evaluate and compare various machine learning models

CO3: Design and Develop various supervised learning models.

CO3: Design and Develop various unsupervised learning algorithms **CO5**:

Apply machine learning techniques to solve real-time problems

Pre-requisites: Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	1	1	1
CO2	3	3	3	2	1	1	1
CO3	3	3	3	3	1	2	2
CO4	3	3	3	3	1	1	2
CO5	3	3	3	3	1	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- **Engage and Motivate:** Instructors should actively engage students to boost their learning confidence.
- **Real-World Relevance:** Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- **Interactive Learning**: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- **Application-Based Learning**: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- **Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyse potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57521	MACHINE LEARNING	L	T	P	C
Theory		3	0	0	3

Unit I	INTRODUCTION TO MACHINE LEARNING	
Fundamentals of Machine Learning (ML): Definition and Scope –-Basic Steps in Knowledge Discovery Process - Types- Applications. Data Descriptive Analysis: Mean- Median- Mode -Standard Deviation-Percentile Data. Workflow of Machine Learning Application Development: Data Cleaning, Data Integration, Data Reduction, Data Transformation, Algorithms and Visualizing Results.		9
Unit II	**PREDICTIVE MODELLING**	
Predictive Modelling: Basic Concepts- Needs- Types- Regression: Linear Regression–Logistic Regression-Evaluation Metrics for Regression. Frequent Pattern Mining: Needs-Associations Rules Mining-Algorithms: Apriori Algorithm-Pattern Evaluation Measures.		9
Unit III	**SUPERVISED LEARNING TECHNIQUES**	
Classification: Basic Concepts- Needs- Types - Features, Labels, Training Data, Testing Data, and models. Algorithms: Decision Tree Induction - Naive Bayes classifier – K-Nearest Neighbors (KNN) - Model Evaluation Metrics. Ensemble Approaches: Voting Classifiers – Bagging and Boosting Sampling Techniques.		9
Unit IV	**UNSUPERVISED LEARNING TECHNIQUES**	
Clustering: Basic Concepts- Needs- Types- Types of Data-Data similarity and Dissimilarity Measures –Partitioning Method: K-Means Algorithms - Hierarchical Method: Agglomerative-Divisive Algorithm. Cluster Analysis: Metrics for Evaluating Clusters.		9
Unit V	**ADVANCED CONCEPTS, TRENDS AND APPLICATIONS**	
Text Mining- Web Mining- Time series Analysis. Case Studies: Market Basket Analysis- Recommendation System- Email Spam and Malware Filtering – Online Fraud Detection – Weather Forecasting- Challenges and Issues in Machine Learning- Tools for Machine Learning.		9
TOTAL PERIODS		**45**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments based on the course.
- Project based Learning in emerging application areas like finance, healthcare etc.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.
- Assignments on different types of learnings
- Tutorials on solving problems using machine learning.
- Flipped classroom activities to explore application areas

TEXT BOOK

1. Ethem Alpaydin, “Introduction to Machine Learning”, Fourth Edition, MIT Press, ,2020.
2. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Morgan,3rd Edition, Kaufmann Publishers, 2011.
3. Sebastain Raschka, Vahid Mirjalili, “Python Machine Learning”, 3rd Edition, Packt publishing 2019.

WEB-BASED/ONLINE RESOURCES:

- https://www.javatpoint.com/machine-learning
- https://www.kaggle.com/learn/intro-to-machine-learning
- https://www.w3schools.com/python/python_ml_getting_started.asp
- https://nptel.ac.in/courses/106106139
- https://nptel.ac.in/courses/106106236
- https://egyankosh.ac.in/

57522	DATA WAREHOUSING AND DATA MINING	L	T	P	C
Theory		3	0	0	3

Introduction

This course covers key aspects of data management and analysis. It starts with Data Warehousing, covering architecture, Dimensional Modeling, and ETL processes, along with tools and technologies. Then, students explore Data Warehousing Techniques, focusing on lifecycle management, metadata, and cloud-based analysis. The course then moves to Data Mining, covering fundamental concepts, preprocessing, classification, and advanced techniques like Support Vector Machines and Neural Networks. Real-world Applications and Case Studies demonstrate Data Mining's use in retail, healthcare, CRM, and fraud detection.

Course Objectives

The objective of this course is to enable the student to

- Learn Data Warehousing fundamentals.
- Acquaint themselves with various Data Warehousing tools and technologies.
- Understand the Data Warehousing lifecycle, emphasizing quality, metadata management, and cloud analysis.
- Explore core Data Mining concepts, preprocessing, and classification/clustering methods.
- Master advanced Data Mining techniques.
- Analyze real-world Data Mining applications in different sectors.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand Data Warehousing principles, architecture, and ETL processes, including Dimensional Modeling.

CO2: Utilize tools and technologies proficiently for Data Warehousing.

CO3: Develop skills in core Data Mining concepts.

CO4: Master advanced Data Mining techniques like Support Vector Machines, Neural Networks, Text Mining, and DBSCAN for in-depth analysis.

CO5: Apply Data Warehousing and Data Mining in real-world scenarios.

Pre-requisites : Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	2	1
CO2	3	3	3	1	1	3	2
CO3	3	3	3	1	1	3	1
CO4	3	3	3	1	1	3	2
CO5	3	3	3	1	1	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57522	Data Warehousing And Data Mining	L	T	P	C
Theory		3	0	0	3

Unit I	INTRODUCTION TO DATA WARE HOUSING	
Introduction to Data Warehousing: Concepts and Architecture - Data Warehouse Design: Dimensional Modeling, Fact, and Dimension Tables - ETL Processes: Data Extraction, Transformation, and Loading - Data Warehouse Implementation: Tools and Technologies		8
Unit II	**DATA WAREHOUSING TECHNIQUES AND TOOLS**	
Data Warehouse Lifecycle: Planning, Design, Implementation, and Maintenance - Data Quality and Metadata Management - OLAP and Multidimensional Data Analysis - Data Warehousing in Cloud Environments		9
Unit III	**INTRODUCTION TO DATA MINING**	
Fundamentals of Data Mining: Concepts, Tasks, and Challenges - Data Preprocessing: Data Cleaning, Integration, Transformation, and Reduction - Classification Techniques: Decision Trees, Naive Bayes, and k-Nearest Neighbors - Clustering Techniques: K-means, Hierarchical Clustering - Association Rule Mining and Frequent Pattern Analysis		10
Unit IV	**CLASSIFICATION TECHNIQUES**	
Introduction to Classification: supervised learning and classification - Decision Trees: ID3, C4.5, and CART algorithms, handling overfitting and pruning techniques - Naive Bayes Classifier: Principles of Bayesian classification, Naive Bayes algorithm for text classification - k-Nearest Neighbors (KNN): KNN algorithm, Distance metrics and parameter selection		10
Unit V	**CLUSTERING TECHNIQUES**	
Introduction to Clustering – Basics concepts of clustering – Partitioning Methods: K-Means clustering – hierarchical clustering: Agglomerative and Divisive Hierarchical clustering Methods - Comparison between partitioning and Hierarchical clustering approaches		8
TOTAL PERIODS		**45**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text Book and References

1. C.S.R.Prabhu , Data Warehousing Concepts, Techniques, Products and Applications ,Third Edition, PHI Learning,2008
2. Robert Wrembel ,Data Warehouses and OLAP Concepts, Architectures, and Solutions,1st Edition IRM Press,2007
3. Mehmed Kantardzic ,Data Mining Concepts, Models, Methods, and Algorithms 2nd Edition, Wiley,2011

Web-based/Online Resources

https://www.geeksforgeeks.org/data-mining/

https://www.javatpoint.com/data-mining-cluster-analysis

https://www.tutorialspoint.com/dwh/dwh_schemas.htm

57523	Ethical Hacking	L	T	P	C
Theory		3	0	0	3

Rationale:

Ethical hacking is designed to provide individuals with the knowledge and skills required to understand, identify, and mitigate security vulnerabilities and threats in computer systems, networks, and applications. This course introduces the concepts of Ethical Hacking and gives the learner the opportunity to learn about different tools and techniques in Ethical hacking and security and to identify and analyze the stages an ethical hacker requires to take in order to compromise a target system as well as will apply preventive, corrective and protective measures to safeguard the system.

Course Objectives:

- Learn the fundamentals of ethical hacking principles, methodologies, and terminology, distinguishing between ethical and malicious hacking practices.
- Learn to identify and assess vulnerabilities and weaknesses in computer systems, networks, and applications through various reconnaissance techniques.
- Explore various hacking tools and techniques used by ethical hackers.
- Learn network scanning and penetration testing to identify security flaws and assess the effectiveness of defense mechanisms.
- Understand key information security concepts and their relevance to ethical hacking.
- Explore common attack vectors and learn how to defend against them.
- Learn how to secure systems and networks by implementing intrusion detection and prevention systems, firewalls, and encryption.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Students will gain a solid understanding of network basics and basic principles of information security.

CO2: Students will be familiarized with various types of cyber attacks, such as malware, social engineering, and denial-of-service (DoS), as well as common vulnerabilities like SQL injection and cross-site scripting (XSS).

CO3: Students will be able to identify and assess vulnerabilities in computer systems, networks and applications through reconnaissance techniques, vulnerability scanning, and analysis.

CO4: Students will develop practical skills in exploiting security weaknesses within legal and ethical boundaries.

CO5: Students will develop practical skills in using a variety of tools and techniques employed by ethical hackers.

Pre-requisites:

Basic Knowledge of Computers and networking fundamentals

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	2	3
CO2	3	3	3	2	3	2	3
CO3	3	3	2	2	2	2	3
CO4	3	3	2	2	2	1	3
CO5	3	3	2	2	2	1	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- Provide students with hands-on experience in simulated environments where they can practice hacking techniques ethically.
- Integrate case studies and real-life scenarios to illustrate ethical dilemmas, ethical hacking methodologies, and the consequences of unethical behavior.
- Implement regular quizzes, and practical exercises to evaluate students' understanding of ethical hacking concepts, tools and techniques.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57523	ETHICAL HACKING	L	T	P	C
Theory		3	0	0	3

Unit I	Introduction to Ethical Hacking	
Introduction to ethical hacking: Types of hacking- advantages, disadvantages and purpose of hacking- Types of hackers- Difference between ethical and non-ethical hacking- Ethical Hacking Terminologies- Tools and Skills- Phases of hacking- Laws of the Land. Information Security Overview- CIA triad (Confidentiality, Integrity, Availability)- The Indian IT Act 2000 and Amendments to the Indian IT Act(2008).		09
Unit II	**Reconnaissance & Footprinting**	
Reconnaissance: Active Reconnaissance- Passive Reconnaissance- Footprinting: Domain Name Information- Finding IP Address- Finding Hosting Company- IP Address Ranges- History of the Website.Fingerprinting: Banner Grabbing- application fingerprinting, web application scanning, and DNS fingerprinting. DNS Enumeration.		09
Unit III	**Scanning & Sniffing**	
Scanning: port scanning- Ping Sweep-Scanning Networks- Network discovery- Vulnerability scanning Sniffing: Introduction- Wire trapping and its types, packet sniffing-ARP spoofing, DNS spoofing and MAC flooding, active and passive sniffing,wi-fi sniffing- session hijacking- Man-In The Middle attack, sniffing countermeasures, sniffing detection techniques.		07
Unit IV	**Enumeration, Vulnerabiliy Analysis & Malwares**	
Enumeration- System enumeration- User enumeration- Service enumeration- Vulnerability Analysis- Vulnerability assessment- Common vulnerabilities and exposures (CVE)- Risk assessment. TCP/IP Hijacking- EMAIL Hijacking -Password Hacking- Dictionary Attack-Hybrid Dictionary Attack-Brute-Force Attack-Rainbow Tables- System Hacking- Password cracking- Privilege escalation- Maintaining access. Malware Threats: Types of malware (Types of viruses, worms, trojans, etc.)- Anti-malware tools and techniques.		10

Unit V	Social Engineering & Web Application Security	
Social Engineering: Types of social engineering attacks- Prevention and awareness- Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks- DoS and DDoS concepts- DoS and DDoS attack techniques- Mitigation strategies- Web Application Security- Common web vulnerabilities -SQL injection- XSS, CSRF- Introduction to Pen Testing: need for pen testing, types and techniques of pen testing, phases of pen testing.		10
	TOTAL PERIODS	45

Text and Reference Books:

1. Patrick Engebretson, The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy, 2nd Edition, Syngress, 2013.
2. William Stallings, Lawrie Brown, Computer Security Principles and Practice, Fourth Edition, Pearson Education, 2017.
3. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams, Grey Hat Hacking: The Ethical Hacker's Handbook, 3rd Edition, The McGraw-Hill Companies, 2011.

Web-based/Online Resources:

https://www.udemy.com/topic/ethical-hacking/free/

https://www.coursera.org/learn/ethical-hacking-essentials-ehe

https://www.hackthebox.com/hacker

https://www.cybrary.it/course/ethical-hacking

https://nielit.gov.in/gorakhpur/sites/default/files/Gorakhpur/B01_Ethical_Hacking_220125.pdf

https://osou.ac.in/eresources/DCS-Syllabus-2022-23.pdf

https://www.wscubetech.com/blog/ethical-hacking-course-syllabus/#

Suggested List of Students Activity:

- Virtual environments can be set up to practice hacking techniques in a controlled environment and students can be assigned real-world scenarios where they need to perform penetration tests on simulated corporate networks, web applications, or wireless networks.
- Students can be provided with vulnerable systems to exploit. Reverse engineering techniques can be taught to students by providing them with malware samples or binary executables to analyze.

57524	AGILE PRODUCT DEVELOPMENT	L	T	P	C
Theory		3	0	0	3

Introduction:

Agile Product Development is a model in Software Engineering, which deals with reliability and quality assurance of the software under development. It provides framework for development of quality software product. The course covers important aspects of product development such as software lifecycle, requirement analysis and documentation, characteristics of good design, design techniques, testing, software implementation, maintenance etc. This course also provides the students with a theoretical understanding of agile software development practices and how small teams can apply them to create high-quality software.

Course Objectives:

The student should be made to

- Define Software Engineering and to understand the phases in a software project
  - Understand different software development models.
  - Understand the benefits and pitfalls of working in an agile team.
  - Understand agile development and testing.
  - To learn how the agility is incorporated in Requirement engineering and quality assurance

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Explain different software development models

CO2: Interpret the concept of agile software engineering and its advantages in software development.

CO3: Analyse the core practices behind the given agile methodologies.

CO4: Interpret how agility is incorporated in Knowledge Management

CO5: Explain and Make use of various tools available to agile teams to facilitate the project and to perform quality assurance in agile team

Pre-requisites: Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2			1	1
CO2	3	2	2	1		2	2
CO3	3	3	3	1		2	2
CO4	3	3	3	1		2	1
CO5	3	3	2	2		1	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- **Engage and Motivate:** Instructors should actively engage students to boost their learning confidence.
- **Real-World Relevance:** Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- **Interactive Learning**: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- **Application-Based Learning**: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- **Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57524	AGILE PRODUCT DEVELOPMENT	L	T	P	C
Theory		3	0	0	3

Unit I	INTRODUCTION TO SOFTWARE ENGINEERING	
Basics of Software Engineering : Need for Software Engineering – Definition – Software Characteristics –Program versus Software Products- Software Development Life Cycle Models: Introduction –Waterfall Model – Prototyping model – Spiral Model – Iterative Enhancement model – Agile model.		9
Unit II	**AGILE METHODOLOGY**	
Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agile Documentations – Agile Drivers, Capabilities and Values.		9
Unit III	**AGILE PROCESSES**	
Lean Production – SCRUM- Crystal -Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.		9
Unit IV	**AGILITY IN KNOWLEDGE MANAGEMENT**	
Agile Information Systems – Agile Decision Making - Earl—S Schools of KM – Institutional Knowledge Evolution Cycle: Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Story Card Maturity Model (SMM).		9
Unit V	**AGILITY IN REQUIREMENTS ENGINEERING & QUALITY ASSURANCE**	
Impact of Agile Processes in Requirements Engineering (RE)– Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Requirements Management in Agile Environment- Agile Requirements Prioritization.– Agile Metrics –- Agility in Quality Assurance.		9
	TOTAL PERIO DS	**45**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments in Software Development.
- Blended learning activities to explore the recent trends and developments in the field.
- Roleplay and case studies

Text Books:

1. Roger S. Pressman, Software Engineering – A Practitioner_s Approach, Seventh Edition, McGrawHill International Edition, 2010
2. Ken Schawber, Mike Beedle, “Agile Software Development with Scrum”, International Edition, Pearson.
3. Robert C. Martin, “Agile Software Development, Principles, Patterns and Practices”, First International Edition, Prentice Hall,2014

Reference Books:

1. Lisa Crispin, Janet Gregory, “Agile Testing: A Practical Guide for Testers and Agile Teams”, Internationaledition, Addison Wesley.
2. Alistair Cockburn, “Agile Software Development: The Cooperative Game”, 2nd Edition, Addison-Wesley
3. Pedro M. Santos, Marco Consolaro, and Alessandro Di Gioia, “Agile Technical Practices Distilled: A learning journey in technical practices and principles of software design”, First edition, Packt Publisher.
4. David J. Anderson, Eli Schragenheim “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results” September 2003,Publisher(s): Pearson,ISBN: 0131424602

Web-based/Online Resources:

1. “The Complete Guide to Agile Software Development” https://clearbridgemobile.com/complete-guideagile-software-development/
2. “Agile Fundamentals Ebook: A Complete Guide for Beginners”, https://agileken.com/agilefundamentals-ebook/
3. “Agile Software Development, Principles, Patterns and Practices”, First International Edition, Prentice Hall EBook https://dl.ebooksworld.ir/motoman/Pearson.Agile.Software.Development.Principles.Patterns.and.Practices.www.EBooksWorld.ir.pdf
4. “Agile Software Development”, https://www.edx.org/course/agile-software-development
5. “Agile Software Development”, https://www.coursera.org/learn/agile-software-development

57530	WEB DEVELOPMENT USING FRAMEWORK PRACTICAL	L	T	P	C
PRACTICAL		0	0	4	2

Introduction

This course is designed to provide students with hands on experience in developing web applications using Frameworks.

Course Objectives:

The objective of this course is to enable the students to

- Acquire knowledge about Frameworks available for Web Development.
- Understand the concepts of Frontend and Backend frameworks
- Gain insight about fundamentals of JavaScript based framework and Python based Framework.
- Ability to design single page applications.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Understanding and implementation of Bootstrap Framework.

CO2: Understanding and implementation of React.js

CO3: Understanding and implementation of Vue.js

CO4: Understanding and implementation of Node.js

CO5: Understanding and implementation of Django

Pre-requisites: Basic Knowledge on HTML, CSS and JavaScript, Basic Knowledge on Python programming Language

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	3		3
CO2	3	3	3	1	3		3
CO3	3	3	3	1	3		3
CO4	3	3	3	1	3		3
CO5	3	3	3	1	3		3

Legend: 3-HighCorrelation, 2-MediumCorrelation, 1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical Test	Practical Test	Practical Document	Practical Examination
Portion	Part A / Cycle 1 Exercises	Part B / Cycle 2 Exercises	All Exercises	All Exercises
Duration	3 Periods	3 Periods	Regularly	3 Hours
Exam Marks	60	60	Each Practical 10 Marks	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	15th Week	

Note:

- **CA1 and CA2**: All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the pattern to be decided by the department.

  The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** Practical document should be maintained for every exercises / experiment immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57530	WEB DEVELOPMENT USING FRAMEWORK PRACTICAL	L	T	P	C
PRACTICAL		0	0	4	2

Part-A		
Bootstrap – Node.js		
Ex.No	**Name of the Experiment**	
1	Create college website using bootstrap grid system and Navbar.	30
2	Create a Form using bootstrap components and perform form validation.	
3	Create a website to implement bootstrap modal and filters.	
4	Demonstrate Non-blocking file read in Node.js	
5	Demonstrate implementing a server in Node.js	
Part-B		
REACT.JS		
Ex.No	**Name of the Experiment**	
6	Demonstrate the use of CSS in React.js	30
7	Demonstrate the use of state and props in React.js	
8	Demonstrate the usage of events in React.js	
9	Demonstrate Routing in React.js	
10	Create a mini project using web Frameworks.	
	TOTAL PERIODS	**60**

Suggested List of Students Activity

- Conduct Ideathon to generate innovative solution for real life problems.
- Micro project that shall be an extension of any practical lab exercise to real-world application.

Reference

1. Benjamin Jakobus, "Mastering Bootstrap 4", Packt Publishing, First Edition, 2016.
2. Robin Wieruch, "The Road to React" , Kindle Edition, 2017.
3. Andrea Passaglia, "Vue.js 2 Cookbook" , Packt Publishing, First Edition, 2017.
4. Florin Cunstantine, "Node.js in Action", Dreamtech Press, Second Edition, 2017
5. William S. Vincent, "Django for Beginners: websites with Python and Django", First Edition, 2020.

Web-based/Online Resources

- https://www.w3schools.com/bootstrap/
- https://bootstrapbay.com/blog/
- https://reactjs.org/tutorial/tutorial.html
- https://scrimba.com/learn/learnreact
- https://www.vuemastery.com/courses/intro-to-vue-js/vue-instance
- https://www.w3schools.com/nodejs/
- https://tutorial.djangogirls.org/en/

Equipment/Facilities required to conduct the Practical Course

Software Requirement:

- Bootstrap
- React.JS
- Node.JS
- Notepad/Notepad++/Dreamweaver

Hardware Requirement:

- Desktop computer

BOARD PRACTICAL EXAMINATION

PART–A

1. Create college website using bootstrap grid system and Navbar.
2. Create a Form using bootstrap components and perform form validation.
3. Create a website to implement bootstrap modal and filters.
4. Demonstrate the usage of CSS in React.js.
5. Demonstrate the usage of events in React.js.

PART–B

6. Using Vue.js Perform addition using Click event.
7. Using Vue.js Perform animation of an element.
8. Create a Web Client using Node.js.
9. Demonstrate event handling in Node.js.
10. Create a simple blog application.

57540	OBJECT ORIENTED PROGRAMMING WITH JAVA	L	T	P	C
Practicum		2	0	4	4

Introduction

Java is a class-based, object-oriented programming language .It is intended to let application developers write once, and run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation. Java is widely used for developing applications for desktop, web, and mobile devices. Java is known for its simplicity, robustness, and security features, making it a popular choice for enterprise-level applications. Students will learn Java tokens, variables, data types, control structures, functions, arrays, strings, object - oriented programming concepts and swing components. Through hands-on students will develop proficiency in writing structured and efficient Java programs to solve a variety of computational problems.

Course Objectives:

The objective of this course is to enable the students to

- To understand the concepts of Object Oriented Programming.
- To learn about the control structures, class with attributes and methods used in Java.
- To gain knowledge of arrays and strings.
- To understand the concept of exception handling mechanism.
- To comprehend the basics of swing components and its importance in application development

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Demonstrate knowledge on Java Programming fundamentals.

CO2: Develop programs in Java using control structures, array and string.

CO3: Demonstrate use of object - oriented programming concepts in Java.

CO4: Apply programming skills to solve overriding problems using interface.

CO5: Develop applications using swing components.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	1	1	2
CO2	3	3	3	3	1	1	2
CO3	3	3	3	3	1	2	2
CO4	3	3	3	3	1	2	2
CO5	3	3	3	3	1	3	2

Legend: 3-HighCorrelation, 2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57540	OBJECT ORIENTED PROGRAMMING WITH JAVA	L	T	P	C
Practicum		2	0	4	4

Unit I	INTRODUCTION TO JAVA	
Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object-Oriented Programming –Benefits of OOPs –.– Java features – Java Environment – JDK – API. Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) –Command Line Arguments – Constants – Variables – Data types - Scope of variables – Type casting – Operators.		6
Ex No 1: Write a program to swap two integer numbers. **Ex No 2**: Write a program to read two integers and find the largest number using conditional operator. **Ex No 3**: Write a program to calculate simple and compound interest.		12
Unit II	**CONTROL STRUCTURES, ARRAY AND STRING**	
Control structures: Decision making statements - looping statements - branching statement - Arrays: One Dimensional Array –Multidimensional Array – String: String Array – String Methods.		6
Ex No 4: Write a Java program to find the largest of three numbers. **Ex No 5:** Write a Java program to find the factorial of a given number. **Ex No 6**: Write a Java program to sort ten numbers using Bubble sort.		12
Unit III	**CLASSES AND OBJECTS**	
Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Method overloading – Static members – Nesting of Methods - Final methods.		6
Ex No 7: Write a Java program to collect employee details using constructors. **Ex No8:** Write a Java program to calculate biggest of two numbers and three numbers using method overloading. **Ex No9**: Write a Java program to display student details using static method.		12

UNIT IV	INHERITANCE AND EXCEPTION HANDLING	
Inheritance: Defining Inheritance –Types of Inheritances– Overriding Methods –Interfaces **- Exception Handling**: Basics of Exception Handling – try block– throwing an exception – catching an exception.		6
Ex No 10: Write a Java program to find the area of a rectangle and triangle using interface. **Ex No 11**: Write a Java program to implement Arithmetic Exception.		12
UNIT V	**AWT CONTROLS**	
AWT components – Labels – Text Field – Button – Checkboxes – Scroll bar – Event handling – Events – Event sources – Event Listeners.		6
Ex No 12: Write a Java program to create a simple calculator to perform addition, subtraction, multiplication and division using button, Label and text field.		12
	TOTAL PERIODS	**90**

TEXT BOOKS

1. E. Balagurusamy, "Programming with Java", TataMc-Graw Hill, 5th Edition, 2014.
2. Sagayaraj, Denis, Karthick and Gajalakshmi, "Java Programming for Core and advanced learners", Universities Press (INDIA) Private Limited, 7th Edition, The Orient Blackswan, 2018.

REFERENCE BOOKS

1. Herbert Schildt, "The complete reference Java", 9th Edition, TataMc-Graw Hill, 2017.
2. Cay S. Horstmann, Gary Cornell, "Core Java Volume I -Fundamentals", 11th Edition Pearson India Education Services Pvt. Ltd, 2007.

BASED/ONLINE RESOURCES

1. https://www.w3schools.com/java/
2. https://www.geeksforgeeks.org/java/
3. https://www.tutorialspoint.com/java/index.htm
4. NPTEL & MOOC courses titled Java
5. https://nptel.ac.in/courses/106105191/

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Programming assignments
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Equipment / Facilities required to conduct the Practical Portion

1. Hardware(s) Requirement:

- Desktop
- Printer

2. Software(s) Requirement:

- Windows Operating System
- JDK.

BOARD PRACTICAL EXAMINATION

PART – A

1. Write a Java program to swap two integer numbers.
2. Write a Java program to read two integers and find the largest number using conditional operator.
3. Write a Java program to calculate simple and compound interest.
4. Write a Java program to find the largest of three numbers.
5. Write a Java Program to find the factorial of the given number.

PART – B

6. Write a Java program to sort ten numbers using Bubble sort.
7. Write a Java program to collect employee details using constructors.
8. Write a Java program to calculate biggest two numbers and three numbers using method overloading.
9. Write a Java program to display the student details using static method.
10. Write a Java program to find the area of rectangle and triangle using interface.
11. Write a Java progam to implement Arithmetic Exception.
12. Write a Java program to create a simple calculator to perform addition, subtraction, multiplication and division using Button, Label, and Text field.

57551	DATA ANALYTICS	L	T	P	C
Practicum		1	0	4	3

Introduction

Being able to do the basics data analysis with Python to build and evaluate data models which includes collecting and importing data, cleaning & preparing data, summarizing & visualization data, building machine learning regression models with python in build libraries.

Course Objectives:

The objective of this course is to enable the students to

- Introduce the data analytics process and its applications.
- Explore the python_s sequence data structures and functional programming for data analytics.
- Apply the functionality of python_s package Pandas to import, clean and analyze data from multiple sources.
- Create data visualizations with Python library – pyplot.
- Model and interpret data using Python library – scikit-learn.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Demonstrate the process involved in data analytics.

CO2: Experiment the basic data analytics with python_s sequence data structures & functional programming.

CO3: Import, clean and analyze data from multiple sources using python library panda

CO4: Create data visualizations with Python library – pyplot.

CO5: Model and interpret data using Python library – scikit-learn.

Pre-requisites: Python Programming, Data Structures Using Python.

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	-	2	1
CO2	3	3	3	3	-	1	3
CO3	3	2	3	3	-	-	-
CO4	3	3	3	3	2	-	-
CO5	3	3	3	3	2	-	-

Legend: 3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57551	DATA ANALYTICS	L	T	P	C
Practicum		1	0	4	3

Unit I	INTRODUCTION TO DATA ANALYTICS AND PYTHON	
Define Data, Types of Data, Data Analytics, - Data Analysis Vs Data Analytics, Data Analysis Process, Quantitative and Qualitative analysis, Application of Data Analysis: Prediction and recommendation. Python functional programming: map, filter, reduce, lamda, list comprehension.		4
Ex No 1: Write a python program to double the elements in list using map function and to find the sum of elements of a list using reduce functions. **Ex No 2**: Write a python program to filter only even numbers in the list using filter function and to create a list of squares of the elements of using list comprehension.		12
Unit II	**DATA LOADING AND CLEANING**	
Data loading, Panda_s data structures: Data Frame- Creating a data frame from dictionary, loading a CSV file into a data frame. Methods of data frame: head (), tail (), shape (), column (), describe (). Data Cleaning: Handling missing data: Filtering out missing data, filling in missing data, Data Transformation: Removing duplicates, Replacing values.		4
Ex No 3: Load a CSV file into a Pandas data frame and print the first five rows, shape of the dataset, and column names and their types. **Ex No 4:** Load a data into a Pandas data frame, list out number of missing values in each column and fill the null values with suitable default value. **Ex No 5:** Load a dataset into a Pandas data frame, find and remove duplicate rows and rename indexes (Column name).		18
Unit III	**DATA ANALYSIS**	
Introduction to static analysis -Basic static analysis using describe function. Correlation Analysis of feature, Introduction to Seaborn, Correlation analysis using Heat map.		3
Ex No 6: Load a dataset into a data frame, drop the non- numeric columns and list out the basic static analysis of each column. **Ex No 7:** Load a dataset into a data frame, find correlation matrix and plot the heat map to find highly correlated feature of the target feature.		12

Unit IV	DATA VISUALIZATION AND PREDICTION.	
Machine Learning Models: Linear Regression-Estimation, Logistic Regression - Classification. Introduction to Modelling Library – Scikit learn: Training Dataset, Testing Dataset, predicting target variable based on feature variable.		4
Ex No 8: Load a pre-cleaned dataset into a data frame, plot the values of feature and target variables using scatterplot to visualize their relation. **Ex No 9:** Visualize a pre-cleaned dataset to detect an outliner and filter out them. **Ex No 10:** Train the sklearn linear model with a pre-cleaned dataset using fit function and predict the target variable.		18
	TOTAL PERIODS	**75**

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Sample CSV File Source:

1. https://www.kaggle.com/datasets/kunwarakash/chennai-housing-sales-price
2. https://www.kaggle.com/datasets/arshid/iris-flower-dataset
3. https://www.kaggle.com/datasets/ruchi798/housing-prices-in-metropolitan-areas-of- India

References:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy,and IPython, O'REILLY 2018, Second Edition.
3. Jake Vanderplas, Python Data Science Handbook, Essential tool for working with data, First Edition, O'Reilly Media, Inc,2017.

Web-Based/Online Resources

1. https://www.kaggle.com/code/kumudadk/introduction-to-machine-learning#pandas
2. https://www.kaggle.com/code/doukanelik/missing-values
3. https://www.kaggle.com/code/shtrausslearning/bayesian-regression-house-price-prediction#2-|- DATA-PREPARATION
4. https://www.kaggle.com/code/sukethae/housing-prices-prediction-in-hyderabad-india
5. https://www.kaggle.com/code/mahnazarjmand/clustring-model-on-iris-dataset/input
6. https://www.kaggle.com/code/pythonafroz/titanic-survival-prediction-with-11-algorithm.

Equipment / Facilities required to conduct the Practical Portion

1. **Hardware Requirement:**
    - DesktopComputers/ Laptop
    - Printer
2. **Software Requirement:**
    - Windows / Linux Operating System
    - Python IDLE / Spyder

BOARD PRACTICAL

EXAMINATION PART – A

Ex No 1: Write a python program to double the elements in list using map function.

Ex No 2: Write a python program to filter only even numbers in the list using filter function.

Ex No 3: Load a CSV file into a Pandas data frame and print the first five rows, shape of the dataset, and column names and their types.

Ex No 4: Load a data into a Pandas data frame, list out number of missing values in each column and fill the null values with suitable default value.

Ex No 5: Load a dataset into a Pandas data frame, find and remove duplicate rows and rename indexes (Column name).

PART – B

Ex No 6: Load a dataset into a data frame, drop the non- numeric columns and list out the basic static analysis of each column.

Ex No 7: Load a dataset into a data frame, find correlation matrix and plot the heat map to find highly correlated feature of the target feature.

Ex No 8: Load a pre-cleaned dataset into a data frame, plot the values of feature and target variables using scatterplot to visualize their relation.

Ex No 9: Visualize a pre-cleaned dataset to detect an outliner and filter out them.

Ex No 10: Train the sklearn linear model with a pre-cleaned dataset using fit function and predict the target variable.

57532	MOBILE COMPUTING	L	T	P	C
Practicum		1	0	4	3

Introduction

This course introduces computer engineering students to the fundamental principles, theories, and practical aspects of mobile computing. Through a combination of theoretical lectures and hands-on practical exercises, students will gain a comprehensive understanding of mobile computing concepts and technologies.

Course Objectives:

On completion of the following units of syllabus contents, the students must be able to

- To learn the basics of wireless communication and cellular networks.
- To study the popular cellular networking technologies.
- To explore various protocols that support mobility at network layer and transport layer. The students should be able to simulate various network topologies with different routing algorithms and they can analyze how each routing algorithm is performing its job.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: To explore various modulation techniques, multiplexing techniques and familiarize with wireless LAN technologies including IEEE 802.11, HIPERLAN, and Bluetooth.

CO2: To understand the evolution and concepts of cellular communication explore the practical issues of mobile computing using network simulation tools.

CO3: To analyse and compare different ad hoc routing protocols.

CO4: To identify the limitations of traditional TCP and understand various TCP improvements and their benefits.

CO5: To understand mobile computing platforms and explore network simulators and programming platforms for mobile applications.

Pre-requisites: A background in computer networks is required.

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	3	2	2
CO2	3	3	1	1	3	3	2
CO3	2	3	2	1	1	1	3
CO4	1	3	2	3	1	1	3
CO5	3	1	1	2	3	2	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Combination of lectures, practical exercises, and simulations to reinforce theoretical concepts.
- Emphasis on hands-on experience with network simulators and programming platforms to enhance understanding and skills in mobile communication technologies.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57552	MOBILE COMPUTING	L	T	P	C
Practicum		1	0	4	3

UNIT I WIRELESS COMMUNICATION AND WIRELESS NETWORKS	
Challenges of Wireless Transmission - Multi-carrier modulation - Spread Spectrum - Satellite Communication - Broadcast systems - Multiplexing - FDMA, TDMA and CDMA. Duplexing Techniques: FDD, TDD. Wireless LAN – Infrared Vs Radio Transmission – Infrastructure Networks – IEEE 802.11 – HIPERLAN – Bluetooth – Wireless ATM.	5
Practical Exercises * 1. Installation of Network Simulator (Eg.NS2) 2. Implementation of Bluetooth network (transfer a file from one device to another). 3. Implement a basic function of Code Division Multiple Access (CDMA).	18
UNIT II CELLULAR COMMUNICATION	
Cellular Communication – Tessellation, Frequency Reuse and Handoff – Evolution of cellular communication systems: 1G, 2G, 3G, 4G and 5G. Overview of GSM - GPRS Network - UMTS and IMT 2000 - Packet Switching Domain -Core Network - Radio Access Network - LTE - Control Plane - User Plane.	5
Practical Exercises * 4. Simulate authentication and encryption techniques used in GSM and analyze their performance. 5. Illustration of Hidden Terminal Problem using Network Simulator.	12
UNIT III MOBILE NETWORK LAYER	
Mobile IP - Mobility features in IPv6 - Proactive and reactive ad hoc routing protocols - DSDV, DSR and AODV.	5
Practical Exercises * 6. Simulate the Distance Vector Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc. 7. Simulate AODV Protocol.	12
UNIT IV MOBILE TRANSPORT LAYER	
Traditional TCP - Limitations of Traditional TCP - TCP improvements for Wireless Networks – Indirect TCP, Snoop TCP, Mobile TCP – Fast Retransmit/ Fast Recovery – Transmission/ Timeout Freezing – Selective Retransmission – Transaction Oriented TCP.	**5**

Practical Exercises * 8. Create a mobile chatting application using TCP with a mobile client.	**6**
UNIT V MOBILE COMPUTING PLATFORM	
PDA - Device characteristics and Software components - Smart Phone - Convergence of Mobile devices - Network simulators: NS2 – GLOMOSIM – SENSIM – OPNET – Programming Platforms – J2ME – Palm OS - SYMBIAN OS - Overview of other mobile Operating Systems.	**5**
Practical Exercises * 9. Set up a simple mobile network topology using a network simulator. Configure and manage mobile devices within a simulated network environment. **10.** Setup & configure Wireless Access Point (AP) using Network Simulator. Analyze the Wi-Fi communication range in the presence of the access point (AP) and the base station (BS).	**12**
	75

Suggested List of Students Activity:

- Group activities challenging Network configuration.
- Performing a survey of popular mobile phones and exploring their

configuration and exploring the structure and operation of a cell phone tower.

- Activities, like contest, to develop Mobile application using Network Simulator.

Text and Reference Books:

1. J. Schiller, "Mobile Communication", Pearson Education, 2nd Edition, 2009.
2. K. Ashoke Talukder, Roopa Yavagal, "Mobile Computing", Tata McGraw Hill, 2nd Edition, 2005.
3. Paul Bedell, "Cellular networks: Design and Operation – A real world Perspective", Outskirts Press, Standard Edition, 2014.

Web-based/Online Resources:

1. http://www.isi.edu/nsnam/ns/doc/ns_doc.pdf
2. https://www.nsnam.org/docs/release/3.22/tutorial/ns-3-tutorial.pdf **Equipment / Facilities required to conduct the Practical**

Course. Hardware Requirement:

- Desktop Computers / Laptop
- Printer

Software required:

1. Any Network

   Simulator Options

   - NS2
   - NS3
   - OMNeT++ (Objective Modular Network Testbed in C++)
   - Cisco Packet Tracer
   - GNS3 (Graphical Network Simulator-3)

BOARD PRACTICAL

EXAMINATION PART – A

1. Installation of Network Simulator (Eg.NS2)
2. Implementation of Bluetooth network (transfer a file from one device to another).
3. Implement a basic function of Code Division Multiple Access (CDMA).
4. Simulate authentication and encryption techniques used in GSM and analyze their performance.
5. Illustration of Hidden Terminal Problem using Network Simulator.

PART – B

6. Simulate the Distance Vector Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc.
7. Simulate AODV Protocol.
8. Create a mobile chatting application using TCP with a mobile client.
9. Set up a simple mobile network topology using a network simulator. Configure and manage mobile devices within a simulated network environment.
10. Setup & configure Wireless Access Point (AP) using Network Simulator. Analyze the Wi-Fi communication range in the presence of the access point (AP) and the base station (BS).

57553	COMPONENT BASED TECHNOLOGIES	L	T	P	C
Practicum		1	0	4	3

Introduction

NET Framework provides a number of components to create many types of applications including those for consoles, Windows, mobile and the web. This Subject uses the .NET platform as a vehicle to master component-based Technology.

Course Objectives

The objective of this course is to enable the student to

- Develop simple applications using .NET
- Understand the concepts of event handlers,Windows Form Based Application.
- Access SQL database by using ADO.NET
- Create web pages using ASP.NET
- Create Web Service Using ASP.NET
- Develop XML database handling methodologies

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Develop simple applications using .NET

CO2: Understand the concepts of event handlers, Windows Form Based Application.

CO3: Access SQL database by using ADO.NET

CO4: Create Web Pages, Web Service Using ASP.NET

CO5: Develop XML database handling methodologies

Pre-requisites: Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	1	1	3
CO2	3	3	3	3	1	1	3
CO3	3	3	3	3	1	1	3
CO4	3	3	3	3	1	1	3
CO5	3	3	3	3	1	1	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.

- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57553	COMPONENT BASED TECHNOLOGIES	L	T	P	C
Practicum		1	0	4	3

Unit I	Introduction to C#.NET	
INTRODUCTION TO C#.NET Variables and constants–data types– declaration. Operators– types– precedence –Expressions – Program flow – Decision statements – if ... then, if...then…else, switch… Case, Loop statements– while, do...while, for. Next, for…each. Next, Array, Classes & objects – Creating and using your own classes – Data members and member methods – Instantiate an object, abstract class – static class Windows programming–Creating windows Forms-Working with Toolbox Controls &Advanced Controls – Events-Menus and Dialog Boxes		5
Exercise 1. Accept a character from console and check the case of the character. 2. Develop a menu-based application to implement a text editor with cut, copy, paste, save and close operations with accessing and shortcut keys.		12
Unit II	**Introduction to ASP.NET**	
Basics of web development with ASP.NET-Introduction to web forms and controls-Creating a simple ASP.NET web application **ASP.NET Web Forms and State Management** Working with web controls and server controls-State management techniques (view state, session, cookies) **Introduction to Web Services in .NET** Basics of web services and their importance-Creating and consuming web services in ASP.NET-SOAP and RESTful web services in .NET		4
Exercise 3. Develop a web application to input data through a web form to a database and validate the data. Use the Required Field Validator and Range Validator Controls. 4. Implement state management techniques such as view state, session, and cookies in an ASP.NET web application. 5. Create a simple SOAP or RESTful web service in ASP.NET and consume it in a client application.		18

Unit III	Introduction to ADO.NET	
Basics of database programming with ADO.NET-Connecting to a database using ADO.NET-Executing SQL queries and retrieving data -Stored Procedure **Advanced ADO.NET Programming** Working with disconnected data-Using Data Sets and Data Adapters-Handling concurrency and transactions in ADO.NET **Data Binding in ASP.NET** Data binding concepts-Binding data to web controls-Displaying database data in ASP.NET web forms		4
Exercise 6. Connect to a database using ADO.NET and retrieve data using SQL queries. 7. Create an ADO.Net application using Stored Procedure 8. Bind data from a database to web controls in an ASP.NET web form.		18
UNIT IV	**Working with XML in .NET**	
Introduction to XML- Construction of an XML document -: XML Serialization in the .NET Framework		2
Exercise 9. Develop a Window application to read an XML document containing subject, mark scored, year of passing into a Dataset 10. Develop a Window application to read students records from Database using ADO.NET and generate XML document containing students' records		12
TOTAL PERIODS		**75**

Suggested List of Students Activity

i. Creation of a Standalone .NET Application

ii. Creation of a Website.

iii. Creating a Web Service.

Textbook for Reference:

1. Andrew Stellman , Jennifer Greene, Head First C#: A Learner's Guide to Real-World Programming with C#, XAML, and .NET, Third edition , O'Reilly ,2013
2. Imar Spaanjaars , Beginning ASP.NET 4.5.1: in C# and VB, 1st Edition,Wrox,2014
3. Tim Patrick, Microsoft ADO.NET 4 Step by Step, 1st Edition Prentice Hall India, 2010.

Website links for reference:

1. https://www.w3schools.com/asp/
2. https://learn.microsoft.com/en-us/dotnet/framework/data/
3. https://www.tutorialspoint.com/xml/index.htm
4. https://learn.microsoft.com/en-us/sql/
5. https://learn.microsoft.com/en-us/dotnet/framework/wcf/

Equipment / Facilities required to conduct the Practical Portion

Hardware Requirement

1. Desktop Computer/Laptop

Software Requirement

1.Microsoft Visual Studio IDE

BOARD PRACTICAL EXAMINATION

PART – A

1. Accept a character from console and check the case of the character.
2. Develop a menu-based application to implement a text editor with cut, copy, paste, save and close operations with accessing and shortcut keys.
3. Develop a web application to input data through a web form to a database and validate the data. Use the Required Field Validator and Range Validator Controls.
4. Implement state management techniques such as view state, session, and cookies in an ASP.NET web application.
5. Create a simple SOAP or RESTful web service in ASP.NET and consume it in a client application.

PART – B

6. Connect to a database using ADO.NET and retrieve data using SQL queries.
7. Create an ADO.Net application using Stored Procedure
8. Bind data from a database to web controls in an ASP.NET web form.
9. Develop a Window application to read an XML document containing subject, mark scored, year of passing into a Dataset
10. Develop a Window application to read students records from Database using ADO.NET and generate XML document containing students' records

57554	MULTIMEDIA SYSTEMS	L	T	P	C
Practicum		1	0	4	3

Introduction

Multimedia application is the combined use of text, images, graphics, animation and video which can be used for business, education and entertainment. This practicum course prepares students to use digital multimedia for communication, creativity, collaboration and critical thinking. It also enables the students to implement their creativity to produce variety of multimedia objects using different multimedia software tools.

Course Objectives:

The objective of this course is to enable the students to

- Understand the basic concepts of multimedia systems
- Introduce various aspects of multimedia components like Images, audio, video, graphics and animation.
- Gain knowledge on Image, audio and video editing software tools
- Provide hands-on experience through a series of practical skill building tasks and exercises.
- Develop multimedia applications using various tools.

Course Outcomes

After successful completion of this course, the student will be able to

CO1: Analyze the key components of multimedia systems
CO2: Design an image and edit images using image editing tools
CO3: Apply audio and video editing using different editing tools
CO4: Create an animation using animation tools
CO5: Apply acquired knowledge in the relevant field for the good cause

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	-	-	-
CO2	3	3	2	2	-	-	-
CO3	3	3	3	3	-	-	-
CO4	3	3	3	3	-	-	-
CO5	3	3	3	2	-	-	-

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- In addition to traditional lecture method, different types of teaching methods and media are to be employed to develop the outcome.
- Guide students to create multimedia objects and applying it in relevant application

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57554	MULTIMEDIA SYSTEMS	L	T	P	C
Practicum		1	0	4	3

UNIT I	INTRODUCTION TO MULTIMEDIA	
Definition of Multimedia, Multimedia applications, Multimedia elements, Transition from conventional media to digital media, Delivering of Multimedia product, copy rights.		3
UNIT II	**TEXT**	
Usage of text in multimedia, Fonts and Faces, Hypermedia documents and Hypertext, Hypermedia Structures, Hypertext Tools, Text Editing and Word Processing Tools, OCR Software.		3
Ex.No	Name of the Experiment	
1	Design a poster with different text effects using suitable software	6
UNIT III	**IMAGES**	
Introduction to image, Making Still Images, Image editing tools, Color: Understanding Natural Light and Color, Color models, Color Palettes, Dithering, 2D graphics, Image compression and file formats: GIF, JPEG, JPG, PNG, TIFF, EXIF, PS, PDF.		3
Ex.No	Name of the Experiment	
2	Convert the given image into pencil sketch using suitable photo editing software.	18
3	Create a two or more partial scanned images of large poster/photo. Create a panoramic view of multiple photos by stitching together them using any panorama software.	
4	Using photo editor software and/or GIF creator software create an animation such as a flying balloon.	
UNIT IV	**SOUND**	
Digital Audio, Making Digital Audio Files, MIDI Audio, MIDI vs Digital Audio, Adding Sound to Your Multimedia Project, Audio Recording, Audio file formats, Sound		3
Editing Tools, sound synthesis.		

Ex.No	Name of the Experiment	
5	Use suitable software to (a) compress / decompress audio files. (b) convert audio to different formats (c) split, join, rip audio.	12
6	Use an audio processing software and perform the audio editing tasks– Import audio, select and edit the sound, create fade-in fade-out effects, label audio segments, use noise remove filter, mix audio, change stereo to mono tracks, export audio to different format and save.	
UNIT V	**VIDEO & ANIMATION**	
Video basics - How video works, Analog Video, Digital Video, Video file formats, Shooting and Editing Video. Principle of animations, animation techniques, animation file formats. Basics of multimedia authoring.		3
Ex.No	Name of the Experiment	
7	Use a video processing software to perform – Trim video clips, crop video, rotate video, join video, add subtitles, edit video dimension, bit rate, frame rate, sample rate, channel, and video/audio quality tasks on a video.	24
8	Create a movie from video clips to demonstrate audio-video mixing, music, video effects, video transitions and titles.	
9	Sketching of cartoon characters using suitable software	
10	Create a 2D animation of an aero plane take off using suitable software.	
TOTAL PERIODS		**75**

Suggested List of Students Activity

- Presentation /Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

References

1. "Ze- Nian Li and M.S. Drew", "Fundamental of Multimedia", Pearson Education, Second Edition, 2014.
2. "Tay Vaughan", "Multimedia: Making It Work", Tata-McGrawHill, 9th Edition, 2014.

Web-based/Online Resources

1. www.geeksforgeeks.com
2. https://www.tutorialspoint.com/multimedia/multimedia_systems.htm
3. https://helpx.adobe.com/in/photoshop/using/tools.html

Equipment / Facilities required to conduct the Practical Portion

1. **Hardware Requirement:**
   - Desktop Computers
   - Printer
2. **Software Requirement:**
   1. Windows / Linux Operating System
   2. Software tools: open-source software or commercial software. The following list is a suggestive list of open-source software and their commercial replacement. Experiments may be done using either opens-source or commercial software. open-source software is preferred.

List of Softwares

1. 2D Graphics and Animation
   a) Open-Source: OpenToonz, Pencil2D, Blender, Powtoon
   b) Commercial software: Adobe Flash
2. Audio Players
   a) Open-Source: CoolPlayer, MPC-HC, Zing 4g Mp3 Player
   b) Commercial software: Windows Media Player
3. Audio Recorders and Editors
   a) Open-Source: Audacity, Traverso, Qtractor,Frinika
   b) Commercial: Sonar X1, ACID music studio, Adobe Audition
4. Multimedia Players
   a) Open-Source: VLC Media Player, Kodi, Mplayer, MediaPortal
   b) Commercial: Windows Media Player
5. Video Editing
   a) Open-Source: OpenShot,Shotcut, Lightworks, Cinelerra, Kdenlive
   b) Commercial: Adobe Premiere Pro CS6
6. Video File Conversion
   a) Open-Source: DVDStyler, DVD Flick, HandBrake, ffdshow
   b) Commercial: Movavi Video Converter, Zamzar, Windows Movie Maker

BOARD PRACTICAL

EXAMINATION PART - A

1. Design a poster with different text effects using suitable software
2. Convert the given image into pencil sketch using suitable photo editing software.
3. Create a two or more partial scanned images of large poster/photo. Create a panoramic view of multiple photos by stitching together them using any panorama software.
4. Using photo editor software and /or GIF creator software create an animation such as a flying balloon.
5. Use suitable software to (a) compress / decompress audio files.
   (b). convert audio to different formats. (c) split, join, rip audio.

PART - B

6. Use an audio processing software and perform the audio editing tasks– Import audio, select and edit the sound, create fade-in fade-out effects, label audio segments, use noise remove filter, mix audio, change stereo to mono tracks, export audio to different format and save.
7. Use a video processing software to perform – Trim video clips, crop video, rotate video, join video, add subtitles, and edit video dimension, bit rate, frame rate, sample rate, channel, and video/audio quality tasks on a video.
8. Create a movie from video clips to demonstrate - audio-video mixing, music, video effects, video transitions, and titles.
9. Sketching of cartoon characters using suitable software
10. Create a 2D animation of an aero plane take off using suitable software.

57560	INNOVATION AND STARTUP	L	T	P	C
Practicum		1	0	2	2

Introduction:

The integration of Innovation and Start-ups concept within the syllabus is testament to the forward thinking nature of educational institutions. By introducing this concept, students are provided with a solid foundation upon which they can build their skills in Innovation and Start-ups. This course can bridge the gap between theory and practice. It allows students to apply the knowledge they have acquired in a real world context, thereby enhancing their understanding and retention of the above concept. This experimental learning approach not only fosters a deeper level of engagement but also trains student with practical skills necessary to navigate the complexities of the business world. This also empowers students to become an Innovator or Entrepreneur. With necessary tools and knowledge, educational institutions are preparing the next generation of entrepreneurs to tackle the challenges and opportunities that lie ahead. This syllabus will explore the different facets of innovation, including its importance, types and strategies for fostering a culture of innovation within organizations

Course Objectives:

The objective of this course is to enable the students

- To understand the concept of Innovation and Start-ups
- To acquire knowledge of Prototype development, IPR, Patents and Copyrights
- To have the practical experience in preparing Business plan for Start-ups
- To visit the existing nearby industry to prepare project report about the present challenges of that industry
- To know the different funding supports available from Government and Non-Government schemes for Start-ups

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Differentiate between Innovation and Start-ups

CO2: Explain the importance of IPR, Patents and Copyrights.

CO3: Describe the methodology to be adopted for preparing the Business Plan

CO4: Gain practical experience by Industrial training and visiting the nearby industry

CO5: Explore and identify various funding facilities available from Government and Non- Government Schemes for Start-ups

Pre-requisites:

There are no specific prerequisites for this course, although a basic understanding of business and technology concepts would be beneficial.

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	1	-	2	3	3
CO2	-	-	1	-	2	3	3
CO3	-	-	1	-	2	3	3
CO4	-	-	1	-	2	3	3
CO5	-	-	1	-	2	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Assessment Methodology

	Continuous Assessment (40 marks)			**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	
Mode	Class Assessment (Unit I,II & Unit III)	Seminar Presentations (Unit IV)	Submission of Industry Visit Project Report (Unit V)	Practical Examination (Project)
Duration	2 hours	---	---	3 hours
Exam Marks	50	20	30	100
Converted to	10	10	20	60
Marks	**10**	**10**	**20**	**60**

Continuous Assessment - 40 marks

S. No	Description	Marks
CA1 i) ii)	**Class Assessment (50 marks) - Unit – I,II & III** Written Examination - Theory Questions 10 questions out of 15 questions (10 x 3 marks :30 marks) 4 questions out of 6 questions (4 x 5 marks : 20 marks)	10 marks
CA 2	**Seminar Presentations (20 marks- each topic carries 10 marks) - Unit IV** Students should present any two topics with PPTs	10 marks
CA 3	Submission of Industry Visit Project Report - **(30 marks) - Unit V**	20 marks
	Total	**40 marks**

End Semester Examination –Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations.

Detailed Allocation of Marks

S. No	Description	Marks
Part A i) ii)	Written Examination – Unit –I,II & III Theory Questions 10 questions out of 15 questions (10 x 3 marks = 30 marks) 3 questions either or pattern (3 x 5 marks = 15 marks)	45
Part B i) ii)	Presentation of Industry Visit Project Report	25
	Interaction and Evaluation	30
	TOTAL	**100**

57560	INNOVATION AND STARTUP	L	T	P	C
Practicum		1	0	2	2

Unit I	INTRODUCTION TO INNOVATION	
An Introduction to Innovation and Creativity- Innovation in current Environment - Types of Innovation - Challenges of Innovation - Steps of Innovation Management - Divergent v/s Convergent thinking - Design thinking and Entrepreneurship		6
Unit II	**INCUBATION CLUBS, IPR, PATENTS AND COPYRIGHTS**	
Idea Generation - Incubation Clubs - Prototype Development - Marketing of Innovation - Management of Innovation - Creation of IPR -Types of IPR - Patents and Copyrights - Patents in India - Technological and Non-Technological Innovation Process.		6
Unit III	**GOVERNMENT AND NON-GOVERNMENT FUNDING SCHEMES FOR START-UPS**	
An introduction to Start-up - Start-ups in India - Procedure for registration of Start-ups - Business Model- Business Plan - Case Studies - Opportunities and Challenges - Funding supports from Government Schemes -MUDRA, TANSEED, NEEDS, PMEGP, UYEGP – Non-Government Schemes - CSR Fund - Angel Investors - Venture Capitalist		6
Unit IV	**SEMINAR**	
All the students have to select a minimum of 2 topics from the list given below. They are expected to collect the resources with the help of faculty assigned to them to prepare PPTs for presentation 1. Idea Generation 2. Innovation Management 3. Product Development 4. Business Model Innovation 5. Organizational Culture and Change Management 6. Leadership and Innovation 7. Barriers to Innovation 8. Innovation Marketing 9. E-Commerce success stories (any one) 10. Role of Start-ups in Higher Education 11. Professional Networking in Building Brands 12. How to start a start-up in India		9

Unit V	EXPOSURE TO INDUSTRY	
All the students should visit and study the nearby industries, incubation centres, start-ups etc., and select any one to prepare a project report which covers the Name of the Industry/Organization, Introduction of the Industry, Type of the Industry, Scope of the Industry, Plant Layout and Location, Details of Plant and Machineries, Process flow chart, Manufacturing Methods, Process of Manufacturing, Product Manufacturing, Quality Control, Marketing, Product selling - Conclusion		18
TOTAL PERIODS		**45**

57570	INDUSTRIAL TRAINING	SUMMER VACATION	C
Theory			2

Introduction

Industrial training is a crucial component of the diploma engineering curriculum, designed to bridge the gap between theoretical knowledge and practical application. Typically conducted during vacation periods, this two-week training program provides students with hands-on experience in their respective engineering fields. The primary objectives are to enhance practical skills, familiarize students with industry standards, and prepare them for future employment.

Two-week industrial training during vacation periods is an invaluable part of diploma engineering education. It not only equips students with practical skills but also provides a comprehensive understanding of the industry, preparing them for successful engineering careers.

Objectives

1. Practical Exposure: Students gain direct exposure to real-world engineering practices, tools, and technologies.
2. Skill Enhancement: The training helps in developing technical and soft skills that are essential for professional growth.
3. Industry Insight: Students learn about the working environment, operational procedures, and challenges faced by industries.
4. Professional Networking: The training offers opportunities to interact with industry professionals, which can be beneficial for career prospects.
5. Application of Knowledge: It allows students to apply classroom knowledge to solve practical problems, enhancing their understanding and retention of engineering concepts.

Structure of the Training Program

- Orientation: Introduction to the company, its operations, and safety protocols.
- Project Assignment: Students are assigned specific projects or tasks relevant to their field of study.
- Supervision and Mentorship: Industry professionals guide and mentor students throughout the training.
- Skill Development Workshops: Sessions on technical skills, software tools, and industry best practices.

- Assessment and Feedback: Performance evaluations and constructive feedback to help students improve.

Benefits for Students

- Enhanced Employability: Practical experience makes students more attractive to potential employers.
- Confidence Building: Working in a real-world setting boosts confidence and professional demeanor.
- Clarified Career Goals: Exposure to various roles and responsibilities helps students define their career paths.

Course Outcomes

CO 1: Demonstrate proficiency in using industrial machinery, tools, and software.

CO 2: Able to identify, analyze, and solve engineering problems using industry-standard methods and practices.

CO 3: Gain a comprehensive understanding of industrial manufacturing processes, quality control, and safety practices.

CO 4: Exhibit improved communication, teamwork, and professional behavior in an industrial setting.

CO 5: Apply theoretical concepts learned in their coursework to practical engineering tasks and projects.

Duties Responsibilities of the Faculty Mentor.

One faculty mentor should be assigned for every 30 students by the HOD / Principal. Faculty mentors shall play a crucial role in overseeing and guiding students during their industrial training program in Diploma engineering.

Pre-Training Responsibilities:

1. Orientation and Preparation:
    - Conduct orientation sessions to familiarize students with the objectives, expectations, and guidelines of the industrial training program.
    - Assist students in understanding the importance of industrial training in their academic and professional development.
2. Placement Coordination:
    - Collaborate with the placement cell or industry liaison office to secure suitable training placements for students that align with their academic specialization and career interests.
    - Facilitate communication between the institution and host organizations to ensure smooth coordination of training arrangements.

3. Training Plan Development:
    - Help students develop a detailed training plan outlining learning objectives, tasks, and expected outcomes for the training period.
    - Guide students in setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals for their training experience.

During Training Responsibilities:

4. Monitoring and Support:
    - Regularly monitor the progress of students during their industrial training. Maintain communication with both students and industry supervisors to track performance and address any issues that may arise.
    - Provide ongoing support and guidance to students, offering advice on technical challenges, professional conduct, and workplace etiquette.
5. Technical Guidance:
    - Offer technical guidance and mentorship related to the specific engineering discipline or specialization of the students. Help them apply theoretical knowledge to practical situations encountered in the industry.
6. Problem-Solving Assistance:
    - Assist students in overcoming obstacles or challenges encountered during their training. Encourage them to develop problem-solving skills and resilience in real-world engineering scenarios.
7. Feedback and Evaluation:
    - Provide constructive feedback on students' performance based on reports, assessments, and observations gathered from industry supervisors.
    - Evaluate students' achievements in relation to their training objectives and competencies developed during the program.

Post-Training Responsibilities:

8. Reflection and Debriefing:
    - Conduct debriefing sessions with students to reflect on their training experiences, discuss lessons learned, and identify areas for further improvement.
    - Help students articulate their learning outcomes and how these experiences contribute to their professional growth.
9. Documentation and Reporting:
    - Ensure comprehensive documentation of students' training activities, achievements, and feedback received from industry supervisors.

- Prepare reports summarizing students' performance and submit these to relevant departments or committees for review and assessment.

10. Career Counseling:
    - Provide career guidance and counseling to students based on their industrial training experiences. Assist them in leveraging these experiences for future job applications or further academic pursuits.
11. Continuous Improvement:
    - Collaborate with industry partners to continuously improve the quality and relevance of the industrial training program.
    - Incorporate feedback from students and industry supervisors to enhance the effectiveness of future training placements.

By fulfilling these duties and responsibilities, faculty mentors contribute significantly to the overall educational experience and professional development of Diploma engineering students during their industrial training program.

Instructions to the students

Before Starting Industrial Training:

1. **Orientation and Preparation:**
    - Attend orientation sessions conducted by the institution or faculty mentors to understand the objectives, expectations, and guidelines of the industrial training program.
    - Familiarize yourself with the specific policies, procedures, and safety regulations of the host organization where you will be undergoing training.
2. Setting Goals:
    - Set clear and specific goals for your industrial training period. Define what skills, knowledge, and experiences you aim to gain during this time.
    - Discuss your goals with your faculty mentor and seek their guidance in developing a training plan that aligns with your career aspirations.
3. Professional Attire and Conduct:
    - Dress appropriately and professionally according to the standards of the industry and host organization.
    - Maintain a positive attitude, demonstrate punctuality, and adhere to workplace etiquette and norms.

During Industrial Training:

4. Learning and Engagement:
    - Actively engage in all assigned tasks and projects. Seek opportunities to learn new skills and technologies relevant to your field of study.
    - Take initiative in asking questions, seeking clarification, and participating in discussions with supervisors and colleagues.

5. Adaptability and Flexibility:
    - Adapt to the work environment and demonstrate flexibility in handling various responsibilities and challenges that arise during your training.
    - Be open to different roles and tasks assigned to you, as this will broaden your experience and skill set.
6. Professionalism and Communication:
    - Communicate effectively with supervisors, colleagues, and clients as required. Practice clear and concise verbal and written communication.
    - Demonstrate professionalism in all interactions, respecting confidentiality, and adhering to company policies and procedures.
7. Safety and Compliance:
    - Prioritize safety at all times. Familiarize yourself with safety protocols, procedures, and emergency exits in the workplace.
    - Follow all safety guidelines and regulations to ensure your well-being and that of others around you.

After Completing Industrial Training:

8. Reflection and Documentation:
    - Reflect on your training experience. Evaluate what you have learned, the challenges you faced, and how you have grown professionally.
    - Maintain a journal or log documenting your daily activities, achievements, and lessons learned during the training period.
9. Feedback and Evaluation:
    - Seek feedback from your industry supervisor and faculty mentor on your performance and areas for improvement.
    - Use constructive feedback to enhance your skills and competencies for future career opportunities.
10. Career Planning:
    - Use your industrial training experience to inform your career planning and decision-making process.

- Discuss your career goals and aspirations with your faculty mentor or career counselor for guidance on next steps after completing your diploma.

By following these instructions, Diploma engineering students can make the most of their industrial training experience, gain valuable insights into their chosen field, and prepare themselves effectively for future professional endeavors.

Attendance Certification

Every student has to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution faculty mentor.

Training Reports

The students have to prepare reports: The report in the form of a diary to be submitted to the concerned faculty mentor of the institution. This will be reviewed while awarding Internal assessment.

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant / product / process / construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training. Any data, drawings etc. should be incorporated with the consent of the Organisation.

Scheme of Evaluation

Internal Assessment

Students should be assessed for 40 Marks by industry supervisor and polytechnic faculty mentor for the Internal Assessment.

Sl. No.	Description	Marks
A	Punctuality and regularity. (Attendance)	10
B	Level / proficiency of practical skills acquired. Initiative in learning / working at site	10
C	Self expression / communication skills. Interpersonal skills / Human Relation.	10
D	Report and Presentation.	10
Total		50

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of industrial training. The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report and Attendance certificate.	20
B	Comprehensive report on Internship, Relevant Internship Certificate from the concerned department.	30
C	Presentation by the student at the end of the Internship.	30
D	Viva Voce	20
Total		100

SEMESTER VI

57611	ADVANCED ENGINEERING MATHEMATICS	L	T	P	C
Theory		3	0	0	3

Introduction:

Mathematics is essential for engineering students to understand core engineering subjects. It provides the framework for engineers to solve problems in engineering domains. This course is designed to bridge the gap between diploma mathematics and B.E/B.Tech mathematics in matrix algebra, differential calculus, vector calculus, differential equations, and Laplace transforms.

Course Objectives:

The objective of this course is to enable the students to

1. Understand the concepts of eigen-values and eigen-vectors of matrices.
2. Learn the notation of partial differentiation and determine the extremities of functions of two variables.
3. Acquire knowledge in vector calculus which is significantly used to solve engineering problems.
4. Formulate and solve differential equations.
5. Understand Laplace transformation and its engineering applications.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Find eigenvalues and corresponding eigenvectors of a square matrix.

CO2: Apply the knowledge of partial differentiation to evaluate Jacobian and extremities of two variable functions.

CO3: Evaluate the gradient of a scalar field and the divergence and curl of vector fields.

CO4: Solve ordinary differential equations using various techniques.

CO5: Use Laplace transforms to solve first-order ordinary differential equations.

Pre-requisites: Matrices, Determinants, Differentiation, Integration and Vector Algebra.

CO/PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	3
CO2	3	3	2	1	1	1	3
CO3	3	3	2	1	1	1	3
CO4	3	3	2	1	1	1	3
CO5	3	3	2	1	1	1	3

Legend: 3 - High Correlation, 2 - Medium Correlation, 1 - Low Correlation

Instructional Strategy:

- A theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based.
- All demonstrations/Hands-on practices might be under a simulated environment.
- Use inducto-deductive approach to achieve the desired learning objectives.
- Use open-ended questions to nurture the problem-solving and reasoning skills among students.
- Support and guide the students for self-study.
- State the need for mathematics with engineering studies and provide real-life example

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

57611	ADVANCED ENGINEERING MATHEMATICS	L	T	P	C
Theory		3	0	0	3

Unit I	**EIGENVALUES AND EIGENVECTORS**	
	Characteristic equation – Eigen-values of 2×2 and 3×3 real matrices – Eigen-vectors of 2×2 real matrices – Properties of eigen-values (excluding proof) – Cayley-Hamilton theorem (excluding proof) – Simple problems.	**7**
Unit II	**FUNCTIONS OF SEVERAL VARIABLES**	
	Partial derivatives of two variable and three variable functions (up to second order) – Homogeneous functions and Euler's theorem (excluding proof) – Jacobian matrix and determinant – Maxima and minima of functions of two variables – Simple problems.	**7**
Unit III	**VECTOR CALCULUS**	
	Scalar filed and Vector field – Vector differential operator – Gradient of a scalar field – Directional derivative – Divergence and curl of a vector field (excluding properties) – Solenoidal and irrotational vector fields – Simple problems.	**7**
Unit IV	**DIFFERENTIAL EQUATIONS**	
	Differential equation – Formation – Order and degree – Solution of a differential equation – Equations of first order and first degree – Variable separable method – Leibnitz's Linear equations – Second order equations of the form $(aD^2 + bD + c)y = e^{nx}$ where a, b, c and n are constants and the auxiliary equation $am^2 + bm + c = 0$ has only real roots) – Complementary function – Particular integral – General solution – Simple problems.	**7**
Unit V	**LAPLACE TRANSFORMS**	
	Definition of Laplace transform – Laplace transforms of standard functions - Linearity and change of scale property (excluding proofs) – First shifting property – Laplace transforms of derivatives – Properties (excluding proofs) – Inverse Laplace transforms – Properties (excluding proofs) – Solving first order ordinary differential equation using Laplace transforms – Simple problems.	**7**
	TEST AND REVISION	**10**
	TOTAL PERIODS	**45**

Suggested List of Students Activities:

- Demonstrate the applications of eigen-values in stability analysis, decouple of three-phase systems and vibration analysis.
- Demonstrate maxima and minima of two variable functions using GeoGebra graphing calculator.
- Demonstrate solenoidal vector field and irrotational vector field using engineering applications.
- Demonstrate the applications of differential equations in solving engineering problems.
- Presentation /Seminars by students.
- Quizzes.

Text Books for Reference:

1. John Bird, Higher Engineering Mathematics, Routledge, 9th Edition, 2021.
2. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
3. Arumugam, S., Thangapandi Isaac, A., & Somasundaram, A., Differential Equations and Applications, Yes Dee Publishing Pvt. Ltd., 2020.
4. Duraipandian, P., & Kayalal Pachaiyappa, Vector Analysis, S Chand and Company Limited, 2014.
5. Narayanan, S., & Manicavachagom Pillai T.K., Calculus Volume I and II, .Viswanathan Publishers Pvt. Ltd., 2007.

Website Links for Reference:

- www.khanacademy.org/math/
- https://www.mathportal.org/
- https://openstax.org/subjects/math
- www.mathhelp.com/
- https://www.geogebra.org/
- https://www.desmos.com/
- https://phet.colorado.edu/

57612	ENTREPRENEURSHIP	L	T	P	C
Theory		3	0	0	3

Introduction

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and start ups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs, relevant to social prosperity and thereby ensure good means of living for every individual, provides jobs and develop Indian economy.

Course Objectives

After completing this subject, the student will be able to

- Acquire entrepreneurial spirit and resourcefulness
- Familiarize Acquire knowledge about the business idea and product selection
- Analyze the banking and financial institutions
- Understand the pricing policy and cost analysis
- Get knowledge about the business plan preparation

Course Outcomes

CO1: Understand the process of entrepreneurship

CO2: Analyse the importance of generation of ideas and product selection

CO3: Familiarization of various financial and non financial schemes

CO4: Acquire various cost components to arrive pricing of the product

CO5: Learn the preparation of project feasibility report

Pre-requisites

Knowledge of basics of Engineering and Industrial engineering

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	-	-	3	1	3
CO2	-	-	-	-	3	3	3
CO3	-	-	-	1	-	3	2
CO4	-	1	3	3	2	3	2
CO5	-	2	3	3	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice- activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real- world scenarios when possible.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

57612	ENTREPRENEURSHIP	L	T	P	C
Theory		3	0	0	3

UNIT I	Entrepreneurship – Introduction and Process	
Concept of entrepreneurship - Importance, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship, , Competencies and characteristics of an entrepreneur -, Ethical Entrepreneurship, Entrepreneurial Values and Attitudes, Creativity, Innovation and entrepreneurship- Entrepreneurs - as problem solvers, Mindset of an employee and an entrepreneur, - Risk Taking-Concepts		7
UNIT II	**Business Idea**	
Types of Business: Manufacturing, Trading and Services, Stakeholders: sellers, vendors and consumers and Competitors, E- commerce Business Models, business idea generation -Types of Resources - Human, Capital and Entrepreneurial tools and resources, etc.,- setting business goals- Patent, copyright and Intellectual property rights, Customer Relations and Vendor Management, -Business Ideas vs. Business Opportunities, Opportunity – SWOT ANALYSIS of a business idea - Business Failure – causes and remedies.- Types of business risks,		7
UNIT III	**Banking**	
Size and capital based classification of business enterprises- Role of financial institutions, Role of Government policy, Entrepreneurial support systems, Incentive schemes for state government, and Incentive schemes for Central governments.		7
UNIT IV	**Pricing and Cost Analysis**	
Types of Costs - Variable - Fixed- Operational Costs - Break Even Analysis - for single product or service, -financial Business Case Study, Understand the meaning and concept of the term Cash Inflow and Cash Outflow- Pricing- Calculate Per Unit Cost of a single product, , Understand the importance and preparation of Income Statement, Prepare a Cash Flow Projection- Factors affecting pricing.- GST.		7
UNIT V	**Business Plan Preparation**	
Feasibility Report – Technical analysis, financial analysis- Market Research - Concept, Importance and Process- tools for market research- Market Sensing and Testing, Marketing and Sales strategy, Digital marketing, Branding - Business name, logo, tag line, Promotion strategy, Business Plan Preparation, -Concept and Importance, , Execution of Business Plan		7
	Revision and Test	**10**
	TOTAL PERIODS	**45**

Suggested list of Students Activity.

1. Students can explore app development or web design. They'll learn about technology, user experience, and marketing.
2. Hosting events, workshops, or conferences allows students to practice project management, networking, and marketing skills.
3. Encourage students to address social or environmental issues through innovative business solutions. This fosters empathy and creativity.
4. Part of entrepreneurship clubs or organizations provides networking opportunities, mentorship, and exposure to real-world challenges.
5. Competitions like business plan contests or pitch events allow students to showcase their ideas and receive feedback.
6. Students can create and sell handmade crafts, artwork, or other products. This teaches them about production, pricing, and customer relations.
7. Students can provide consulting services in areas they're knowledgeable about, such as social media marketing or financial planning.
8. Encourage students to create and manage their own small business or offer freelance services. This hands-on experience helps them understand various aspects of entrepreneurship.

Text Books for References:

1. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra., 2019.
2. H.Nandan, Fundamentals of Entrepreneurship, Prentice Hall India Learning Private Limited, Third Edition, 2013.
3. R.K. Singal, Entrepreneurship Development & Management, S K Kataria and Sons, 2013.

Website Links for References:

- https://ocw.mit.edu/courses/15-390-new-enterprises-spring-2013/resources/lecture-1/
- https://onlinecourses.nptel.ac.in/noc20_ge08/preview

57613	PROJECT MANAGEMENT	L	T	P	C
Theory		3	0	0	3

Introduction

Project management is the systematic application of knowledge, skills, tools, and techniques to project activities to meet specific project requirements. It involves planning, organizing, and managing resources to achieve project goals within defined scope, time, and budget constraints. Project management encompasses several key processes and phases, including initiation, planning, execution, monitoring and controlling, and closing. It is essential across various industries to ensure projects are completed successfully, efficiently, and effectively, aligning with organizational objectives and stakeholder expectations. Project managers play a crucial role in leading teams, managing risks, ensuring quality, and communicating with stakeholders to drive project success.

Course Objectives

After completing this subject, the student will be able,

- To understand the concept, characteristics and elements of projects.
- To understand the stages in Project Life Cycle.
- To appreciate the need for Project Portfolio Management System.
- To know the considerations in choosing appropriate project management structure.
- To understand the components of techno-economic feasibility studies.
- To know about the detailed project report
- To learn about project constraints.
- To understand the techniques of evaluation.
- To get insight into the Social Cost Benefit Analysis Method.
- To know how to construct project networks using PERT and CPM.
- To learn how to crash project networks
- To understand the meaning of project appraisal.
- To understand the meaning of project audits.
- To know the qualities of an effective project manager.
- To understand the stages in Team Development model.

Course Outcomes

CO 1: Understand the Project Management Principles.

CO 2: Learn to create and manage project schedules.

CO 3: Create structure and manage the project commitments.

CO 4: Gain enterprise support.

CO 5: Prepare Detailed Project Report (DPR).

Pre-requisites :

Basic Knowledge.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	-	-	-	2	2
CO2	2	2	1	-	1	3	2
CO3	3	2	3	3	1	3	3
CO4	3	2	2		1	3	2
CO5	3	2	3	3	1	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their curiosity to learn.
- Implement task-based learning activities where students work on specific tasks or projects.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

57613	PROJECT MANAGEMENT	L	T	P	C
Theory		3	0	0	3

UNIT I	Project Management – An Overview, Project Portfolio Management System and Structure, Steps in Defining Project and Project Delays	
Project – Classification – Importance of Project Management – An Integrated Approach – Project Portfolio Management System – The Need – Choosing the appropriate Project Management Structure: Organizational considerations and project considerations – steps in defining the project – project Rollup – Process breakdown structure – Responsibility Matrices – External causes of delay and internal constraints.		7
UNIT II	**Various Stages and Components of Project Feasibility Studies, Phases of a Project, Stages in Project Life Cycle and Project Constraints**	
Project feasibility studies - Opportunity studies, General opportunity studies, specific opportunity studies, pre-feasibility studies, functional studies or support studies, feasibility study – components of project feasibility studies – Managing Project resources flow – project planning to project completion: Pre-investment phase, Investment Phase and operational phase – Project Life Cycle – Project constraints.		7
UNIT III	**Project Evaluation under Certainty and Uncertainty, Project Evaluation, Commercial and Social Cost Benefit Analysis**	
Project Evaluation under certainty - Net Present Value (Problems - Case Study), Benefit Cost Ratio, Internal Rate of Return, Urgency, Payback Period, ARR – Project Evaluation under uncertainty – Methodology for project evaluation – Commercial vs. National Profitability – Social Cost Benefit Analysis, Commercial or National Profitability, social or national profitability.		7
UNIT IV	**Developing Project Network using PERT and CPM, Project Appraisal and Control Process.**	
Developing a Project Plan - Developing the Project Network – Constructing a Project Network (Problems) – PERT – CPM – Crashing of Project Network (Problems - Case Study) – Resource Leveling and Resource Allocation – how to avoid cost and time overruns – Steps in Project Appraisal Process – Project Control Process – Control Issues – Project Audits – the Project Audit Process – project closure – team, team member and project manager evaluations		7

UNIT V	Project Managing Versus Leading of Project, Qualities of Project Manager and Managing Project Teams, Team Building Models and Performance Teams and Team Pitfalls.	
Managing versus leading a project - managing project stakeholders – social network building (Including management by wandering around) – qualities of an effective project manager – managing project teams – Five Stage Team Development Model – Situational factors affecting team development – project team pitfalls.		7
	Revision and Test	**10**
	TOTAL PERIODS	**45**

Suggested list of Students Activity,

Project Simulation and Role-Playing:

- Activity: Participate in simulated project scenarios where students take on different roles within a project team (e.g., project manager, team member, stakeholder).
- Purpose: This helps students understand the dynamics of project management, including leadership, communication, and team collaboration.

Case Study Analysis:

- Activity: Analyze real-world case studies of successful and failed projects.
- Purpose: This activity enables students to apply theoretical knowledge to practical situations, identify best practices, and learn from the challenges and solutions implemented in real projects.

Project Plan Development:

- Activity: Develop a comprehensive project plan for a hypothetical or real project, including scope, schedule, budget, risk management, and quality management plans.
- Purpose: This allows students to practice creating detailed and structured project plans, honing their skills in planning and organizing project activities.

Group Project:

- Activity: Work in teams to manage a project from initiation to closure, simulating a real project environment.
- Purpose: Group projects help students learn how to work collaboratively, manage group dynamics, and apply project management tools and techniques in a team setting.

Project Management Software Training:

- Activity: Gain hands-on experience with project management software such as Microsoft Project, Asana, or Trello.
- Purpose: This activity equips students with practical skills in using technology to plan, track, and manage project tasks and resources efficiently.

Text Books for Reference:

1. Clifford F. Gray And Erik W. Larson, Project Management – The Managerial Process, Tata Mcgraw Hill.
2. Dragan Z. Milosevic, Project Management Toolbox: Tools And Techniques For The Practicing Project Manager,
3. Gopalakrishnan, P/ Ramamoorthy, V E, Textbook Of Project Management, Macmillan India. Ltd.
4. Harold Kerzner, Project Management: A Systems Approach To Planning, Scheduling, And Controlling, Eighth Edition, John Wiley & Sons
5. Jason Charvat, Project Management Methodologies: Selecting, Implementing, And Supporting Methodologies And Processes For Projects, John Wiley & Sons
6. Kevin Forsberg, Ph.D, Hal Mooz, Visualizing Project Management: A Model For Business And Technical Success, Second Edition, Pmp And Howard Cotterman, John Wiley & Sons.

Website Links for Reference:

https://youtu.be/pc9nvBsXsuM

NPTEL Courses

https://youtu.be/PqQqTAu_FiM

57614	FINANCE FUNDAMENTALS	L	T	P	C
Theory		3	0	0	3

Introduction

This course gives a deep insight into the finance fundamentals such as money management and the process of acquiring needed funds. It also encompasses the oversight, creation, and study of money, banking, credit, investments, assets, liabilities that make up financial systems and improves overall financial literacy.

Course Objectives

The objective of this course is to

1. Identify different ways to save money for future
2. Understand various techniques to raise capital
3. Get acquainted with the essential terminologies used in finance language
4. Get exposed to different types of budgeting
5. Instill the concept of costing and its impact on profitability

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Manage financial resources effectively to achieve personal goals

CO2: Ensure that the business has enough money to meet its obligations and that it can recover in the future

CO3: Exhibit financial literacy through the usage of different terminologies appropriate to the context

CO4: Differentiate different types of budgeting and allocate the resources

CO5: Apply the idea of marginal costing in decision making

Pre-requisites

Knowledge of basic mathematics

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	-	-	-	2	2
CO2	2	2	1	-	1	3	2
CO3	3	2	3	3	1	3	3
CO4	3	2	2		1	3	2
CO5	3	2	3	3	1	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their curiosity to learn.
- Implement task-based learning activities where students work on specific tasks or projects.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

57614	FINANCE FUNDAMENTALS	L	T	P	C
Theory		3	0	0	3

UNIT I	Personal Finance	
Personal Finance – Meaning, Objectives and advantages – Individual Perspective – Family Perspective – Time Value of Money – Personal Savings: Meaning, Different modes of Saving – Bank Deposit, Online Investments, Insurance, Stocks, Gold, Real Estate – Returns Vs Risk – Financial Discipline – Setting Alerts for commitments (With Real time Examples)		7
UNIT II	**Business Funding**	
Sources: Personal Savings – Borrowings - Venture Capital – Venture Capital Process – Commercial Banks – Government Grants and Scheme.		7
UNIT III	**Finance language**	
Capital – Drawing – Income – Expenditure – Revenue Vs Capital Items – Assets – Fixed Assets – Current Assets – Fictitious Assets – Liabilities – Long-term Liabilities – Current Liabilities – Internal Liabilities – External Liabilities – Share holders fund: Equity Share capital, Preference Share Capital, Reserve & Surplus – Borrowings: Debentures, Bank Loan, Other Loan – Depreciation – Reserve Vs Provision.		7
UNIT IV	**Budgeting**	
Budgetary Control – Meaning – Preparation of various budgets – Purchase budget – Sales Budget – Production budget – Cash Budget – Flexible budgets. (With Problems)		7
UNIT V	**Marginal Costing**	
Marginal Costing – Meaning – Marginal Costing Vs Absorption Costing – Concepts of Variable Cost, Fixed Cost and Contribution – PV Ratio – Break Even Point – Margin of Safety – Key Factor – Application of Marginal Costing in decision making – Make or Buy – Shutdown or Continue – Exploring New Markets (With Problems)		7
	Revision and Test	**10**
	TOTAL PERIODS	**45**

Suggested list of Students Activity Financial

Statement Analysis:

- Activity: Analyze and interpret financial statements, including balance sheets, income statements, and cash flow statements of different companies.
- Purpose: This activity helps students understand the financial health and performance of organizations, developing skills in financial analysis and critical thinking.

Investment Portfolio Management:

- Activity: Create and manage a simulated investment portfolio, making decisions on asset allocation, stock selection, and diversification.
- Purpose: This allows students to apply theoretical concepts in a practical setting, learning how to evaluate investment opportunities and manage financial risk.

Case Study Analysis:

- Activity: Examine real-world case studies involving financial decisions made by companies, such as capital budgeting, mergers and acquisitions, and financial restructuring.
- Purpose: Case studies provide insights into the application of finance principles in business scenarios, enhancing problem-solving and decision-making skills.

Financial Modeling:

- Activity: Build financial models using spreadsheets to forecast future financial performance, conduct sensitivity analysis, and evaluate business projects.
- Purpose: Financial modeling is a critical skill in finance, enabling students to project financial outcomes and support strategic decision-making with quantitative analysis.

Classroom Discussions and Debates:

- Activity: Participate in discussions and debates on current financial issues, market trends, and economic policies.
- Purpose: Engaging in discussions helps students stay informed about the latest developments in finance, develop their communication skills, and form well-rounded opinions on financial matters.

Text Books for Reference:

1. Banking Theory, Law & Practice - Dr.L.Natarajan, Margham Publications.
2. Corporate Accounting by T.S.Reddy and Dr.A.Murthy, Margham Publications.
3. Management Accounting by T.S.Reddy and Dr.Y.Hariprasd Reddy, Margham Publications.
4. Cost Accounting by T.S.Reddy and Dr.Y.Hariprasd Reddy, Margham Publications.

57615	5G TECHNOLOGY	L	T	P	C
Theory		3	0	0	3

Introduction:

This course provides an in-depth understanding of 5G technology, covering foundational concepts, essential radio access technologies, core network architecture, protocols and standards, and emerging technologies in wireless communication.

Course Objectives:

The objective of this course is to enable the students to

- Understand the fundamental principles and evolution of wireless communication systems, including the transition from previous generations to 5G.
- Identify and explain the key features, requirements, and use cases of 5G networks in various industries and applications.
- Analyze the architecture and components of 5G networks, including radio access technologies, core network elements, and network slicing.
- Develop proficiency in radio access technologies such as OFDM, MIMO.
- Explore emerging technologies and applications in 5G, such as IoT, edge computing, and AI integration, and assess their impact on future communication systems.
- Gain hands-on experience in implementing and troubleshooting 5G networks through practical exercises and simulations.
- Understand the regulatory and standardization processes governing 5G deployment, ensuring compliance and interoperability with global standards.
- Analyze security protocols and mechanisms implemented in 5G networks to ensure data confidentiality, integrity, and availability.
- Develop critical thinking and problem-solving skills to address challenges and optimize performance in 5G network design, deployment, and management.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Understanding 5G principles, features, and applications.

CO2: Proficiency in 5G radio access technologies.

CO3: Mastery of 5G core network architecture and protocols.

CO4: Knowledge of 5G protocol stack and interworking mechanisms.

CO5: Exploring emerging technologies and applications in 5G networks.

Pre-requisites:

- Basic understanding of telecommunications and networking principles.
- Proficiency in mathematics, including algebra and trigonometry.
- Knowledge of computer architecture and programming concepts.
- Familiarity with wireless communication technologies and laboratory equipment.

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	-	-	-	-
CO2	2	2	1	2	-	-	1
CO3	1	1	2	2	-	-	1
CO4	2	1	1	2	-	-	1
CO5	2	1	1	1	2	-	1

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

Real-world Applications: Integrate real-world examples and applications of digital logic design, such as binary arithmetic in computer architecture, digital communication systems, and control systems. Showing practical applications helps students understand the relevance of the subject.

Interactive Lectures: Conduct interactive lectures with demonstrations, multimedia presentations, and interactive whiteboards to illustrate abstract concepts effectively. Encourage student participation through discussions, questions, and problem-solving exercises.

Use of Visual Aids: Utilize visual aids such as diagrams, charts, and animations to clarify complex concepts like Boolean algebra, logic gates, and sequential logic circuits. Visual representations help reinforce learning and improve comprehension.

Flipped Classroom Approach: Implement a flipped classroom model where students review lecture materials and resources independently before class and use class time for hands-on activities, problem-solving, and discussions. This approach encourages active learning and fosters deeper understanding.

Formative Assessment: Use formative assessment techniques such as quizzes, concept mapping, and in-class exercises to gauge student understanding and provide timely feedback. Adjust teaching strategies based on assessment results to address areas of difficulty.

Self-directed Learning Resources: Provide self-directed learning resources such as textbooks, online tutorials, and supplementary materials to accommodate diverse learning styles and allow students to explore topics at their own pace.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**

  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.

- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57615	5G TECHNOLOGY	L	T	P	C
Theory		3	0	0	3

Unit I	INTRODUCTION TO 5G TECHNOLOGY	
Overview of wireless communication systems - Evolution from 1G to 5G - Key features and requirements of 5G networks - Comparison between 4G and 5G technologies - network latency and its importance in 5G - 5G spectrum bands and frequency ranges-Basics of network coverage and capacity in 5G - 5G enabled devices and their functionalities - role of AI and ML in enhancing 5G capabilities - network slicing and its benefits in 5G deployment - 5G architecture and network		9
Unit II	**RADIO ACCESS TECHNOLOGIES IN 5G**	
Introduction to radio access technologies (RATs) and their role in wireless communication - multiple access techniques (FDMA, TDMA, CDMA) and their evolution in 5G - orthogonal frequency-division multiplexing (OFDM) and its significance in 5G - multiple-input multiple-output (MIMO) and its application - beam forming techniques - small cell deployment - heterogeneous network (HetNet) architecture.		9
Unit III	**CORE NETWORK IN 5G**	
Evolution of core network architecture from 4G to 5G (e.g., LTE to NGC) - Network slicing and virtualization in 5G core - Service-based architecture (SBA) and control plane/user plane separation (CUPS) - Network functions virtualization (NFV) and software-defined networking (SDN) - Edge computing and mobile edge computing (MEC) in 5G networks		9
Unit IV	**5G PROTOCOLS AND STANDARDS**	
Overview of 5G protocol stack (PHY, MAC, RLC, PDCP, RRC, etc.) - 3GPP standardization process and release versions - NR (New Radio) air interface protocol architecture - Signalling procedures and message flows in 5G networks - Interworking and coexistence with legacy networks (e.g., LTE, Wi-Fi).		9

Unit V	EMERGING TECHNOLOGIES AND APPLICATIONS IN 5G	
Internet of Things (IoT) and machine-to-machine (M2M) communications in 5G - Vehicle-to-everything (V2X) communication and smart transportation systems - Augmented reality (AR), virtual reality (VR), and immersive multimedia applications. Network security and privacy considerations in 5G networks - Future trends and challenges in 5G technology development.		9
	TOTALPERIODS	**45**

Suggested List of Students Activity:

The following student activities or similar activities can be assigned for assessing IA marks

- Students are tasked with conducting research on the evolution of wireless communication systems, spanning from the first-generation (1G) to the fifth-generation (5G) networks. They gather information on the technological advancements, key milestones, and the impact of each generation on society and industries
- Using simulation software such as OPNET or NS-3, students simulate a 5G network deployment scenario. They configure parameters such as base stations, user equipment, and traffic patterns to model realistic network conditions.
- Students analyze a real-world case study of a 5G network deployment project. They examine the challenges faced by the network operators, the design decisions made during the deployment process, and the outcomes achieved.
- Students conduct an in-depth analysis of the signalling protocols used in 5G networks. They examine protocols such as the Radio Resource Control (RRC) protocol, Session Management (SM) protocol, and User Plane Protocol (UPP), studying their functionalities, message formats, and interactions.
- Each student selects an emerging technology relevant to 5G, such as Internet of Things (IoT), edge computing, or network slicing. They research the technology's principles, applications, and potential impact on 5G networks
- In the laboratory, students perform hands-on experiments related to radio access technologies or core network components. For example, students may configure and test a small-scale OFDM-MIMO system to understand its performance characteristics.

- Students collaborate in groups to design a 5G network architecture tailored to a specific use case or scenario. Each group conducts comprehensive research on network requirements, technology options, and deployment considerations. They develop a detailed network design proposal, considering factors such as coverage, capacity, scalability, and cost-effectiveness. Finally, groups present their design proposals to the class, showcasing their understanding of 5G network planning and their ability to address environmental and sustainability concerns.

Textbooks:

1. Afif Osseiran, Jose F Monserrat, Patrick Marsch, 5G Mobile and Wireless Communications Technology, 1st Edition, Cambridge University Press, 2016
2. Erik Dahlman, 5G NR: The Next Generation Wireless Access Technology , 1st Edition, Elsevier, 2016.
3. Jonathan Rodriguez , Fundamentals of 5G Mobile Networks, 1st Edition, Wiley, 2015
4. HarriHolma, AnttiToskala, Takehiro Nakamura, "5G Technology 3GPP NEW RADIO", John Wiley & Sons, 1/e, 2020.

Web-based/Online Resources:

NPTEL :https://nptel.ac.in/courses/108/105/108105134/

Udemy: https://www.udemy.com/course/5g-mobile-networksmodern-wireless-communication-technology/

57616	DEVOPS	L	T	P	C
Theory		3	0	0	3

Introduction:

The DevOps is the combination of two words, one is Development and other is Operations. It is a culture to promote the development and operation process collectively. The DevOps course will help to learn DevOps basics and provide depth knowledge of various DevOps tools such as Git, Maven, Ansible, Jenkins.

Course Objectives:

The objective of this course is to enable the students to

- . To understand basics of Devops.
- To illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems.
- To understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment).
- To understand the version control tools like Git.
- To understand about configuration management using

Course Outcomes

After successful completion of this course, the student will be able to

CO1: Understand basics of Devops.

CO2: Perform continuous integration and continuous testing and Continuous deployment using Jenkins by building and automating test case using Maven.

CO3: Ability to perform automated continuous deployment.

CO4: Understand different actions performed through version control tools like Git.

CO5: Ability to do configuration management using Ansible.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	-	-	-
CO2	3	3	3	3	-	-	-
CO3	3	3	3	3	-	-	-
CO4	3	3	2	3	-	-	-
CO5	3	3	3	3	-	-	-

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy:

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz MCQ	Model Theory Exam	Theory Exam
Portion	Two Units	Another Two Units	Online / Offline	All Units	All Units
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Final Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

Note:

- **CA1 and CA2**: Written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.
- **CA1 and CA2 Questions Pattern:**
  FOUR questions should be asked from each unit. Students shall write any **FIVE** questions out of **EIGHT** questions. Each question carries 10 marks each. (5 X 10 Marks = 50 Marks) Each question may have subdivisions. Maximum two subdivisions shall be permitted.
- **CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted Online/Offline. The marks scored should be converted to 5 marks for the internal assessment.
- **CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 15 Marks for the internal assessment.

Question Pattern: Model Examination and End Semester Examination

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each. (5 X 20 Marks = 100 Marks)

Four questions will be asked from every unit. Students should write any two questions from each unit. The question may have two subdivisions only.

57616	DEVOPS	L	T	P	C
Theory		3	0	0	3

Unit I	INTRODUCTION TO DEVOPS	
Introduction to Devops – History of Devops – Devops Definition – Devops Main Objectives – Devops and Software Development Life Cycle – Waterfall Model – Agile Model.		8
Unit II	**COMPILE AND BUILD USING MAVEN**	
Introduction - Installation of Maven – Maven Build Requirements - Maven POM Builds (pom.xml), Maven Build lifecycle - Maven repositories(local, global), Maven create and build Artifacts, Maven Dependencies – Maven Plugins.		10
Unit III	**CONTINUOUS INTEGRATION USING JENKINS**	
Introduction to Jenkins – Continuous Integration with Jenkins – Jenkins Management – Scheduling build jobs - Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace Management.		10
Unit IV	**VERSION CONTROL USING GIT**	
GIT Features – 3 – Tree Architecture – GIT Clone/Commit/Push – GIT Hub Projects – GIT Rebase & Merge – GIT Stash, Reset, Checkout – GIT Clone, Fetch,Pull.		10
Unit V	**CONFIGURATION MANAGEMENT USING ANSIBLE**	
Introduction to Ansible, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles.		7
TOTAL PERIODS		**45**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

References

1. Jennifer Davis, Ryn Daniels, “Effective DevOps”, 1st edition, O’Reilly, 2017.
2. David Johnson, “Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps”, Second Edition, CreateSpace Independent Publishing Platform, 2016.
3. Mariot Tsitoara, “Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer”, Second Edition, Apress, 2019.

Web-based/Online Resources:

- https://www.jenkins.io/user-handbook.pdf
- https://maven.apache.org/guides/getting-started/

57621	DATA SCIENCE	L	T	P	C
Practicum		1	0	4	3

Introduction

Data science is like being a digital detective, utilizing tools and algorithms to unveil hidden patterns in raw data. This course on Data Science equips learners with the ability to understand the process of Data Science, manipulate structured and unstructured data through various tools, algorithms, and software. This course also gives the insights about statistical data analysis and python libraries for data wrangling and data visualization. Data science is often considered as the twenty-first century's most lucrative career pathway this course gains much attention. This course also introduce basic machine learning algorithms.

Course Objectives:

The objective of this course is to enable the students to

- To learn to describe the data for the data science process.
- To learn to describe the relationship between data.
- To utilize the Python libraries for data wrangling.
- To present and interpret data using visualization libraries in Python
- To know the basic machine learning models

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Define the data sciences and data science process

CO2: Perform statistical calculation on data using python.

CO3: Perform wrangling on data with python libraries

CO4: Create effective visualization of given data

CO5: Build data science applications with Support vector machines, Naive Bayes, Decision Trees and with Clustering algorithms.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	-	-	-	1
CO2	3	3	3	2	-	-	2
CO3	3	3	3	3	-	-	2
CO4	3	3	3	3	-	-	2
CO5	3	3	3	3	1	1	2

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57621	DATA SCIENCE	L	T	P	C
Practicum		1	0	4	3

Unit I	INTRODUCTIONTO DATA SCIENCE	
Theory: Data Science: Need, benefits and uses – facets of data -Data Science Process - Basics of Numpy Arrays.		3
Practical: Ex No 1: Create a Python List / tuple which stores the details of a student (rollno, name, dept, branch, percentage of mark) in Python and print the values. Ex No 2: Create the python list, convert the list and tuple as NumPy array and print its elements. Slice the NumPy array in to 3 slices and print all;		12
Unit II	**DESCRIBING DATA**	
Theory: Statistical Analysis: Mean Median, Mode, Standard Deviation, Range, Percentile. Missing value analysis - Numpy arrays : aggregations – computations on arrays, Introduction to Pandas		3
Practical: Ex No 3: Load your class Marklist data from a csv (comma-separated value) file into numpy array. Perform the following operations to inspect your array: Len(), ndim, size, dtype, shape, info(). Ex No 4:: Load a data into a pandas dataframe and perform following functions on it : min(), max(), cumsum(), mean(), median(), corrcoef(), std().		12
Unit III	**PYTHON LIBRARIES FOR DATA WRANGLING**	
Theory: Data manipulation with Pandas: data indexing and selection –missing data; Data Transformation: Removing duplicates- Replacing values - aggregation and grouping.		3
Practical: Ex No 5: Load a data into a pandas data frame, list out number of missing values in each column and fill the missing values with suitable default value. Ex No 6: Load two csv file into two data frame(d1,d2), combine both the Data frame and find and remove duplicate rows and rename indexes.		12

UNIT IV	DATA VISUALIZATION	
Theory: Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms - Visualization with Seaborn.		3
Practical: Iris Dataset is one of best know datasets in pattern recognition literature. This dataset contains 3 classes of 50 instances each, where each class refers to a type of iris plant. One class is linearly separable from the other 2 the latter are NOT linearly separable from each other. Attribute Information: Sepal Length in cm , Sepal Width in cm Petal Length in cm, Petal Width in cm Class: Iris Setosa Iris Versicolour Iris Virginica Ex No 7:Load the Iris dataset, where observations belong to either one of three iris flower classes and visualize the average value for each feature of the Setosa iris class using a barchart with suitable linewidth and color. Ex No 8: Load the Iris dataset; plot all the column_s relationships using a pairplotfor multivariate analysis. Save the plot as JPEG file.		12
UNIT V	**MACHINE LEARNING ALGORITHMS**	
Theory: Basic Machine Learning Algorithms: Classification: Support vector machines- Naive Bayes- Decision Trees- Clustering- Confusion Matrix.		3
Practical: Ex.no 9 : Implement the Machine learning model for clustering with Iris dataset and analyse Decision Tree. Ex.no 10 : Implement the Machine learning model for clustering with Iris dataset and analyse K-means Clustering.		12
	TOTAL HOURS	**75**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments in data science.
- online quizzes
- Blended learning activities to explore the recent trends and developments in the field.
- Model Development

Text Books:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, Dreamtech Press, First Edition, 2016
2. Allen Downey, Think Stats: Exploratory Data Analysis in Python, Second Edition, O'Reilly, 2014.
3. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, , Second Edition, O'Reilly Media, 2019.

Web-based/Online Resources:

- NPTEL Course on Foundation of Data Science https://onlinecourses.swayam2.ac.in/imb24_mg31/preview
- NPTEL Course on Python for Data Science https://onlinecourses.nptel.ac.in/noc24_cs54/preview
- https://www.kaggle.com/code/doukanelik/missing-values
- https://www.kaggle.com/code/mahnazarjmand/clustring-model-on-iris-dataset/input
- https://www.kaggle.com/datasets/saurabh00007/iriscsv/code
- IBM Data Science Professional Certificate https://www.coursera.org/professional-certificates/ibm-data-science

Equipment / Facilities required to conduct the Practical Course

Hardware Required.

1. Desktop Computers/ Laptop

Software Required.

1. Python /google colab

BOARD PRACTICAL

EXAMINATION PART - A

Ex No 1: Create a Python List / tuple which stores the details of a student (rollno, name, dept, branch, percentage of mark) in Python and print the values.

Ex No 2: Create the python list, convert the list and tuple as NumPy array and print its elements. Slice the NumPy array in to 3 slices and print all.

Ex No 3: Load your class Marklist data from a csv (comma-separated value) file into numpy array. Perform the following operations to inspect your array: Len(), ndim, size, dtype, shape, info().

Ex No 4:: Load a data into a pandas dataframe and perform following functions on it : min(), max(), cumsum(), mean(), median(), corrcoef(), std().

Ex No 5: Load a data into a pandas data frame, list out number of missing values in each column and fill the missing values with suitable default value.

PART - B

Ex No 6: Load two csv file into two data frame(d1,d2), combine both the Data frame and find and remove duplicate rows and rename indexes.

Ex No 7: Load the Iris dataset, where observations belong to either one of three iris flower classes and visualize the average value for each feature of the Setosa iris class using a barchart with suitable linewidth and color.

Ex No 8: Load the Iris dataset; plot all the column_s relationships using a pairplot for multivariate analysis. Save the plot as JPEG file.

Ex.no 9 : Implement the Machine learning model for clustering with Iris dataset and analyse Decision Tree.

Ex.no 10 : Implement the Machine learning model for clustering with Iris dataset and analyse K-means Clustering.

57622	CLOUD PLATFORM	L	T	P	C
Practicum		1	0	4	3

Introduction

This course gives a comprehensive exposure to various commercial cloud Platforms Google, Amazon and Microsoft and Open source cloud platforms Eucalyptus and OpenStack. The course introduces the latest IoT technologies in Cloud. The focus of this course is to introduce students Machine Learning, a sub-field of Artificial Intelligence, and to Cloud applications of Machine Learning. This helps the students to combine these technologies to produce innovative business solutions.

Course Objectives:

The Objective of this course is

- To provide an in-depth and comprehensive knowledge of various commercial and open source cloud platforms.
- To comprehend and apply the services offered by various cloud platforms practically.
- To understand and apply the concept of IoT in cloud.
- To apply Machine learning in cloud.
- To justify, adopt and combine various cloud technologies, applications, and services to effectively manage their transition into the IT function.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.

CO2: Use and Manage Virtual Machines on AWS, Google Cloud and Azure platforms.

CO3: Understand and apply the spectrum of Cloud computing capabilities to deploy virtual machines on Eucalyptus and Open Stack.

CO4: Learn about using hosting services, storage services, networking services, and machine learning services.

CO5: To Apply IoT in cloud and learn to combine them to cater to the practical needs of next-generation mobile devices and social media users.

Pre-requisites: Nil

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	2	-	-	-	1
CO2	1	3	3	-	-	-	1
CO3	1	3	3	-	-	-	1
CO4	1	3	3	-	-	-	1
CO5	1	3	3	-	-	-	3

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- The teacher can use experiential learning as an instructional strategy both in and outside the classroom.
- It may be necessary for the teacher to pre-teach the skills and processes necessary to achieve the intended learning outcomes.
- The teacher needs to encourage students to share their thoughts so that the entire class can benefit from individual insights.
- Teachers can encourage divergent thinking by asking students to transform a teacher guided image into several others of their own creation.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57622	CLOUD PLATFORM	L	T	P	C
Practicum		1	0	4	3

Unit I	Amazon Web Services (AWS)	
AWS - Introduction - Services-Architecture-AWS Regions - Availability zones- Working with AWS- EC2 Instances -Volumes on EC2 - Elastic Block Store (EBS) - Managing data in AWS S3- AWS VPC- working with Virtual Network -Cloud Watch.		3
Ex.No.	Name of the Experiment	
1	Set up an AWS free tier account , navigate the AWS Management Console and deploying a Virtual Server (EC2 Instance) on AWS.	6
2	Host a Static Website in AWS using Amazon S3	6
Unit II	**Google Cloud Platform (GCP)**	
GCP-Introduction -Core Services and Products-GCP Global Infrastructure-Regions and Zones - GCP Security and Compliance-Working with Google compute engine-Managing data in Google Cloud Storage.		3
Ex.No.	Name of the Experiment	
3	Setup a GCP Account and project ,explore the GCP console and resource hierarchy and deploy a Virtual Machine (Compute Engine) on GCP.	6
4	Configure and Manage VPCs and Firewall Rules in GCP.	6
Unit - 3	**Microsoft Azure**	
Microsoft Azure Overview-Services and Solutions- Global Infrastructure and Data Centers-Identity and Access Management -Pricing and Cost Management-Working with Azure Virtual Machines and disks- Managing data in azure storage - Blob Storage -File Storage-Working with Virtual Networks.		3
Ex. No.	Name of the Experiment	
5	Create an Azure account and subscription and explore the Azure portal and resource groups. Deploy Virtual Machines (VMs) on Azure.	6
6	Implement Azure Storage Solutions: Blob Storage and File Storage.	6

Unit - 4	**IoT Cloud**	
IoT and Cloud - Architecture of IoT-Cloud - Local and Global Positioning Systems (GPS) - IoT Interactions with GPS, Clouds, and Smart Machines-Cloud services for IoT- IoT Cloud Platforms - AWS-IoT - Microsoft Azure IoT- Google IoT- Features-Working.		3
Ex. No.	Name of the Experiment	
7	Add a device to Google IoTcore and collect data in IoT core.	12
Unit - 5	**Open source Cloud and Machine learning Framework**	
Open Source Cloud - OpenStack -Introduction-Features- Architecture-Components. Cloud-Based Machine Learning Frameworks - Introduction to machine learning concepts- Azure Machine Learning Workspace - AWS Machine Learning Platform.		3
Ex. No.	Name of the Experiment	
8	Create an instance using OpenStack.	4
9	Create a Virtual Private network using openstack. Associate the instance with the VPN created.	4
10	Use any Cloud based Machine learning framework to predict the employee salary based on experience.	4
TOTAL PERIODS		**75**

Textbook for Reference

1. Barrie Sosinsky, Cloud Computing Bible, First Edition, Wiley-India, 2011.
2. Mark Wilkins, Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud , First Edition, Pearson Education., 2019.
3. Praveen Kukreti ,Google Cloud Platform All-In-One Guide: Get Familiar with a Portfolio of Cloud-based Services in GCP, First Edition, BPB Publications,2023.
4. Michael Collier Robin Shahan, Fundamentals of Azure Second Edition , Microsoft Press, 2019.

5. Deepak Kumar Saxena, JitendraKumar Verma , Vicente Gonzalez-Prida Diaz , ViraShendryk , Cloud IoT: Concepts, Paradigms, and Applications, First Edition, Chapman & Hall, 2022.
6. Naresh K. Sehgal , Pramod Gupta ,Introduction to Machine Learning in the Cloud with Python: Concepts and Practices ,First Edition, Cham, Switzerland : Springer 2021.

Web-based/Online Resources

1. https://docs.aws.amazon.com/
2. https://dtcenter.org/sites/default/files/communitycode/nwp_containers/Documentation/AMS_2020/01_intro_to_cloud_and_aws.pdf
3. https://aws.amazon.com/training/classroom/architecting-on-aws/
4. https://www.techrepublic.com/resource-library/ebooks/google-cloud-platform-an-insider-s-guide-free-pdf/https://cloud.google.com/docs

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

Equipment / Facilities required to conduct the Practical Course

Hardware Required.

1. Desktop Computers / LAPTOP with Internet Facility
2. Printers

BOARD PRACTICAL
EXAMINATION PART – A

Ex No 1: Set up an AWS free tier account ,navigate the AWS Management Console and deploying a Virtual Server (EC2 Instance) on AWS.

Ex No 2: Host a Static Website in AWS using Amazon S3loop.

Ex No 3: Setup a GCP Account and project ,explore the GCP console and resource hierarchy and deploy a Virtual Machine (Compute Engine) on GCP.

Ex No 4: Configure and Manage VPCs and Firewall Rules in GCP.

Ex No 5: Create an Azure account and subscription and explore the Azure portal and resource groups. Deploy Virtual Machines (VMs) on Azure

PART – B

Ex No 6: Implement Azure Storage Solutions: Blob Storage and File Storage.

Ex No 7: Add a device to Google IoTcore and collect data in IoT core.

Ex No 8: Create an instance using OpenStack.

Ex No 9: Create a Virtual Private network using openstack. Associate the instance with the VPN created.

Ex No 10: Use any Cloud based Machine learning framework to predict the employee salary based on experience.

57623	Web Application Development	L	T	P	C
Practicum		1	0	4	3

Introduction

"Web Application Development" is a comprehensive course designed to equip students with the knowledge and skills necessary to create dynamic and interactive web applications. Throughout this course, students will explore into the core concepts and technologies used in modern web development, including HTML, CSS, JavaScript, server-side programming, and database management. By exploring frontend frameworks like React.js or Angular, and backend technologies such as Node.js, students will learn how to build responsive user interfaces and implement robust backend logic to handle data processing and user interactions. Additionally, students will gain practical experience in database integration, API development, and deployment strategies, preparing them to design and deploy full-stack web applications that meet industry standards and user expectations.

Course Objectives

The objective of this course is to enable the student to

- Understand the fundamental concepts and technologies used in web development, including HTML, CSS, and JavaScript.
- Explore frontend frameworks such as React.js or Angular to build dynamic and responsive user interfaces.
- Gain proficiency in server-side programming with Node.js to handle data processing and business logic.
- Learn database management concepts and techniques, including database design, querying, and database integration with web applications using Mongo DB.
- Develop practical skills in building RESTful APIs to facilitate communication between frontend and backend components.
- Master deployment strategies for web applications, including self-hosting, cloud deployment, and containerization.

Pre-requisites:

- Basic Programming Knowledge
- HTML and CSS Proficiency
- Database Basics
- Curiosity and Eagerness to Learn

CO/PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	3
CO2	3	1	3	2	1	2	3
CO3	2	1	2	2	2	3	3
CO4	3	3	3	3	3	3	3
CO5	3	3	3	2	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- The teacher can use experiential learning as an instructional strategy both in and outside the classroom.
- It may be necessary for the teacher to pre-teach the skills and processes necessary to achieve the intended learning outcomes.
- The teacher needs to encourage students to share their thoughts so that the entire class can benefit from individual insights.
- Teachers can encourage divergent thinking by asking students to transform a teacher guided image into several others of their own creation.

Practicum (Practical)

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57623	Web Application Development	L	T	P	C
Practicum		1	0	4	3

Unit I	Foundations of Web Development	
Overview of Web Technologies and Development: Evolution of the World Wide Web Importance of web applications - Concept of client-server architecture. Web Protocols and Standards: HTTP/HTTPS, DNS, TCP/IP. Development Environments: IDEs and Code Editors – Version Control with Git. HTML5 Elements: Forms, Tables, Multimedia. CSS3 Fundamentals: Box Model, Flexbox, CSS Grid Layout		9
Ex: 1. Creating complex HTML forms and tables and Styling using Flex box Ex: 2. Implementing CSS Grid Layout		6
Unit II	**Front-End Frameworks and Libraries**	
Advanced CSS: Animations, Transitions, Responsive Design: Media Queries. Introduction to Front-End Frameworks: Angular.js Basics: Components and templates, Directives and Filters – Services – Tables – Forms and validation – Routing - Application.		9
Ex: 3. Applying media queries for responsive design, Adding animations and transitions. Ex: 4. Building a responsive layout with Bootstrap Ex: 5. Building a small Angular JS application.		8
Unit III	**Backend Development with Node.js and Express.js**	
Introduction to Node.js and Express.js: Overview of Node.js as a JavaScript runtime environment for server-side applications - Introduction to Express.js as a minimal and flexible web application framework for Node.js - event-driven, non-blocking I/O model of Node.js and its benefits - Routing and Middleware in Express.js - Data Validation and Error Handling.		9
Ex: 6. Developing Back-End Apps with Node.js and Express		6
Unit IV	**Database Management with MongoDB**	
Introduction to MongoDB: Overview, Key features and advantages of MongoDB - MongoDB CRUD Operations: Performing CRUD (Create, Read, Update, Delete) operations on MongoDB collections using the MongoDB Node.js driver - Querying documents using MongoDB query operators and aggregation framework - Indexing		9

and optimizing MongoDB queries for improved performance and scalability		
Ex: 7. Establishing a connection to MongoDB database from Node.js application using Mongoose ODM (Object-Document Mapper)		4
Unit V	**Deployment and Hosting**	
Web Hosting: Types of hosting services (shared, VPS, dedicated, cloud) – Popular Hosting Providers (AWS, Azure, Heroku). Domain Registration: Process of registering and managing a domain name. Deployment Pipelines: Basics of Continuous Integration/Continuous Deployment (CI/CD) – Tools and platforms for CI/CD. Security in Web Development: Importance of web security – common security threats.		9
Ex: 8. Deploying the final web application to a production environment using chosen deployment strategy.		6
	TOTAL PERIODS	**75**

Suggested List of Students Activity:

- Seminars / Assignment / Mini projects
- Periodic class quizzes conducted on monthly

Reference:

- Jon Duckett, "HTML and CSS: Design and Build Websites" , First Edition, Wiley Publications, 2011.
- Ethan Brown, "Web Development with Node and Express: Leveraging the JavaScript Stack", O'Reilly, 2014.
- Kirupa Chinnathambi, "Learning React: A Hands-On Guide to Building Web Applications Using React and Redux", Second Edition, Addison-Wesley, 2018.
- Shannon Bradshaw, Eoin Brazil, and Kristina Chodorow, "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage", O'Reilly, Third Edition, 2020.

57624	ADVANCED DBMS	L	T	P	C
Practicum		1	0	4	3

Rationale

Advanced Database management systems contain comprehensive contents on various concepts related to Query optimization and structured , unstructured and semi structured databases. An in-depth knowledge of distributed and parallel databases is imparted during the course of study. The design and querying of spatial and temporal databases along with hands on experience is emphasized. This course includes study of XML database design and querying. Students will get a detailed introduction to the non relational databases like NoSQL and emerging databases like mobile, web and cloud databases. After learning this subject, students will be able to design and use Advanced Database Management Systems as a backend for developing realtime applications.

Course Objectives

The objective of this course is

1. To design conceptual and physical database tuning .
2. To comprehend and apply the concepts of Object, Distributed, Parallel, Spatial Temporal and XML databases.
3. To learn and apply the concepts of Multimedia and NoSql databases.
4. To understand and use the concepts of emerging database technologies like Web Mobile and Cloud Databases.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze the basics of query optimization techniques and apply it to minimize the cost.

CO2: Design a Distributed database system and execute distributed queries.

CO3: Design Spatial and Temporal Database systems and implement it in corresponding applications.

CO4: Design XML database systems and validate with XML schema

CO5: Apply NoSQL database systems and manipulate the data associated with it. Design a database system in Cloud and integrate it with application.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	-	-	-	3
CO2	3	3	3	-	-	-	1
CO3	3	3	3	-	-	-	1
CO4	3	3	3	-	-	-	1
CO5	3	3	3	-	-	-	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- The teacher can use experiential learning as an instructional strategy both in and outside the classroom.
- It may be necessary for the teacher to pre-teach the skills and processes necessary to achieve the intended learning outcomes.
- The teacher needs to encourage students to share their thoughts so that the entire class can benefit from individual insights.
- Teachers can encourage divergent thinking by asking students to transform a teacher guided image into several others of their own creation.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57624	Advanced DBMS	L	T	P	C
Practicum		1	0	4	3

Unit - 1	Query Optimization and Object based database Concepts	
Theory: Query optimization –Basic steps in query optimization -Query processing.--Query evaluation plans. Transaction Management concepts - Properties of Transactions.. Object Oriented Database Management System(OODBMS) - The ODMG Data Model - Applications of an OODBMS- Object Relational DBMS- Object-Relational Database Model .		3
Ex.No.	Name of the Experiment	
1	Consider the SQL query select * from employee,department where employee.dept_id = department.dept_id What evaluation plan would a query optimizer likely choose to get the least estimated cost?	4
2	Design an ORDBMS for the following schema of a Library Database: BOOK (Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS (Book_id, Author_Name, Address) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Branch_id, No- of_Copies) BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date) . Write SQL queries to a) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc. b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. c) Delete a book in BOOK table. d) Update the contents of other tables to reflect this data manipulation operation.	8

Unit - 2	Distributed and Parallel Databases	
Distributed Database Management System (DDBMS)- Definition- DDBMS Architecture, Distributed database design, Allocation, Fragmentation, Replication, query processing, transaction processing, Parallel Databases-Architecture, Data partitioning strategy, Interquery and Intraquery Parallelism –Parallel query Evaluation.		3
Ex.No.	Name of the Experiment	
3	Consider a schema that contains the following table with the key underlined: Employee (Eno, Ename, Desg, Dno). Assume that we horizontally fragment the table as follows: Employee1(Eno, Ename, Desg, Dno), where 1 <= Dno<=10, Employee2(Eno, Ename, Desg, Dno), where 11 <= Dno<=20, Employee3 (Eno, Ename, Desg, Dno), where 21 <= Dno<=30 .In addition, assume we have 4 sites that contain the following fragments: Site1 has Employee1, Site2 has Employee2, Site3 has Employee2 and Employee3, Site4 has Employee1. Add relations to the database as per your requirements. Perform the following operations: a) Create the above database. b) Insert values into the database. c) Create the specified fragments. d) Implement at least five suitable queries on Employee fragments.	12
Unit - 3	**Spatial Temporal and XML Databases**	
Spatial Databases- Definition, Types of spatial data, Querying- spatial selection, spatial join, and other set operations. Temporal Databases- Introduction, Temporal data models. Semi structured Databases--XML Databases**-** – XML Hierarchical Data Model - XML Schema - DTD - XPath - XQuery .		3

Ex. No.	Name of the Experiment	
4	Create a spatial database of Tamilnadu and form the following queries a) Show a list of all the names of places adjoining your location.. b) List the unique town names in your region. c) Find the restaurants close to your location.. d) Find the distance between any two places in Tamilnadu.	4
5	Create the employees table and form the following SQL queries: a) Find the number of employees hired each year. b) Find the number of employees hired each month. c) Find the number of employees hired each week. d) Find the 3 most recently hired employees and what department they work in.	4
6	Write a DTD for XML documents with student data: name, address and a student_id, one or more subjects (computer science, Mechanical, Electrical, Civil etc). Write an XML document containing student data conforming to the DTD, and check it for validity. a) Write a XQuery which returns The names of all students in ascending order. b) The students who study the same subjects. c) The subjects which are studied by more than 10 students.	4
Unit - 4	**Unstructured and Non-relational Databases**	
Multimedia databases-Multimedia sources, issues and applications. NoSQL databases - CAP Theorem – Sharding- Document based – MongoDB Operation– Insert, Update, Delete, Query, Indexing, Application, Replication, Sharding– Cassandra: Data Model, Key Space, Table Operations, CRUD Operations, CQL Types.		3

Ex. No.	Name of the Experiment	
7	a) Consider a student database consisting of (Register_no, Fname, Lname, Address (Street,City, Pincode), Mobile Nos, Total Marks).	
	as data. Design the database using MongoDB and perform the following operations: i. Create the above student database. ii. Insert values into the above database. iii. Find the Students who have got Total Marks greater than 450. iv. Update the Pincode of the students who belong to a particular City. v. Delete a particular student given the Register No.	6
8	Perform the above operations using Cassandra followed by the following operations: vi Insert additional mobile numbers for a particular student. vii. Delete the street name in the address given a particular city.	6
Unit - 5	**Emerging Databases**	
Web databases -Web search engines, web search architecture Inverted indexes for web search engines, web crawling, web search statistics . Mobile Databases- Concept -Mobile Database Architecture - Modes of Operations of Mobile Database - Transaction Model in MDS Cloud Databases- Database options in Cloud, Changing role of the DBA in the cloud- Moving your databases to the cloud.		3
Ex. No.	Name of the Experiment	
9	Provision a cloud database using AWS RDS service. Understand the setup process, configurations, and common management tasks.	6
10	Integrate your application with the cloud database. Learn how to establish a connection, perform database operations, and handle responses in your application.	6
TOTAL PERIODS		**75**

Text Books for Reference:

1. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson Education, 2017.
2. Raghu Ramakrishnan, Database Management Systems, ,4th edition, Mcgraw-Hill,2015 .
3. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, Tata McGraw Hill, 2019.

Website links for reference:

1. https://archive.nptel.ac.in/courses/106/105/106105175
2. https://link.springer.com/book/10.1007/3-540-57507-34.

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

Equipment / Facilities required to conduct the Practical Course

Hardware Required.

1. Desktop Computers/ Laptop
2. Printer

Software Required.

1. Java / Python
2. MySQL, MongoDB, Cassandra

BOARD PRACTICAL EXAMINATION

PART – A

Ex No 1: Consider the SQL query

select * from employee,department where employee.dept_id = department.dept_id What evaluation plan would a query optimizer likely choose to get the least estimated cost?

Ex No 2: Write SQL queries to

a) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.

b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.

c) Delete a book in BOOK table.

d) Update the contents of other tables to reflect this data manipulation operation.

Ex No 3: Consider a schema that contains the following table with the key underlined: Employee (Eno, Ename, Desg, Dno). Assume that we horizontally fragment the table as follows: Employee1(Eno, Ename, Desg, Dno), where 1 <= Dno<=10, Employee2(Eno, Ename, Desg, Dno), where 11 <= Dno<=20, Employee3 (Eno, Ename, Desg, Dno), where 21 <= Dno<=30 .In addition, assume we have 4 sites that contain the following fragments:
Site1 has Employee1, Site2 has Employee2, Site3 has Employee2 and Employee3, Site4 has Employee1. Add relations to the database as per your requirements. Perform the following operations:

a) Create the above database.

b) Insert values into the database.

c) Create the specified fragments. Implement at least five suitable queries on Employee fragments.

Ex No 4:

Create a spatial database of Tamilnadu and form the following queries

a) Show a list of all the names of places adjoining your location..

b) List the unique town names in your region.

c) Find the restaurants close to your location..

d) Find the distance between any two places in Tamilnadu.

Ex No 5:

Create the employees table and form the following SQL queries:

a) Find the number of employees hired each year.

b) Find the number of employees hired each month.

c) Find the number of employees hired each week.

Find the 3 most recently hired employees and what department they work in.

PART – B

Ex No 6:

Write a DTD for XML documents with student data: name, address and a student_id, one or more subjects (computer science, Mechanical, Electrical, Civil etc). Write an XML document containing student data conforming to the DTD, and check it for validity.

a) Write a XQuery which returns The names of all students in ascending order.

b) The students who study the same subjects.

c) The subjects which are studied by more than 10 students.

Ex No 7:

a) Consider a student database consisting of (Register_no, Fname, Lname, Address (Street,City, Pincode), Mobile Nos, Total Marks). as data. Design the database using MongoDB and perform the following operations:

i. Create the above student database.

ii. Insert values into the above database.

iii. Find the Students who have got Total Marks greater than 450.

iv. Update the Pincode of the students who belong to a particular City.

v. Delete a particular student given the Register No.

Ex No 8:

Perform the above operations using Cassandra followed by the following operations:

vi Insert additional mobile numbers for a particular student.

vii. Delete the street name in the address given a particular city.

Ex No 9:

Provision a cloud database using AWS RDS service. Configure and setup the common management tasks.

Ex No 10:

Integrate an application with the cloud database. Establish a connection, perform database operations, and handle responses in your application.

57625	Mobile Application Development	L	T	P	C
Practicum		1	0	4	3

Rationale

This course is concerned with the development of applications on mobile and wireless computing platforms. Android will be used as a basis for teaching programming techniques. Students will work at all stages of the software development life-cycle from inception through to implementation and testing.

Course Objectives

The objective of this course is to

- To facilitate students to understand android SDK.
- To help students to gain a basic understanding of Android application development.
- To inculcate working knowledge of Android Studio development tool.
- To test Android applications.
- To deploy Android applications.

Course Outcomes

After successful completion of this course, the students should be able to CO1: Identify various concepts of mobile programming that make it unique from programming for other platform.

CO2: Critique mobile applications on their design pros and cons.

CO3: Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.

CO4: Test Android applications.

CO5: Deploy applications to the Android marketplace for distribution.

Pre-requisites : Nil.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	-
CO2	3	3	2	1	1	1	-
CO3	3	3	2	1	1	1	-
CO4	3	3	2	1	1	1	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57625	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
Practicum		1	0	4	3

Unit I	INTRODUCTION TO MOBILE APPLICATION DEVELOPMENT	
THEORY: Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building First Android application,		3
Ex.No	Name of the Experiment	
1	Implement “Hello World” Android example.	12
2	Develop an application that uses GUI components, Font and Colours.	
Unit II	**INTRODUCTION TO ANDRIOD**	
THEORY: Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Android Manifest File and its common settings.		3
Ex.No	Name of the Experiment	
3	Develop an application that uses Layout Managers and event listeners.	12
4	Write an application that draws basic graphical primitives on the screen.	
Unit III	**ANDROID USER INTERFACE DESIGN**	
THEORY: Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts.		3
Ex.No	Name of the Experiment	
5	Develop an application that makes use of Notification Manager.	12
6	Implement an application that writes data to the SD card.	
Unit IV	**TESTING AND MANAGING ANDROID APPLICATIONS**	
THEORY: Testing Android applications, Publishing Android application, Using Android preferences.		3
Ex.No	Name of the Experiment	
7	Develop a native application that uses GPS location information.	12
8	Develop an application for sending & receiving SMS.	

Unit V	ANDROID APIs AND DEPLOYING ANDROID APPLICATION	
THEORY: Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Using Android Networking APIs, Using Android Web and Telephony APIs, Deploying Android Application to the World.		3
Ex.No	Name of the Experiment	
9	Develop an application that makes use of SQLite databases.	12
10	Write an application that creates alarm clock.	
TOTAL PERIODS		**75**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

Textbook for Reference

1. Dawn Griffiths, David Griffiths, "Head First Android Development: A Brain-FriendlyGuide", 1st edition, O'Reilly, 2017.
2. John Horton, Android Programming for Beginners, 2nd edition, Packt Publishing, 2018.
3. Barry Burd, Android Application Development All-in-One For Dummies, 2nd edition, For Dummies, 2020.

Web-based/Online Resources

- https://developer.android.com/guide
- https://en.wikipedia.org/wiki/Android_10
- https://flutter.dev/
- http://ai2.appinventor.mit.edu

Board Practical

Examination PART-A

1. Implement “Hello World” Android example.
2. Develop an application that uses GUI components, Font and Colours.
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of Notification Manager.

PART-B

6. Implement an application that writes data to the SD card.
7. Develop a native application that uses GPS location information.
8. Develop an application for sending & receiving SMS.
9. Develop an application that makes use of SQLite databases.
10. Write an application that creates alarm clock.

57626	UI AND UX DESIGN	L	T	P	C
Practicum		1	0	4	3

Introduction

User Interface (UI) and User Experience (UX) Design play key roles in the experience users have when interacting with digital products and applications. In this course, student will learn the theory and methodologies behind UI and UX design. Student will learn design their own wireframes and interactive prototypes. Learning UI and UX basics can help to student collaborate better on team projects and create new career opportunities.

Course Objectives

The objectives of this course are enabling the students

- To learn problem solving skills.
- To gain knowledge of UI and UX Design.
- To understand the concept of functions and their role in UX Design.
- To comprehend the basics of interaction structures and its importance in application development.
- To recognize the importance of visual design.

Course Outcomes

At the end of the course, students will be able

CO1: Demonstrate knowledge on UI and UX design concepts.

CO2: Develop and performing a **competitive analysis in UX design.**

CO3: Design user personas using persona UXPressia's online builder tool.

CO4: Develop interaction design and functional layout.

CO5: Creating web and mobile app applications using visual design tools.

Pre-requisites: Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	1	2
CO2	3	3	3	3	1	1	2
CO3	3	3	3	3	2	2	2
CO4	3	3	3	2	2	3	2
CO5	3	3	3	3	2	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment(40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical & Written Test	Practical & Written Test	Practical Test	Practical Examination
Portion	PART A/Cycle 1 Exercises & Two units	PART B/Cycle 2 Exercises & another Two units	All Exercises	All Exercises
Duration	3 Periods	3 Periods	3 Hour	3 Hours
Exam Marks	60	60	100	100
Converted to	15	15	10	60
Final Marks	30		10	60
Tentative Schedule	7th Week	14th Week	16th Week	

Note:

- **CA1 and CA2**: The practical and Written test be conducted as per the portion above and the scheme of evaluation can be decided by the departments. Assessment written & Practical test should be conducted for 60 Marks. The marks awarded will be converted to 15 Marks for each assessment test. Addition of CA1 and CA2 will be considered for the internal assessment of 30 Marks.
- **CA3:** All the exercises/experiments should be completed and kept for the practical test. The student shall be permitted to select any one by lot for the test. The practical test should be conducted and the scheme of evaluation can be decided by the department. The marks awarded should be converted to 10 Marks for the internal assessment.

SCHEME OF EVALUATION

Section	Description	Marks
1	Aim & Procedure	35
2	Execution and Result	15
TOTAL		**50**

Question pattern – Written Test Theory

Description		Marks	
Part – A	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			100 Marks

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

Section	Description	Marks
1	Aim (05), Procedure for the experiment from Part-A (30)	35
2	Aim (05), Procedure for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A **OR** Part-B	25
4	Viva voce	05
TOTALMARKS		**100**

57626	UI AND UX DESIGN	L	T	P	C
Practicum		1	0	4	3

Unit I	INTRODUCTION TO UI AND UX DESIGN	
Introduction to UI and UX Design and the Key Methodologies such as Product Design Life Cycle.		3
ExNo1: Identifying interface connectivity and establishing interface connectivity between two different program modules. **ExNo2**: Understand front end and backend interfacing and Implementation of both interfacing.		12
Unit II	**UX DESIGN**	
User Centred Design - Design Thinking - Activity Based Design - Agile Process.		3
Ex No 3: Create and performing a competitive analysis in UX design helps companies identify competitors_ strengths and weaknesses relative to their own business, product, and design. **Ex No 4:** Designing a Responsive layout for a societal application		12
Unit III	**USER RESEARCH**	
Stakeholder & User Interviews - Creating Personas - Empathy Mapping - Information Architecture - Building User Journey		3
Ex No 5: Hands on Design Thinking Process for a new product. **Ex No 6:** Conduct end-to-end user research - User research, creating personas, Ideation process (User stories, Scenarios), Flow diagrams, Flow Mapping.		12
UNIT IV	**INTERACTION DESIGN**	
Ideation Methods - Interaction & Prototyping - Paper & Digital Prototyping - Design a Web / Mobile App.		3
Ex No 7: Identifying interaction design and functional layout. practical implementation of interaction design and functional layout. **Ex No 8:** Exploring various UI Interaction Patterns.		12
UNIT V	**VISUAL DESIGN**	
Web & Mobile App Design - Grid Systems - Colors Theory and Palette - Understanding Typography.		3

Ex No 9: Create Social media advertisement using online tools and applications. **Ex No 10**: Design super market special offer sales poster using online tools and applications.	12
TOTAL PERIODS	**75**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Programming assignments
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Textbook for Reference

1. Tom Green, Joseph Labrecque, A Guide to UX Design and Development: Developer's Journey Through the UX Process (Design Thinking), First Edition, APress, 2023
2. Jon Yablonski, Laws of UX: Using Psychology to Design Better Products & Services, First Edition, O'Reilly, 2020.
3. Donald Chesnut, Kevin P. Nichols, UX for Dummies, Frist Edition, Wiley, 2014.

Website links for reference:

- NPTEL User Interface Design: https://archive.nptel.ac.in/courses/124/107/124107008/
- MIT OpenCourseWare: https://ocw.mit.edu/courses/6-831-user-interface-design-and-implementation-spring-2011/pages/lecture-notes/

1. **Hardware(s) Requirement:**
   - Desktop Computer /Laptop
   - Printer
2. **Software(s) Requirement:**
   - Windows / Linux Operating System

BOARD PRACTICAL

EXAMINATION PART – A

1. Identifying interface connectivity and establishing interface connectivity between two different program modules.
2. Understand front end and backend interfacing and implementation of both interfacing.
3. Create and performing a **competitive analysis in UX design** helps companies identify competitors_ strengths and weaknesses relative to their own business, product, and design.
4. Designing a Responsive layout for a societal application.
5. Hands on Design Thinking Process for a new product.

PART – B

6. Conduct end-to-end user research - User research, creating personas, Ideation process (User stories, Scenarios), Flow diagrams, Flow Mapping.
7. Identifying interaction design and functional layout. Practical implementation of interaction design and functional layout.
8. Exploring various UI Interaction Patterns.
9. Create Social media advertisement using online tools and applications.
10. Design super market special offer sales poster using online tools and applications.

57631	INTERNSHIP	Periods	C
PROJECT		540	12

Introduction

Internships in educational institutions are designed to provide students with practical experience in their field of study and to bridge the gap between academic knowledge and professional practice.

Objectives

After completing Internship, Interns will be able to,

- Apply the theoretical knowledge and skill during performance of the tasks assigned in internship.
- Demonstrate soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship.
- Document the Use case on the assigned Task.
- Enable interns to apply theoretical knowledge gained in the classroom to real-world practical applications.
- Provide hands-on experience in the industrial practices.
- Develop essential skills such as communication, organization, teamwork, and problem-solving.
- Enhance specific skills related to the intern's area of focus.
- Offer a realistic understanding of the daily operations and responsibilities.
- Provide opportunities to work under the guidance of experienced supervisors and administrators.
- Allow interns to explore different career paths.
- Help interns make informed decisions about their future career goals based on first-hand experience.
- Facilitate the establishment of professional relationships with supervisor, administrators, and other professionals in the field.
- Provide access to a network of contacts that can be beneficial for future job opportunities and professional growth.
- Foster personal growth by challenging interns to step out of their comfort zones and take on new responsibilities.

- Build confidence and self-efficacy through successful completion of internship tasks and projects.
- Give insight into the policies, regulations, and administrative practices.
- Allow interns to observe and understand the implementation of standards and policies in practice.
- Provide opportunities for constructive feedback from supervisors and mentors, aiding in the intern's professional development.
- Enable self-assessment and reflection on strengths, areas for improvement, and career aspirations.
- Encourage sensitivity to the needs and backgrounds of different groups, promoting inclusive and equitable industrial practices.

Course Outcomes

CO 1: Demonstrate improved skills.

CO 2: Exhibit increased professional behavior.

CO 3: Apply theoretical knowledge and principles in real-world practices.

CO 4: Develop and utilize assessment tools to evaluate the learning and practices. CO 5: Engage in reflective practice to continually improve their learning and professional growth.

Facilitating the Interns by an Internship Provider.

- Orient intern in the new workplace. Give interns an overview of the organization, Explain the intern's duties and introduce him or her to co-workers.
- Develop an internship job description with clear deliverables and timeline.
- Allow the interns in meetings and provide information, resources, and opportunities for professional development.
- The interns have never done this kind of work before, they want to know that their work is measuring up to organizational expectations, hence provide professional guidance and mentoring to the intern.
- Daily progress report of Intern is to be evaluated by industry supervisor. Examine what the intern has produced and make suggestions. Weekly supervision meetings can help to monitor the intern's work.

Duties Responsibilities of the Faculty Mentor

- To facilitate the placement of students for the internship
- To liaison between the college and the internship provider
- To assist the Industrial Training Supervisor during assessment

Instructions to the Interns

- Students shall report to the internship provider on the 1st day as per the internship schedule.
- Intern is expected to learn about the organization, its structure, product range, market performance, working philosophy etc.
- The interns shall work on live projects assigned by the internship provider.
- The Intern shall record all the activities in the daily log book and get the signature of the concerned training supervisor.
- Intern shall have 100% attendance during internship programme. In case of unavoidable circumstances students may avail leave with prior permission from the concerned training supervisor of the respective internship provider. However, the maximum leave permitted during internship shall be as per company norms where they are working and intern shall report the leave sanctioned details to their college faculty mentor.
- The interns shall abide all the Rules and Regulations of internship provider
- Intern shall follow all the safety Regulations of internship provider.
- On completion of the internship, the intern shall report to the college and submit the internship certificate mentioning duration of internship, evaluation of interns by internship provider, Student's Diary and Comprehensive Training Report.

Attendance Certification

Every month students have to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Training Reports

The students have to prepare two types of reports: Weekly report in the form of diary to be submitted to the concerned staff in-charge of the institution. This will be reviewed while awarding Internal

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these

progress reports.

Comprehensive Training Report

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant/product/process/construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training.

Any data, drawings etc. should be incorporated with the consent of the Organization.

Scheme of Evaluation

Internal Assessment

Students should be assessed for 50 Marks by industry supervisor and polytechnic faculty mentor during 3rd Month and 5th Month. The total marks (50 + 50) scored shall be converted to 40 marks for the Internal Assessment.

Sl. No.	Description	Marks
A	Punctuality and regularity. (Attendance)	10
B	Level / proficiency of practical skills acquired. Initiative in learning / working at site	10
C	Ability to solve practical problems. Sense of responsibility	10
D	Self expression / communication skills. Interpersonal skills / Human Relation.	10
E	Report and Presentation.	10
Total		50

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of internship period (June - May). The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report.	20
B	Comprehensive report on Internship, Relevant Internship Certificate from the concerned department.	30
C	Presentation by the student at the end of the Internship.	30
D	Viva Voce	20
Total		100

57632	FELLOWSHIP	Periods	C
PROJECT		540	12

Introduction

The Fellowship in the Diploma in Engineering program is designed to provide aspiring engineers with a comprehensive educational experience that combines theoretical knowledge with practical skills. This fellowship aims to cultivate a new generation of proficient and innovative engineers who are equipped to meet the challenges of a rapidly evolving technological landscape.

Participants in this fellowship will benefit from a robust curriculum that covers core engineering principles, advanced technical training, and hands-on projects. The program emphasizes interdisciplinary learning, encouraging fellows to explore various branches of engineering, from mechanical and civil to electrical, electronics & communication and computer engineering. This approach ensures that graduates possess a versatile skill set, ready to adapt to diverse career opportunities in the engineering sector.

In addition to academics, the fellowship offers numerous opportunities for professional development. Fellows will engage with industry experts through seminars, workshops, and internships, gaining valuable insights into real-world applications of their studies. Collaborative projects and research initiatives foster a culture of innovation, critical thinking, and problem-solving, essential attributes for any successful engineer.

By offering this fellowship, participants become part of a vibrant community of learners and professionals dedicated to advancing the field of engineering. The program is committed to supporting the growth and development of each fellow, providing them with the tools and resources needed to excel both academically and professionally.

The Fellowship in the Diploma in Engineering is more than just an educational endeavor; it is a transformative journey that equips aspiring engineers with the knowledge, skills, and experiences necessary to make significant contributions to society and the engineering profession.

Objectives

After completing students will be able to,

- Provide fellows with a solid foundation in core engineering principles and advanced technical knowledge across various engineering disciplines.

- Equip fellows with hands-on experience through laboratory work, projects, and internships, ensuring they can apply theoretical knowledge to real-world scenarios.
- Promote interdisciplinary understanding by encouraging exploration and integration of different engineering fields, fostering versatility and adaptability in fellows.
- Encourage innovation and creativity through research projects and collaborative initiatives, enabling fellows to develop new solutions to engineering challenges.
- Facilitate professional growth through workshops, seminars, and interactions with industry experts, preparing fellows for successful careers in engineering.
- Develop critical thinking and problem-solving skills, essential for tackling complex engineering problems and making informed decisions.
- Strengthen connections between academia and industry by providing opportunities for internships, industry visits, and guest lectures from professionals.
- Foster leadership qualities and teamwork skills through group projects and collaborative activities, preparing fellows for leadership roles in their future careers.
- Instill a sense of ethical responsibility and awareness of the social impact of engineering practices, encouraging fellows to contribute positively to society.
- Promote a culture of lifelong learning, encouraging fellows to continually update their knowledge and skills in response to technological advancements and industry trends.
- Prepare fellows to work in a global engineering environment by exposing them to international best practices, standards, and cross-cultural experiences.

Course Outcomes

CO 1: Demonstrate a strong understanding of core engineering principles and possess the technical skills necessary to design, analyze, and implement engineering solutions across various disciplines.

CO 2: Apply theoretical knowledge to practical scenarios, effectively solving engineering problems through hands-on projects, laboratory work, and internships.

CO 3: Exhibit the ability to conduct research, develop innovative solutions, and contribute to advancements in engineering through critical thinking and creative approaches to complex challenges.

CO 4: Understand and adhere to professional and ethical standards in engineering practice, demonstrating responsibility, integrity, and a commitment to sustainable and socially responsible engineering.

CO 5: Enhance strong communication skills, both written and verbal, and be capable of working effectively in teams, demonstrating leadership and collaborative abilities in diverse and multidisciplinary environments.

Important points to consider to select the fellowship project.

Selecting the right fellowship project is crucial for maximizing the educational and professional benefits of a Diploma in Engineering program.

- **Relevance to Future Plans**: Choose a project that aligns with your long-term career aspirations and interests. This alignment will ensure that the skills and knowledge you gain will be directly applicable to your desired career path.
- **Industry Relevance**: Consider the current and future relevance of the project within the industry. Opt for projects that address contemporary challenges or emerging trends in engineering.
- **Access to Facilities**: Ensure that the necessary facilities, equipment, and materials are available to successfully complete the project. Lack of resources can hinder the progress and quality of your work.
- **Mentorship and Guidance**: Select a project that offers strong mentorship and support from experienced faculty members or industry professionals. Effective guidance is crucial for navigating complex problems and achieving project objectives.
- **Project Scope**: Assess the scope of the project to ensure it is neither too broad nor too narrow. A well-defined project scope helps in setting clear objectives and achievable milestones.
- **Feasibility**: Evaluate the feasibility of completing the project within the given timeframe and with the available resources. Consider potential challenges and ensure you have a realistic plan to address them.
- **Technical Skills**: Choose a project that allows you to develop and enhance important technical skills relevant to your field of study. Practical experience in using specific tools, technologies, or methodologies can be highly beneficial.
- **Soft Skills**: Consider projects that also offer opportunities to develop soft skills such as teamwork, communication, problem-solving, and project management.
- **Innovative Thinking**: Select a project that encourages creativity and innovative problem-solving. Projects that push the boundaries of traditional engineering approaches can be particularly rewarding.
- **Societal Impact**: Consider the potential impact of your project on society or the

engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference

Guidelines to select Fellowship

- Ensure the program is accredited by a recognized accrediting body and has a strong reputation for quality education in engineering.
- Ensure it covers core engineering principles that align with your interests and career goals.
- Investigate the qualifications and experience of the faculty mentor. Look for programs with faculty who have strong academic backgrounds, industry experience, and active involvement in research.
- Check if the program provides adequate hands-on training opportunities, such as laboratory work, workshops, and access to modern engineering facilities and equipment.
- Assess the program's connections with industry. Strong partnerships with companies can lead to valuable internship opportunities, industry projects, and exposure to real-world engineering challenges.
- Explore the availability of research opportunities. Participation in research projects can enhance your learning experience and open doors to innovative career paths.
- Look for programs that offer professional development resources, such as workshops, seminars, and networking events with industry professionals and alumni.
- Ensure the program provides robust support services, including academic advising, career counseling, mentorship programs, and assistance with job placement after graduation.
- Consider the cost of the program and available financial aid options, such as scholarships, grants, and fellowships. Evaluate the return on investment in terms of career prospects and potential earnings.
- Research the success of the program's alumni. High employment rates and successful careers of past graduates can indicate the program's effectiveness in preparing students for the engineering field.

Duties Responsibilities of the Faculty Mentor

Each student should have a faculty mentor for the Institute.

- Get the approval from the Chairman Board of Examinations with the recommendations of the HOD/Principal for the topics.
- Provide comprehensive academic advising to help fellows select appropriate specializations, and research projects that align with their interests and career goals.
- Guide fellows through their research projects, offering expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist fellows in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.

- Offer career advice and support, helping fellows explore potential career paths, prepare for job searches, and connect with industry professionals and opportunities.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between fellows and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure fellows have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of fellows, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging fellows to practice integrity and responsibility in their work.
- Assist with administrative tasks related to the fellowship program, such as preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development of fellows.
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the Fellowship Scholar

- Regularly meet with your faculty mentor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your mentor.
- Develop strong organizational skills. Use planners, calendars, and task management

tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.

- Take advantage of opportunities to participate in research projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student to offer fellowship.

- **Completed Application Form**: This is typically the standard form provided by the institution or fellowship program that includes personal information, educational background, and other relevant details.
- **Detailed CV/Resume**: A comprehensive document outlining your educational background, knowledge experience, interest in research experience, publications, presentations, awards, and other relevant achievements if any.
- **Personal Statement**: A document explaining your motivation for applying to the fellowship, your career goals, how the fellowship aligns with those goals, and what you intend to achieve through the program.
- **Recommendation Letters**: Letters from faculty mentor, employer, or professionals who can attest to your academic abilities, professional skills, and suitability for the fellowship.

- **Proposal/Description**: A detailed proposal or description of the fellowship project or study you plan to undertake during the fellowship. This should include objectives, methodology, expected outcomes, and significance of the project.
- **Enrollment Verification**: Documentation verifying your current acceptance status in the academic institution or industry where the fellowship will be conducted.
- **Funding Information**: Details about any other sources of funding or financial aid you are receiving, if applicable. Some fellowships may also require a budget proposal for the intended use of the fellowship funds.
- **Samples of Work**: Copies of the relevant work that demonstrates your capabilities and accomplishments in your field.
- **Endorsement Letter**: A letter from your current academic institution endorsing your application for the fellowship, if required.
- **Ethical Approval Documents**: If your research involves human subjects or animals, you may need to submit proof of ethical approval from the relevant ethics committee.
- **Additional Documents**: Any other documents requested by the fellowship program required by the institution.

Attendance Certification

Every month students have to get their attendance certified by the supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the faculty mentor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Rubrics for Fellowship.

Sl. No.	Topics	Description
1	Alignment with Objectives	Assess how well the project aligns with the stated objectives and requirements. Determine if the student has addressed the key aspects outlined in the project guidelines.
2	Depth of Research:	Evaluate the depth and thoroughness of the literature review. Assess the student's ability to identify and address gaps in existing research.

3	Clarity of Objectives:	Check if the student has clearly defined and articulated the objectives of the project. Ensure that the objectives are specific, measurable, achievable, relevant, and time-bound (SMART).
4	Methodology and Data Collection:	Evaluate the appropriateness and justification of the research methodology. Assess the methods used for data collection and their relevance to the research questions.
5	Analysis and Interpretation:	Examine the quality of data analysis techniques used. Assess the student's ability to interpret results and draw meaningful conclusions.
6	Project Management:	Evaluate the project management aspects, including adherence to timelines and milestones. Assess the student's ability to plan and execute the project effectively.
7	Documentation and Reporting:	Check the quality of documentation, including code, experimental details, and any other relevant materials. Evaluate the clarity, structure, and coherence of the final report.
8	Originality and Creativity:	Assess the level of originality and creativity demonstrated in the project. Determine if the student has brought a unique perspective or solution to the research problem.
9	Critical Thinking:	Evaluate the student's critical thinking skills in analyzing information and forming conclusions. Assess the ability to evaluate alternative solutions and make informed decisions.
10	Problem-Solving Skills:	Evaluate the student's ability to identify and solve problems encountered during the project. Assess adaptability and resilience in the face of challenges.

INTERNAL MARKS - 40 Marks

As per the rubrics each topic should be considered for the Review 1 and Review 2. Equal weightage should be given for all the topics. It should be assessed by a faculty mentor and the industrial professional or research guide.

Review 1 shall be conducted after 8th week and Review 2 shall be conducted after 14th week in the semester. Average marks scored in the reviews shall be considered for the internal assessment of 40 Marks.

Scheme of Evaluation

PART	DESCRIPTION	MARKS
A	Assessment as per the rubrics.	30
B	Attendance	10
Total		**40**

END SEMESTER EXAMINATION - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of fellowship. The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report.	20
B	Comprehensive report of the Fellowship Work.	30
C	Presentation by the student.	30
D	Viva Voce	20
Total		100

57633	IN HOUSE PROJECT	Periods	C
PROJECT		540	12

Introduction

Every student must do one major project in the Final year of their program. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two for the partial fulfillment for the award of Diploma in Engineering.

For the project works, the Department will constitute a three-member faculty committee to monitor the progress of the project and conduct reviews regularly.

If the projects are done in-house, the students must obtain the bonafide certificate for project work from the Project supervisor and Head of the Department, at the end of the semester. Students who have not obtained the bonafide certificate are not permitted to appear for the Project Viva Voce examination.

For the projects carried out in Industry, the students must submit a separate certificate from Industry apart from the regular bonafide certificate mentioned above. For Industry related projects there must be one internal faculty advisor / Supervisor from Industry (External), this is in addition to the regular faculty supervision.

The final examination for project work will be evaluated based on the final report submitted by the project group **of not exceeding four students**, and the viva voce by an external examiner.

Objectives

Academic project work plays a crucial role in the education of Diploma in Engineering students, as it helps them apply theoretical knowledge to practical situations and prepares them for real-world engineering challenges.

- **Integration of Knowledge**: Consolidate and integrate theoretical knowledge acquired in coursework to solve practical engineering problems.
- **Skill Development**: Enhance technical skills related to the specific field of engineering through hands-on experience and application.
- **Problem-Solving Abilities**: Develop critical thinking and problem-solving abilities by addressing complex engineering issues within a defined scope.
- **Project Management**: Gain experience in project planning, execution, and management, including setting objectives, timelines, and resource allocation.

- **Teamwork and Collaboration**: Foster teamwork and collaboration by working in multidisciplinary teams to achieve project goals and objectives.
- **Research Skills**: Acquire research skills by conducting literature reviews, gathering relevant data, and applying research methodologies to investigate engineering problems.
- **Innovation and Creativity**: Encourage innovation and creativity in proposing and developing engineering solutions that may be novel or improve upon existing methods.
- **Communication Skills**: Improve communication skills, both oral and written, by presenting project findings, writing technical reports, and effectively conveying ideas to stakeholders.
- **Ethical Considerations**: Consider ethical implications related to engineering practices, including safety, environmental impact, and societal concerns.
- **Professional Development**: Prepare for future professional roles by demonstrating professionalism, initiative, and responsibility throughout the project lifecycle.

Course Outcomes

CO 1: Demonstrate the ability to apply theoretical concepts and principles learned in coursework to solve practical engineering problems encountered during the project. **CO 2:** Develop and enhance technical skills specific to the field of engineering relevant to the project, such as design, analysis, simulation, construction, testing, and implementation.

CO 3: Apply critical thinking and problem-solving skills to identify, analyze, and propose solutions to engineering challenges encountered throughout the project lifecycle.

CO 4: Acquire project management skills by effectively planning, organizing, and executing project tasks within defined timelines and resource constraints.

CO 5: Improve communication skills through the preparation and delivery of project reports, presentations, and documentation that effectively convey technical information to stakeholders.

Important points to consider to select the In-house project.

- Selecting a project work in Diploma Engineering is a significant decision that can greatly influence your learning experience and future career prospects.
- Choose a project that aligns with your career aspirations and interests within the field of engineering. Consider how the project can contribute to your professional development and future opportunities.
- Ensure the project aligns with your coursework and specialization within the Diploma

program. It should complement and build upon the knowledge and skills you have acquired in your studies.

- Evaluate the scope of the project to ensure it is manageable within the given timeframe, resources, and constraints. Avoid projects that are overly ambitious or impractical to complete effectively.
- Assess the availability of resources needed to conduct the project, such as equipment, materials, laboratory facilities, and access to relevant software or tools. Lack of resources can hinder project progress.
- Select a project that genuinely interests and motivates you. A project that captures your curiosity and passion will keep you engaged and committed throughout the project duration.
- Consider the availability and expertise of faculty advisors or industry mentors who can provide guidance and support throughout the project. Effective mentorship is crucial for success.
- Clearly define the learning objectives and expected outcomes of the project. Ensure that the project will help you achieve specific learning goals related to technical skills, problem-solving, and professional development.
- Look for opportunities to propose innovative solutions or explore new methodologies within your project. Projects that encourage creativity can set you apart and enhance your learning experience.
- Consider ethical implications related to the project, such as safety protocols, environmental impact, and compliance with ethical guidelines in research and engineering practices.
- Evaluate whether the project offers opportunities for collaboration with peers, experts from other disciplines, or industry partners. Interdisciplinary projects can broaden your perspective and enhance your teamwork skills.
- Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

By carefully considering these points, Diploma Engineering students can make informed decisions when selecting project work that not only enhances their academic learning but also prepares them for successful careers in engineering.

Duties Responsibilities of the internal faculty advisor.

Each group should have an internal faculty advisor assigned by the HOD/Principal.

- The in-house project should be approved by the project monitoring committee constituted by the Chairman Board of Examinations.
- The in-house project should be selected in the fifth semester itself. Each in-house project shall have a maximum of four students in the project group.
- Provide comprehensive academic advising to help in the selection of appropriate in-house project that align with their interests and career goals.
- Offer expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between students and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure students have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of the in-house project, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging students to practice integrity and responsibility in their work.
- Assist in preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development .
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the students.

- Regularly meet with your internal faculty advisor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your faculty advisor.
- Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in in-house projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.

- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student for an in-house project.

Submit a printed report of your in-house project work along with the fabrication model / analysis report for the End Semester Examination.

Rubrics for In-House Project Work

Sl. No.	Topics	Description
1	Objectives	Clearly defined and specific objectives outlined. Objectives align with the project's scope and purpose.
2	Literature Review	Thorough review of relevant literature. Identification of gaps and justification for the project's contribution.
3	Research Design and Methodology	Clear explanation of the research design. Appropriateness and justification of chosen research methods.
4	Project Management	Adherence to project timeline and milestones. Effective organization and planning evident in the project execution.
5	Documentation	Comprehensive documentation of project details. Clarity and completeness in recording methods, results, and challenges.
6	Presentation Skills	Clear and articulate communication of project findings. Effective use of visuals, if applicable.

7	Analysis and Interpretation	In-depth analysis of data. Clear interpretation of results in the context of research questions.
8	Problem-Solving	Demonstrated ability to identify and address challenges encountered during the project. Innovative solutions considered where applicable.
9	Professionalism and Compliance	Adherence to ethical standards in research. Compliance with project guidelines and requirements.
10	Quality of Work	Overall quality and contribution of the project to the field. Demonstrated effort to produce high-quality work.

SCHEME OF EVALUATION

The mark allocation for Internal and End Semester Viva Voce are as below.

Internal Mark Split (40 Marks)*		
Review 1 (10 Marks)	Review 2 (15 Marks)	Review 3 (15 marks)
Committee: 5 Marks. Supervisor: 5 Marks	Committee: 7.5 Marks Supervisor: 7.5 Marks	Committee: 7.5 Marks Supervisor: 7.5 Marks

Note: * The rubrics should be followed for the evaluation of the internal marks during reviews.

END SEMESTER EXAMINATION - Project Exam

The performance of each student in the project group would be evaluated in a viva voce examination conducted by a committee consisting of an external examiner and the Department project supervisor and an internal examiner.

End Semester (100)#			
Record (20 Marks)	Presentation (20 Marks)	Viva Voce (20 Marks)	Model / Analysis Report (40 Marks)
External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 20 Internal: 10 Supervisor: 10

 # The marks scored will be converted to 60 Marks.

Students who are unable to complete the project work at the end of the semester can apply for an extension to the Head of the Department, with the recommendation from the project guide for a period of a maximum of two months. For those students who extend the project work for two months, Viva Voce will be carried out and results will be declared separately. If the project report is not submitted even beyond the extended time, then students are not eligible to appear for Project Viva Voce Examination.