



**PPSU**

**P P SAVANI UNIVERSITY**

**SCHOOL OF ENGINEERING**

**B. TECH. (COMPUTER SCIENCE ENGINEERING – ML & AI)**

**SYLLABUS BOOK**

**AY 2023-24**

### INSTITUTE VISION

To emerge as an Institute of Excellence by imparting value-based education aided with Research, Innovation and Entrepreneurial skills.

### INSTITUTE MISSION

1.	To impart the holistic engineering education of highest quality & prepare socially responsible professionals with entrepreneurial skills.
2.	To prepare value-aided engineering professionals to meet up global industry requirements by imparting cutting edge professional education.
3.	To inculcate the attitude of research and innovation among the stake holders through experiential and project-based teaching-learning pedagogy.
4.	To acquire global talent pool by providing world class amenities for teaching, learning & research.

Graduates will demonstrate ability to:

PEO No	PROGRAMME EDUCATIONAL OBJECTIVES
PEO 1	Solve real-world engineering problems, design and develop innovative and cost-effective solutions exhibiting engineering skills/fundamentals to cater needs of society.
PEO 2	Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting comprehensive competitiveness.
PEO 3	Exhibit professional ethics & values, effective communication, teamwork, multidisciplinary approach, and ability to relate engineering issues to broader societal framework.

<b>PO No</b>	<b>PROGRAMME OUTCOMES</b>
PO 1	Engineering knowledge: Apply knowledge of engineering fundamentals, science, mathematics & engineering specialization for the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complex engineering problems leading to substantial conclusions using basic principles of mathematics, science and engineering.
PO 3	Design/development of solutions: Develop solutions for complex engineering problems and design system components or processes meeting specified needs having due consideration for the safety and societal & environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge & methods like design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid & viable conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for prediction and modeling of complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply cognitive learning by the contextual knowledge to assess societal, health, safety, legal and cultural issues and following responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge & skill needed for sustainable development.
PO 8	Values & Ethics: Apply basic moral values & ethical principles and pledge to professional ethics/norms and responsibilities of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual/as a team member or as a leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need, do necessary preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

<b>PSO No</b>	<b>PROGRAMME SPECIFIC OUTCOMES (PSO)</b> <b>COMPUTER SCIENCE ENGINEERING (ML &amp; AI)</b>
PSO 1	Build skills to develop software applications in specialised areas of Computer Science & Engineering such as artificial intelligence, machine learning, data science & gaming.
PSO 2	Analyse and formulate solutions to real world and socially relevant problems using Artificial Intelligence and Machine Learning concepts.
PSO 3	Prepare technically competent employee, researcher, entrepreneur, excel in competitive exams, and boost passion for the higher studies.

<b>Credit Guidelines (General)</b>			
<b>Component</b>	<b>Hour/Week</b>	<b>Credit</b>	<b>Total Hours/Semester</b>
Theory	1	1	15
Practical	2	1	30
Tutorial	1	1	15
Note: In specific cases; extra credits can be granted for specific/important subjects.			

<b>CO-PO Mapping Guidelines</b>		
<b>Mapping Level</b>	<b>% age Mapping</b>	<b>Indicator</b>
0 / -	0	No Mapping
1	0-33	Low Level (Slightly Mapped)
2	33-66	Medium Level (Moderately Mapped)
3	>66	High Level (Strongly Mapped)

# Syllabus Book

**B. Tech.**

Computer Science Engineering  
(Machine Learning & Artificial Intelligence)



**P P Savani University**

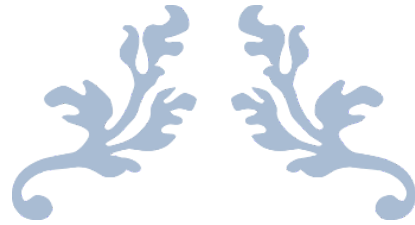
School of Engineering

Effective From: 2023-24

Authored by: P P Savani University

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# FIRST YEAR B. TECH.



**P P SAVANI UNIVERSITY**

**SCHOOL OF ENGINEERING**

**TEACHING & EXAMINATION SCHEME FOR FIRST YEAR B.TECH. COMPUTER SCIENCE ENGINEERING (ML&AI) PROGRAMME AY: 2023-24**

Se m	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
<b>1 OR 2</b>	SESH1110	Calculus	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SESH1120	Linear Algebra	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SEME1110	Hardware Workshop	ME	0	4	0	4	4	0	0	100	0	0	0	100
	SECE1110	Software Workshop	CE	0	4	0	4	2	0	0	100	0	0	0	100
	SEIT1110	Cyberspace Awareness	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SEIT1120	Competitive Quantitative Aptitude	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SECE1120	Joy of Programming	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SESH1130	Conceptual Experimental Physics	SH	3	2	0	5	4	40	60	40	60	0	0	200
	SECH1110	Fundamental Chemistry & Environmental Science	CH	3	2	0	5	4	40	60	40	60	0	0	200
	SEME1120	Fundamentals of Technical Drawing	ME	0	4	0	4	4	0	0	40	60	0	0	100
	SECV1110	Core Engineering Concepts	CV	3	2	0	5	4	40	60	40	60	0	0	200
	CFLS2130	Intermediate Communicative English	CFLS	3	0	0	3	3	100	0	0	0	0	0	100
CLSC2180	Essentials of Entrepreneurship	CFLS/SLM	2	0	0	2	2	100	0	0	0	0	0	100	
				<b>Total</b>			<b>52</b>	<b>45</b>							<b>2000</b>

<b>Group 1</b>	SESH1110	Calculus	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SEME1110	Hardware Workshop	ME	0	4	0	4	4	0	0	100	0	0	0	100
	SEIT1110	Cyberspace Awareness	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SESH1130	Conceptual Experimental Physics	SH	3	2	0	5	4	40	60	40	60	0	0	200
	SEME1120	Fundamentals of Technical Drawing	ME	0	4	0	4	4	0	0	40	60	0	0	100
	SECE1120	Joy of Programming	CE	3	2	0	5	4	40	60	40	60	0	0	200
	CFLS2130	Intermediate Communicative English	CFLS	3	0	0	3	3	100	0	0	0	0	0	100
							<b>Total</b>	<b>29</b>	<b>26</b>						
<b>Group 2</b>	SESH1120	Linear Algebra	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SECE1110	Software Workshop	CE	0	4	0	4	2	0	0	100	0	0	0	100
	SEIT1120	Competitive Quantitative Aptitude	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SECH1110	Fundamental Chemistry & Environmental Science	CH	3	2	0	5	4	40	60	40	60	0	0	200
	SECV1110	Core Engineering Concepts	CV	3	2	0	5	4	40	60	40	60	0	0	200
	CLSC2180	Essentials of Entrepreneurship	CFLS/SLM	2	0	0	2	2	100	0	0	0	0	0	100
							<b>Total</b>	<b>23</b>	<b>19</b>						

**P P Savani University**  
**School of Engineering**  
**Department of Science and Humanities**

Course Code: SESH1110

Course Name: Calculus

Prerequisite Course/s: Algebra, Geometry, Trigonometry & Pre-Calculus till 12<sup>th</sup> Standard level

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	0	2	5	40	60	0	0	100	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the course:**

To help learners to

- summarize concept of calculus to enhance ability of analysing mathematical problems.
- acquire knowledge and ability to work with differentiation and integration for applications of mathematical techniques in engineering.
- develop the tool of convergence or divergence of any infinite series and power series for learning advanced Engineering Mathematics.
- acquire knowledge of partial differentiation and ability to work with applications to advanced Engineering Mathematics.
- application of concavity of graph and find out points of inflection.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Calculus</b> Limits, Continuity, Types of Discontinuity, Successive Differentiation, Rolle's Theorem, LMVT, CMVT, Maxima and Minima.	9	20
2.	<b>Sequence and Series-I</b> Convergence and Divergence, Comparison Test, Integral Test, Ratio Test, Root Test, Alternating Series, Absolute and Conditional Convergence.	9	20
3.	<b>Sequence and Series-II</b> Power series, Taylor and Macluarin series, Indeterminate forms and L'Hospitals Rule.	5	10
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Partial Derivatives</b>	11	30

	Function of several variables, Partial differentiation, Applications, Chain rule, Linear approximations, Maxima and Minima, Euler's theorem, Lagrange multiplier.		
5.	<b>Curve tracing</b> Tracing of Cartesian Curves, Polar Coordinates, Polar and Parametric Form of Standard Curves, Areas and Length in Polar co-ordinates	11	20
	<b>TOTAL</b>	45	100

#### List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	Calculus-1	4
2.	Calculus-2	4
3.	Calculus-3	2
4.	Sequence and Series-1	4
5.	Sequence and Series-2	2
6.	Sequence and Series-3	2
7.	Partial Derivatives-1	4
8.	Partial Derivatives-2	2
9.	Curve tracing-1	4
10.	Curve tracing-2	2
	<b>TOTAL</b>	30

#### Text Book:

Title	Author(s)	Publication
Thomas' Calculus	George B. Thomas, Maurice D. Weir and Joel Hass	Pearson
Elementary linear Algebra	Howard Anton and Chris Rorres	Wiley

#### Reference Book:

Title	Author(s)	Publication
Advanced Engineering Mathematics	E Kreyszig	John Wiley and Sons
A textbook of Engineering Mathematics	N P Bali and Manish Goyal	Laxmi
Higher Engineering Mathematics	B S Grewal	Khanna
Engineering Mathematics	T Veerarajan	Tata Mc Graw Hill
Engineering Mathematics-1 (Calculus)	H. K. Dass and Dr. Rama Verma	S. Chand

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

#### Tutorial:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks
- Continuous Evaluation consists of self-performance assignment to 20 marks.
- Internal Viva consists of 30 marks.

### Course Outcome(s):

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

SESH1110	CALCULUS
CO 1	Recall the concepts of limit, continuity and differentiability for analysing mathematical problems.
CO 2	Analyze the series for its convergence and divergence to solve real world problems.
CO 3	Evaluate various limit problems using L' Hospital's rule.
CO 4	Identify the ordinary differentials and partial differentials and solve the maximum and minimum value of function.
CO 5	Construct the graphs for function with intervals and identify more application for function.

### Mapping of CO with PO-PSO

SESH1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	1	1								1
CO 2	3	2	1									1
CO 3	2	2	1									
CO 4	2	2	1	1								1
CO 5	2	2	1									1

### Mapping of CO with PSO

SESH1110	PSO1	PSO2	PSO3
CO 1	3		
CO 2	1	1	
CO 3	1	2	
CO 4	3	2	
CO 5	1	1	

### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Calculus	1, 2, 3, 4, 5
2	Sequence and Series – I	1, 2, 3, 4, 6
3	Sequence and Series – II	1, 2, 3, 4, 6
4	Partial Derivatives	1, 2, 3, 4, 5
5	Curve tracing	1, 2, 3, 4, 5, 6

**P P Savani University  
School of Engineering**

**Department of Science and Humanities**

Course Code: SESH1120

Course Name: Linear Algebra

Prerequisite Course/s: Algebra, Geometry, Trigonometry & Pre-Calculus till 12<sup>th</sup> Standard level

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	0	2	5	40	60	0	0	100	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- analyse and solve system of linear equations and understand characteristics of Matrices.
- learn about and work with vector space, linear transformation and inner product space.
- apply concepts of linear algebra for solving science and engineering problems.
- introduce the concept of improper integral and Beta-Gamma Function.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Matrix Algebra</b> Elementary Row and Column operations, Inverse of matrix, Rank of matrix, System of Linear Equations, Characteristic Equation, Eigen values and Eigen vector, Diagonalization, Cayley Hamilton Theorem.	12	30
2.	<b>Vector Space</b> Concept of vector space, Subspace, Linear Combination, Linear Dependence and Independence, Span, Basis and Dimension, Row Space, Column Space and Null Space, Rank and Nullity.	11	20
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
3.	<b>Linear Transformation</b> Introduction of Linear Transformation, Kernel and Range, Rank and Nullity, Inverse of Linear Transformation, Rank Nullity Theorem, Composition of Linear Maps.	9	20
4.	<b>Inner Product Space</b> Inner Product, Angle and Orthogonality, Orthogonal projection, Gram-Schmidt process and QR Decomposition, Least square decomposition.	8	20

5.	<b>Beta and Gamma function</b> Improper Integrals, Convergence, Properties of Beta and Gamma Function, Duplication Formula (without proof)	5	10
<b>TOTAL</b>		45	100

**List of Tutorial:**

Sr. No.	Name of Tutorial	Hours
5.	Matrix Algebra-1	4
6.	Matrix Algebra-2	2
7.	Vector Space-1	4
8.	Vector Space-2	2
9.	Linear Transformation-1	4
10.	Linear Transformation-2	2
11.	Inner Product Space-1	4
12.	Inner Product Space-2	2
13.	Beta and Gamma function-1	4
14.	Beta and Gamma function-2	2
<b>TOTAL</b>		30

**Text Book(s):**

Title	Author/s	Publication
Thomas' Calculus	George B. Thomas, Maurice D. Weir and Joel Hass	Pearson
Elementary Linear Algebra	Howard Anton and Chris Rorres	Wiley

**Reference Book(s):**

Title	Author(s)	Publication
Advanced Engineering Mathematics	E Kreyszig	John Wiley & Sons
A textbook of Engineering Mathematics	N P Bali and Manish Goyal	Laxmi
Higher Engineering Mathematics	B S Grewal	Khanna
Engineering Mathematics for First Year	T Veerarajan	Tata Mc Graw Hill
Engineering Mathematics-1 (Calculus)	H. K. Dass and Dr. Rama Verma	S. Chand

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous evaluation consists of performance of tutorial which will be evaluated out of 10 Marks for each tutorial and average of the same will be converted to 50 marks.
- Continuous Evaluation consists of self-performance assignment to 20 marks.
- Internal Viva consists of 30 marks.

**Course Outcome(s):**

After the completion of the course, the following course outcomes will be able to:

<b>SESH1120</b>	<b>LINEAR ALGEBRA &amp; CALCULUS</b>
CO 1	Evaluate linear system using matrices and the knowledge of eigenvalues and eigenvectors for matrix diagonalization
CO 2	Determine the basis and dimension of vector spaces and subspaces.
CO 3	Discuss the matrix representation of a linear transformation given bases of the relevant vector space.
CO 4	Apply vectors, inner products, and linear transformations to real world situations.
CO 5	Classify gamma, beta functions & their relation which is helpful to evaluate some definite integral arising in various branch of engineering.

#### Mapping of CO with PO-PSO

<b>SESH1120</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	1	1								3
CO 2	3	2	1									2
CO 3	2	2	1									3
CO 4	2	2	1	1								1
CO 5	2	1	1									1

#### Mapping of CO with PSO

<b>SESH1120</b>	PSO1	PSO2	PSO3
CO 1	3	2	
CO 2	1	1	
CO 3	2	2	
CO 4	2	2	
CO 5			

#### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Matrix Algebra	1, 2, 3, 4, 5, 6
2	Vector Space	1, 2, 3, 4, 6
3	Linear Transformation	1, 2, 3, 4, 6
4	Inner Product Space	1, 2, 3, 4, 5, 6
5	Beta and Gamma Function	1, 2, 3, 4, 5

**P P Savani University**  
**School of Engineering**  
**Department of Mechanical Engineering**

Course Code: SEME1110

Course Name: Hardware Workshop

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)			Credit	Examination Scheme (Marks)						
Theory	Practical	Tutorial		Theory		Practical		Tutorial		Total
			CE	ESE	CE	ESE	CE	ESE		
00	04	00	04	00	00	10	00	00	00	100
						0				

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- learn about the safety measures required to be taken while using working in workshop.
- learn about how to select the appropriate tools required for specific operation.
- learn about different manufacturing technique for production out of the given raw material.
- understand applications of machine tools, hand tools, power tools and welding process.

**Course Content:**

Module No.	Contents	Weightage in %
1.	<p><b>Introduction:</b> Introduction to Various Shops / Sections and Workshop Layouts, Safety Norms to be Followed in a Workshop.</p> <p><b>Fitting Shop:</b> Introduction of Fitting Shop; Safety; Making a Job as per Drawing including Marking and other Performing Operations.</p> <p><b>Carpentry and Drilling Shop:</b> Introduction of Carpentry Shop; Preparation of Job as per Drawing including Marking and other Performing Operations.</p> <p><b>Introduction to Machine Tools:</b> Introduction and Demonstration of various Machine Tools like Lathe, Drilling, Grinding, Hack Saw Cutting etc.</p> <p><b>Introduction to Welding &amp; Plumbing:</b> Introduction and Demonstration of Welding process. Introduction and Demonstration of Plumbing Shop.</p>	25%
2.	<p><b>Introduction to Computer Hardware</b> Computer hardware structure, Identify and understand hardware components: CPU, Motherboard, RAM, HDD, SSD, Keyboard, Ports, Mouse, Monitor, Printer, UPS/SMPS, etc.</p> <p><b>Hardware Maintenance and Troubleshooting</b> Assembling and disassembling a PC, connectors and cables, BIOS setup, Disk</p>	25%

	management, Device manager, Task manager, Network management, Backup/recovery disk.	
3.	<b>Electrical and Electronic Skill:</b> Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C & diode) and ICs on PCB, connections on Breadboard	25%
4.	<b>Logic Gates:</b> Digital Electronics, Symbol and truth table of Logic gates (OR, AND, NOT, NAND, NOR and EX-OR gate), De morgan's theorem. <b>Cathode Ray Oscilloscope:</b> Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only–no mathematical treatment), brief discussion on screen phosphor, visual persistence & Use of CRO for the measurement of voltage (dc or ac frequency, time period. Special features of dual trace, Digital storage Oscilloscope: Block diagram and principle of working.	25%

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction and Demonstration of Safety Norms. Different Measuring Instruments. Introduction and Demonstration of Machine Shop. To Perform a Job of Fitting Shop.	12
2.	To Perform a Job of Carpentry Shop. Introduction and Demonstration of Plumbing Shop & Welding Process.	15
3.	(I)Identify computer hardware layout and components (II)Perform assembling and disassembling of PC	08
4.	Configure BIOS, disk, network and other hardware management	05
5.	Understanding the electronic components and study of Soldering and Desoldering of electronic components on PCB Board.	04
6.	Understanding the connection on Breadboard and study of Alternate Flashing LED Lights using Breadboard.	06
7.	Verify the truth table of Logic gates and De morgan's theorem on IC trainer board.	04
8.	Study of Cathode Ray Oscilloscope.	06
	<b>TOTAL</b>	60

#### Text Book(s):

Title	Author(s)	Publication
Elements of Workshop Technology	S K Hajra Choudhury	Media Promoters & Publishers
A text book in Electrical Technology	B L Theraja	S Chand and Co

#### Reference Book(s):

Title	Author(s)	Publication
Basic Electronics: A text lab manual	P.B. Zbar, A.P. Malvino, M.A. Miller	Mc-Graw Hill.
Digital Electronics	Subrata Ghoshal	Cengage Learning

#### Course Evaluation:

##### Practical:

- Continuous Evaluation consists of Performance of Practical/Tutorial which will be evaluated

- out of 10 for each practical/Tutorial and average of the same will be converted to 30 Marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator
- Internal Viva consists of 30 Marks.
- Practical performance/quiz/drawing/test will consist of 30 Marks.

### Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME1110	HARDWARE WORKSHOP
CO 1	Apply the application of mechanical workshop such as fitting, drilling and carpentry. Understand various tools of mechanical workshop and understand its applications.
CO 2	Identify and inspect hardware components and interpret latest development of the field.
CO 3	Make students capable of analysing and solving the varieties of problems coming up in the electrical measurements and also enable the students to design as well as trouble shoots the circuits and networks through hands-on mode.
CO 4	Develop skill to build, and troubleshoot digital circuits.

### Mapping of CO with PO-PSO

SEME1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	2	1		3	3		3	3	1	3
CO 2	2	1	1	2	2	2			2	2	1	2
CO 3	3	2	2	2	2	2	2	3	2	2	3	3
CO 4	2	3	2	3	3		3	3	1	2	1	2

### Mapping of CO with PSO

SEME1110	PSO1	PSO2	PSO3
CO 1	3	1	1
CO 2	1	1	2
CO 3	1	3	3
CO 4	2	2	2

### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction, Fitting Shop, Carpentry Shop and Drilling Shop, Introduction to Machine Tools, Welding and Plumbing	2,3,4,6
2	Introduction to Computer Hardware, Hardware Maintenance and Troubleshooting	1,2,3,4,5,6
3	Understand and designing of Electrical circuit	2,3,5
4	Cathode ray oscilloscope and Digital Electronics	1,2,3,5

**P P Savani University**  
**School of Engineering**  
**Department of Computer Engineering**

Course Code: SECE1110

Course Name: Software Workshop

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
00	04	00	02	00	00	100	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Provide a comprehensive knowledge of overall basic computer software tools and technology.
- Providing hands-on experience related to basic software installation, usage of Operating systems, and various essential software utilities.

**Course Content:**

<b>Section I</b>		
Module No.	Content	Weightage in %
1.	<b>Software Fundamentals</b> Introduction to Software, Types of software, Applications of software, Web based software, Understand Software specific requirements, Installation of Software	10
2.	<b>Operating System</b> Introduction of OS, Functions of Operating System, Types of OS, Installation of Windows and Linux OS, Linux architecture, Role of Device Drivers in OS, Shell scripting, Command structure, and general-purpose utility.	25
3.	<b>DOS Commands</b> Getting Started with DOS, Introduction to Command Prompt, System Files and Command, Creating directories, Traversing through directories, Deleting directories, Viewing Files within a directory.	15
<b>Section II</b>		
Module No.	Content	Weightage in %
4.	<b>Application Software</b> Introduction to Application Software, Types of Application Software, Installation of Application Software, Logo Designing, Creating Flowcharts and diagrams, Introduction To Google Apps.	10

5.	<b>Data Analysis using Application Software</b> Introduction to Spreadsheets, Spreadsheet Functions to Organize Data, Introduction to Filtering, Pivot Tables, and Charts, VlookUp and HlookUp in Spreadsheets.	15
6.	<b>Website Creation</b> Creating a website using Google Sites, Creating Web Pages, Working with Images, Working with Documents on Web Pages. Introduction to Wordpress, Installing Web Server and Wordpress, Creating Web pages in Wordpress.	25

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Study of Different Software.	2
2.	Installation of any 2 software with required plugins and libraries.	4
3.	Study of Different Operating Systems.	2
4.	Creation of Bootable Pen drive.	2
5.	Installation of Windows OS.	2
6.	Installation of Linux OS using VMWare.	2
7.	Study of Basic commands of Linux/UNIX.	4
8.	Study of Basic commands of DOS.	4
9.	Design logo using Canva.	2
10.	Draw a Flowchart to find maximum of two numbers in either draw.io or Microsoft Visio or LucidChart.	2
11.	Study of different Google Apps.	4
12.	Create a Google Doc and Google sheet and share with 2 classmates.	2
13.	Demonstrate working of HlookUp and VlookUp in Excel.	2
14.	Create different types of charts in Excel.	4
15.	Demonstrate Data Analysis in Excel.	4
16.	Create a Google Website with minimum two pages showing your personal details.	4
17.	Demonstrate embedding of a youtube video and pdf document on a web page in google site.	4
18.	Demonstrate placing Map and hyperlinks on web page in Google Site.	4
19.	Create a wordpress site and create minimum three web pages and menu to navigate between the pages.	4
20.	Demonstrate the use of Accordion in wordpress.	2
	<b>TOTAL</b>	60

**Text Book(s):**

Title	Author/s	Publication
Fundamentals Of Computers, 2nd Edition	Reema Thareja	Oxford University Press
Excel 2019 Bible	Michael Alexander, Richard Kusleika, John Walkenbach	Wiley

**Reference Book(s):**

Title	Author/s	Publication
UNIX : Concepts and Applications   4th	Sumitabha Das	McGraw Hill Education

Edition		
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**Web Material Link(s):**

- <https://sites.google.com/site/willkimbley/google-apps-tutorials>
- <https://www.cs.upc.edu/~robert/teaching/foinf/doshelp.html>
- <https://www.javatpoint.com/software-engineering>
- <https://www.wikihow.com/Create-a-Website-Using-Google-Sites>
- <https://www.wpbeginner.com/guides/>

**Course Evaluation:**

**Practical:**

- Continuous Evaluation consists of performance of practical, which should be evaluated out of 10 marks per each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during Internal practical Exam.
- Mini Project performance consists of 40 marks during End Semester Exam.

**Course Outcome(s):**

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

SECE1110	Software Workshop
CO 1	Understand the types of computer software with their requirements and how to use as per the need.
CO 2	Install different Operating Systems and learn commands used in the OS.
CO 3	Get familiar with the application software and different applications of application software
CO4	Achieve some useful information from data through analysis and represent it with different views like charts, graphs etc.
CO 5	Learn the designing and development of website to have a global communication.

**Mapping of CO with PO:**

SECE1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			1							2
CO 2	3	3	2		3					2		3
CO 3	3	2	1	1	2							3
CO 4	2		3	3	3				1	2		3
CO 5	3		3	2	3			1				3

**Mapping of CO with PSO:**

SECE1110	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	3	3	
CO 3	3	2	
CO 4	3	3	2
CO 5	3	3	3

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Software Fundamentals	1,2
2	Operating System	1,2,3,6
3	Disk Operating System	2,3
4	Application Software	2,3,4,5
5	Data Analysis using Application Software	3,4,5,6
6	Website Creation	2,3,6

**P P Savani University**  
**School of Engineering**

**Department of Information Technology**

Course Code: SEIT1110

Course Name: Cyberspace Awareness

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	0	0	2	40	60	00	00	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

- understand governance, regulatory, legal, economic, environmental, social, and ethical context of cyber security.
- equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- help students to protect the one's data, systems, and networks from malicious attacks and cyber threats.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Cyber space</b> Cyber space, Cyber Crime and its Types, Overview of Cyber Security, Cyber Attacks in History, Internet Governance, Hacking and its Types, Cracking, Overview of System and Web Vulnerability, OWASP	06	20
2.	<b>Cyber Threats</b> Various Cyber Threats, Malware, Phishing, Password Attacks, DOS attack, Man in the Middle, Drive by download, Malvertising, Rogue Software, Cyber Warfare and its conflicts, Cyber Terrorism, Case studies	09	30
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
3.	<b>Cyber security Practices</b> Cyber Security Practices and dos and don'ts, Data Privacy and Security, Security Controls, Overview of social media and its security, E-Commerce, Digital payments and its security, Tools and technology for cyber security, Platform to report and combat cyber crime, Case	05	15

	studies		
4.	<b>Cyberspace and the Law</b> Cyber Security Regulations, Cyber Law, need for a Comprehensive Cyber Security Policy, Need for an International convention on Cyber space, Contemporary crime, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards, The INDIAN Cyberspace, Indian IT Act 2000, Indian IT Act 2008, Case studies	06	15
5.	<b>Cyber Forensics</b> Introduction to Cyber Forensics, Handling Preliminary analysis, Investigating Investigations, Controlling an Investigation, Legal Policies, Case studies	04	20
	<b>TOTAL</b>	30	100

**Text Book(s):**

Title	Author/s	Publication
Cybersecurity for Beginners	Raef Meeuwisse	Cyber Simplicity Ltd

**Reference Book(s):**

Title	Author/s	Publication
Cyber Security	Nina Godbole, Sunit Belapure	Wiley India, New Delhi
The Indian Cyber Law	Suresh T. Vishwanathan;	Bharat Law House New Delhi

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Course Outcome(s):**

After completion of the course, the students will be able to,

SEIT1110	Cyberspace Awareness
CO 1	Understand Concepts of Cyber space.
CO 2	Analyze the Concepts of Cyber Threats.
CO 3	Elaborate the overview of social media and understanding cybercrimes.
CO 4	Identify cyber laws and cyber acts in India.
CO 5	Explore different case studies based on cyber-Forensics.

**Mapping of CO with PO:**

SEIT1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2				3						2

CO 2	2	3				3						2
CO 3	3	2				3			2			3
CO 4		3				3		3		2		3
CO 5		2			2			2		3		3

**Mapping of CO with PSO:**

<b>SEIT1110</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO 1	3	2	2
CO 2	2	3	2
CO 3	3	2	3
CO 4	2	3	2
CO 5	3	3	2

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Introduction to Cyber space	1
2	Cyber Threats	1,2
3	Cyber security Practices	1,2,3
4	Cyberspace and the Law	1,2
5	Cyber Forensics	1,2,3

**P P Savani University**  
**School of Engineering**  
**Department of Computer Engineering**

Course Code: SEIT1120

Course Name: Competitive Quantitative Aptitude

Prerequisite Course(s): ---

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	00	00	02	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

- This course is designed to suit the need of the outgoing students and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning during various examinations and campus interviews.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Quantitative Ability (Basic Mathematics)</b> Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds & Indices, Percentages, Problems on Numbers, Quadratic Equations	5	15
2.	<b>Quantitative Ability (Applied &amp; Engineering Mathematics)- Part I</b> Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest,	5	35
3.	<b>Quantitative Ability (Applied &amp; Engineering Mathematics) -Part II</b> Time, Speed and Distance, Time & Work, Ratio and Proportion, Mixtures and Allegation	5	20
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Data Interpretation</b> Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams	6	20
5.	<b>Logical Reasoning (Deductive Reasoning)</b> Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding - Decoding, Calendars, Clocks, Seating Arrangement,	6	20

	Syllogism		
6.	<b>Mensuration &amp; Trigonometry</b> Two-dimensional (2D) and Three-dimensional (3D) Mensuration, Degree and Radian Measures, Trigonometric Ratios, Complementary Angles, Height and Distance, Standard Identities, Area, Inequalities	3	10
	<b>TOTAL</b>	30	100

**Text Book(s):**

Title	Author/s	Publication
Quantitative aptitude for Competitive examination	R S Agarwal	S. Chand
A Modern Approach to Verbal & Non-Verbal Reasoning	R S Agarwal	S. Chand

**Reference Book(s):**

Title	Author/s	Publication
Analytical and Logical reasoning	Sijwali B S	arihant

**Web Material Link(s):**

- <https://prepinsta.com/>
- <https://www.indiabix.com/>
- <https://www.javatpoint.com/>

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Course Outcome(s):**

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

SEIT1120	Competitive Quantitative Aptitude
CO 1	Understand the basic concepts of quantitative ability
CO 2	Understand the basic concepts of logical reasoning Skills
CO 3	Acquire satisfactory competency in use of reasoning
CO4	Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability
CO 5	Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc

**Mapping of CO with PO:**

SEIT1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2							2			3
CO 2	2	3							2			3
CO 3	2	3							3			3
CO 4		3							3			3

CO 5									3	3		3
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**Mapping of CO with PSO:**

SEIT1120	PSO1	PSO2	PSO3
CO 1	2	2	3
CO 2	2	3	3
CO 3	2	3	3
CO 4	2	3	3
CO 5			3

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Quantitative Ability (Basic Mathematics)	1, 3, 5
2,3	Quantitative Ability (Applied & Engineering Mathematics)	1, 2, 3, 5
4	Data Interpretation	2, 3, 6
5	Logical Reasoning (Deductive Reasoning)	2, 4, 5
6	Mensuration & Trigonometry	1, 3, 5

**P P Savani University**  
**School of Engineering**

**Department of Computer Engineering**

Course Code: SECE1120

Course Name: Joy of Programming

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- identify appropriate approach to computational problems.
- develop logic building and problem-solving skills.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Motivation of Programming:</b> Use of Programming, Importance of Programming, Discussion of different Case Study	5	14
2.	<b>Welcome to Programming:</b> Introduction of Programming, Flow Charts and Algorithms, Debugging, Tracing the execution of the Program, Watching Variables Values in Memory, Character Set, Keyword and Identifiers, Constants and Variables, Data Types - Declaration and Initialization, Basic Input, and Output Operations, Symbolic Constants, Overflow and Underflow of Data.	9	18
3.	<b>Conditional Statements and Looping Statements:</b> Decision Making & Branching: Decision Making with If and If - else Statements, Nesting of If-else Statements, The Switch and go-to statements. Looping: The while Statement, The Break Statement & The Do While loop, The FOR loop, Jump within loops - Programs.	9	18
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Collection of Data:</b> Introduction, One-dimensional Arrays, Two-dimensional Arrays, Concept of Multidimensional Arrays, Declaring and Initializing String Variables, Arithmetic Operations on Characters, Putting Strings Together, Comparison of Two Strings, String Handling Functions, Dictionary, List, Tuples and Sets.	10	20
5.	<b>Functions</b> Introduction to Functions, defining a Function, Calling a Function, Types of Functions, Function Arguments, Anonymous	6	15

	Functions, Global and Local Variables, Recursion		
6.	<b>Building Desktop Application</b> Exploring the Tkinter Library in Python, Creating basic Desktop application using Tkinter	6	15
	<b>TOTAL</b>	45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Working with basic elements of C languages (different input functions, different output functions, different data types, and different operators).	2
2.	Working with control structures (if statement, if-else statement, nested if-else statement, switch statement, break statement, goto statement).	2
3.	Working with array and strings in C.	4
4.	Introduction to Python (Introduction to IDLE, different data types, Input Output in Python, Operators, Operator precedence).	2
5.	Implementation of Dictionaries, Sets, Tuples and Lists and its various methods in Python.	6
6.	Working with functions in C/Python.	2
7.	Working with recursive function in C/Python.	2
8.	Building desktop application of your own calculator in Python.	4
9.	Case Study: a. Sorting : Arrange the books b. Searching : Find in seconds c. Recursion : Tower of Hanoi	6

*# Use of different libraries will be covered in Practical Assignments.*

#### Text Book(s):

Title	Author(s)	Publication
Programming in ANSI C	E. Balagurusamy	Tata McGraw Hill
Python Programming: A modular approach	Sheetal Taneja, Naveen Kumar	Pearson

#### Reference Book(s):

Title	Author(s)	Publication
Programming in C	Ashok Kamthane	Pearson
Python Cookbook	David Ascher, Alex Martelli	O Reilly Media

#### Web Material Link(s):

- <https://www.tutorialspoint.com/cprogramming/index.htm>
- <https://www.w3schools.com/c/>
- <https://www.tutorialspoint.com/python/>
- <https://www.w3schools.com/python/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

##### Practical:

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.

- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during End Semester Exam.

### Course Outcomes:

After completion of the course, the students will be able to

SECE1120	JOY OF PROGRAMMING
CO 1	Immediately analyze the syntax and semantics of the computer languages and apply it in programs.
CO 2	Implement computing solutions using logic building and problem-solving skills of a given programming language.
CO 3	Interpret the fundamental language syntax, semantics and fluent in the use of python or any computer language control flow statements.
CO 4	Determine the methods to create and manipulate programs by utilizing the data structures like lists, dictionaries, tuples and sets with emphasis on Python.

### Mapping of CO with PO:

SECE1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			3			2	2			3
CO 2	2	3			3				2			3
CO 3	3	2			3							3
CO 4	3				3							3

### Mapping of CO with PSO:

SECE1120	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	3	3	2
CO 3	3	2	2
CO 4	3	3	2

### Level of Revised Bloom's Taxonomy in Assessment:

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Motivation of Programming	1, 2, 4
2.	Welcome to Programming	1, 2, 3
3.	Conditional Statements and Looping Statements	1, 2, 3
4.	Collection of Data	1, 2, 3
5.	Functions	2, 3, 4, 6
6.	Building Desktop Application	2, 3, 4, 6

**P P Savani University  
School of Engineering**

**Department of Chemical Engineering**

Course Code: SECH1110

Course Name: Fundamental Chemistry & Environmental Science

Prerequisite Course(s): -

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Understand the basic concepts of chemistry, including atoms, molecules, and chemical processes.
- Apply the scientific method to examine chemical phenomena, including the design and execution of experiments, data analysis, and evidence-based conclusion drawing.
- Evaluate the causes and consequences of environmental problems and propose solutions based on scientific evidence.
- Integrate knowledge from multiple disciplines to analyze environmental problems and propose effective solutions.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Chemistry</b> Overview of the scientific method and chemistry as a science, Basic concepts of matter, including atoms, molecules, and the periodic table, Introduction to chemical bonding and intermolecular forces, Basic principles of chemical reactions, including stoichiometry and reaction types	6	15
2.	<b>Chemical Thermodynamics and Kinetics</b> Introduction to thermodynamics and the laws of thermodynamics, Energy and enthalpy changes in chemical reactions, Introduction to chemical kinetics and reaction rates, Factors affecting reaction rates, including temperature, concentration, and catalysts	6	15
3.	<b>Properties of Matter and Solutions</b> Physical properties of matter, including states of matter and phase changes, Solutions and their properties, including solubility and colligative properties, Introduction to acids and bases and their properties, Chemical equilibrium and the equilibrium constant	5	10
4.	<b>Organic Chemistry</b> Introduction to organic chemistry and the basics of carbon chemistry, Functional groups and their properties, Nomenclature and isomerism in organic compounds, Introduction to organic	6	10

	reactions and mechanisms		
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<b>Section II</b>			
Module	Content	Hours	Weightage in %
5.	<b>Introduction to Environment</b> Definition, principles and scope of Environmental Science, Impacts of development on Environment, Environmental Degradation, The interdisciplinary nature of environmental science, Concept of 4R's	06	10
6.	<b>Environmental Pollution</b> a) Water Pollution: Introduction – Water Quality Standards, Sources of Water Pollution, Classification of water pollutants, Effects of water pollutants. b) Air Pollution: Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO <sub>2</sub> , NO <sub>x</sub> , Auto exhaust, Effects of common air pollutants c) Noise Pollution: Introduction, Sound and Noise, Noise measurements, Causes and Effects. d) Solid Waste: Generation and management e) Bio-medical Waste: Generation and management f) E-waste: Generation and management	08	20
7.	<b>Social Issues and Environment</b> Sustainable Development, Equitable use of Resources for sustainable lifestyle and it's benefits, Water conservation, Climate Change, Global Warming and Green House Effect, Acid Rain, Depletion of Ozone layer, Carbon Footprint	08	20
	<b>TOTAL</b>	45	100

**List of Practical:**

Sr. No	Name of Practical	Hours
1.	Acid-base titration adding a base of known concentration to an acid of unknown concentration until the reaction is complete, and the concentration of the acid is determined.	02
2.	Determination of the boiling point of a liquid heating a sample of a liquid and observing the temperature at which it boils.	02
3.	Determination of the density of a liquid weighing a known volume of a liquid and calculating its density.	04
4.	Determination of the pH of a solution using a pH meter to measure the acidity or basicity of a solution.	04
5.	Flame test: burning a sample of a substance and observing the color of the flame to identify the presence of certain elements.	04
6.	Preparation of a salt reacting an acid and a base to form a salt and observing the reaction products.	02
7.	Testing of soil acidity	02
8.	Studying the effect of temperature on the solubility of a solid in water at different temperatures to see how temperature affects solubility.	02

9.	Studying the properties of acids and bases: Students can test the properties of different acids and bases (e.g., pH, conductivity) and compare their properties.	04
10.	Investigating the reaction between an acid and a metal and measure the amount of gas produced.	04

**Text Book(s):**

Title	Author/s	Publication
Textbook of Environmental Chemistry and Pollution Control	Dr. S. S. Dara, Dr. D.D. Mishra	S Chand & Co Ltd
Environmental Studies	Benny Joseph	Mc.Graw hill education Pvt. Ltd.
Environmental Studies	Dr. S.K. Dhameja	S.K. Kataria & Sons

**Reference Book(s):**

Title	Author/s	Publication
Engineering Chemistry	Jain & Jain	Dhanpat Rai Publishing company
Environmental Studies (From crisis to cure)	R. Rajagopalan	OXFORD university press

**Web Material Link(s):**

[https://www.iare.ac.in/sites/default/files/lecture\\_notes/IARE\\_ENS\\_LECTURE\\_NOTES\\_2.pdf](https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_ENS_LECTURE_NOTES_2.pdf)

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of performance of Practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
- Viva/Oral presentation consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

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

SECH1110	Fundamental Chemistry & Environmental Science
CO 1	Develop a fundamental understanding of the principles and concepts of chemistry, including atomic structure, chemical reactions, and chemical bonding.
CO 2	Demonstrate an ability to apply chemical knowledge to real-world problems, such as calculating reaction yields and predicting chemical properties.
CO 3	Identify the types of pollution in society along with their sources.
CO 4	Realize the global environmental issues.

**Mapping of CO with PO:**

SECH1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	1	1			2			2		1
CO 2	1	1	2	3		1	2			1		1
CO 3	1	2	2	3	3	3		2	1	1	3	
CO 4	3	3	2	2	1	1				3		1

**Mapping of CO with PSO:**

SECH1110	PSO1	PSO2	PSO3
CO 1	1	2	3
CO 2	3	1	1
CO 3	2		2
CO 4	1		

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to Chemistry	2,1
2	Chemical Thermodynamics and Kinetics	4, 5
3	Properties of Matter and Solutions	1,2
4	Organic Chemistry	4,5
5	Introduction to Environment	1,2
6	Environmental Pollution	1,2,3
7	Social Issues and Environment	1,2,3

**P P Savani University  
School of Engineering**

**Department of Mechanical Engineering**

Course Code: SEME1120

Course Name: Fundamentals of Technical Drawing

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)			Credit	Examination Scheme (Marks)						
Theory	Practical	Tutorial		Theory		Practical		Tutorial		Total
			CE	ESE	CE	ESE	CE	ESE		
00	04	00	04	00	00	40	60	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Know conventions and the methods of engineering drawing.
- Interpret engineering drawings using fundamental technical mathematics.
- Construct basic and intermediate geometry.
- Improve their visualization skills so that they can apply these skills in developing new products.
- Improve their technical communication skill in the form of communicative drawings.
- Comprehend the theory of projection.
- Basic knowledge of computer-aided drawing using AutoCAD.

**Course Content:**

<b>Section I</b>			
Module No.	Contents	Lab Hours	Weightage in %
1.	<b>Introduction:</b> Importance of the Course; Use of Drawing Instruments and accessories; BIS – SP – 46; Lettering, Dimensioning, and Lines; Representative Fraction; Types of Scales (Plain and Diagonal Scales); Construction of Polygons.	03	05%
2.	<b>Engineering Curves:</b> Classification and Application of Engineering Curves; Construction of Conics, Cycloidal Curves, Involute, Spiral, and Normal & Tangent to each curve.	12	15%
3.	<b>Projections of points, lines &amp; planes:</b> Types of Projections; Introduction of Principle Planes of Projections; Projection of Points in all four Quadrants; Projection of Lines inclined to one Referral Plane & two Referral Planes. True length and inclination with reference plane; Projection of Planes (Circular and Polygonal) with inclination to one Referral Plane and two Referral Planes; Concept of Auxiliary Projection Method.	15	30%
<b>Section II</b>			

Module No.	Content	Hours	Weightage in %
4.	<b>Orthographic Projection and Isometric Projections</b> Types of Projections: Principle of First and Third Angle Projection Applications & Difference; Projection from Pictorial view of Object, View from Front, Top, and Sides; Full Section View. Isometric Scale, Conversion of Orthographic views into Isometric Projection, Isometric View, or Drawing of simple objects.	18	30%
5.	<b>Residential Building Planning:</b> Introduction to buildings, Classification of buildings, Principles of building planning, Principles of architecture composition, Detail drawing, Line Plan, plan, elevation, section, Preparing working drawing of residential building.	06	10%
6.	<b>Computer-Aided Drawing:</b> Introduction to AutoCAD, Basic commands for 2D drawing (Line, Circle, Polyline, Rectangle, Hatch, Fillet, Chamfer, Trim, Extend, Offset, Dim style, etc.)	06	10%

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction sheet (dimensioning methods, different types of lines, construction of various polygons, dividing the line and angle into parts, use of stencil, lettering), plane scale and diagonal scale	03
2.	Engineering curves	12
3.	Projection of points, lines & planes	15
4.	Orthographic projection	10
5.	Isometric projection	10
6.	Residential building drawing (Line plan, Plan, Elevation, Section, Schedule opening)	04
7.	Computer-Aided Drawing	06
	<b>TOTAL</b>	60

#### Text Book(s):

Title	Author(s)	Publication
A Text Book of Engineering Graphics	P J Shah	S. Chand & Company Ltd., New Delhi
Engineering Drawing	N D Bhatt	Charotar Publishing House, Anand
Building Planning, Designing and Scheduling	Gurucharan Singh	Standard Book

#### Reference Book(s):

Title	Author(s)	Publication
Engineering Drawing	P.S.Gill	S. K. Kataria & sons, Delhi
Engineering Drawing	B. Agrawal & C M Agrawal	Tata McGraw Hill, New Delhi
Engineering drawing made Easy	K. Venugopal	Wiley Eastern Ltd
Building Drawing	M. G. Shah, C.M. Kale, S.Y. Patki	Tata McGraw Hill

**Web Material Link(s):**

- <http://nptel.ac.in/courses/105104148/>

**Course Evaluation:****Practical:**

- Continuous evaluation consists of performance of practical/tutorial which will be evaluated out of 20 marks for each practical/tutorial and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical test will consist of 30 marks and viva will consist of 30 marks during end semester exam.

**Course Outcome(s):**

After the completion of the course, the following course outcomes will be able to:

<b>SEME1120</b>	<b>FUNDAMENTALS OF TECHNICAL DRAWING</b>
CO 1	Apply BIS standards of building planning and conventions while drawing Lines, printing Letters, and showing dimensions.
CO 2	Explore the various methods to draw various engineering curves and their applications.
CO 3	Classify the orthographic projection systems concerning the observer, object, and reference planes.
CO 4	Develop 3D Isometric views in relation to 2D orthographic views.
CO 5	Software application in engineering drawing.

**Mapping of CO with PO:**

<b>SECH1120</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1				1			1	
CO 2	2		1	1	1			1			1	
CO 3	2		1	1				1			1	1
CO 4	2		1	2	1			1			1	1
CO 5	2	1	1	2	1			1			1	1

**Mapping of CO with PSO:**

<b>SECH1120</b>	PSO1	PSO2	PSO3
CO 1	1	2	2
CO 2	2	2	3
CO 3	2	3	1
CO 4	3	3	3
CO 5	3	3	3

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Introduction	1, 2, 6
2	Engineering Curves	2, 6
3	Projection of Points, Line & Plane	1, 2, 3, 4
4	Orthographic Projection	2, 5, 4

5	Isometric Projections and Isometric Drawing	2, 5, 4
6	Computer-Aided Drawing	2,3,6

**P P Savani University**  
**School of Engineering**  
**Department of Civil Engineering**

Course Code: SECV1110

Course Name: Core Engineering Concepts.

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)			Credit	Examination Scheme (Marks)						
Theory	Practical	Tutorial		Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Study the basic fundamentals of construction planning and material.
- Study significance of mechanical engineering systems in different fields of engineering.
- Study the basic concepts of electrical and electronics engineering.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Basics of Construction material and techniques</b> Common materials used in construction, Aggregate, Sand, Cement, Bricks, Timber, Steel, Paints. Bonds in brick masonry techniques, Foam works, Curing, Compaction of concrete, Water proofing, Fire safety norms and requirement.	08	18
2.	<b>Building planning and Bye laws</b> Building by laws as per national building code, building by laws as per local authority, standards for residential, public, commercial, industrial and institutional buildings planning, planning of earth quake resistance building, overview of RERA and ODPS, Green building and LEED certification, general layout, maps and plan used at construction site.	08	18
3.	<b>Basic Electricity Principles</b> Concept of Charge, Potential Difference and Current, Resistor, capacitor, Inductor, Ohm's law, effect of Temperature on resistance, temperature coefficient, Series and parallel combinations of Resistors and capacitors, Lenz and Faraday's laws for electromagnetic induction, AC Electricity and DC Electricity.	07	14

	<b>Electrical Wiring:</b> Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors.		
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Basics of I.C Engines:</b> Construction and working of 2 Stroke & 4 Stroke Petrol and Diesel Engines, Difference Between 2-Stroke - 4 Stroke Engine & Petrol-Diesel Engine, Efficiency of I. C. Engines.	08	18
5.	<b>Power Transmission Elements:</b> Construction and Applications of Couplings, Clutches and Brakes, Difference Between Clutch and Coupling, Types of Belt Drive and Gear Drive	08	18
6.	<b>DC Circuits and AC Circuits</b> DC Circuits: Introduction of Electrical circuit elements (prerequisites), voltage and current sources, Kirchoff's current and voltage laws, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits. AC Circuits: Representation of sinusoidal waveforms, peak and RMS values, Phasor representation of AC quantities, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Series and parallel resonance. Three phase balanced circuits, voltage and current relations in star and delta connections, Power measurement in three phase circuits.	06	14
7.	<b>Basics of Steam Generators:</b> Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox Boiler, Functioning of Different Mountings and Accessories	LAB	08
	<b>TOTAL</b>	45	100

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Preparation of drawing sheet showing various bonds.	04
2.	Preparation of Basic plan of Construction site.	04
3.	Preparation sketch of various building component.	04
4.	Verify the series and parallel connections of resistors and capacitors.	04
5.	To understand construction and working of various types of boilers.	04
6.	To understand construction and working of mountings and accessories.	04
7.	To verify the Kirchoff's current and voltage laws and Network theorems.	02
8.	To understand construction and working 2 -stroke & 4 -stroke Petrol	02

	engines.	
9.	To understand construction and working 2 -stroke & 4 -stroke Diesel engines.	02
	<b>TOTAL</b>	30

**Text Book(s):**

Title	Author(s)	Publication
Elements of Mechanical Engineering	Sadhu Singh	S. Chand Publications
Building construction	Dr. B C Punamia	Laxmi Publication
A text book in Electrical Technology	B L Theraja -	S Chand & Co.
Basic Electrical Engineering	D. C. Kulshreshtha	McGraw Hill, 2009

**Reference Book(s):**

Title	Author(s)	Publication
Basic Mechanical Engineering	T.S. Rajan	Wiley Eastern Ltd., 1996.
Town Planning	G. K. Hiraskar	Dhanpatrai Publications
Basic Electrical Engineering	Nagsarkar and Sukhija,	Oxford University Press

**Web Material Link(s):**

- <http://nptel.ac.in/course.php>

**Course Evaluation:**

**Theory:**

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

**Practical:**

- Continuous Evaluation consists of performance of practical which will be evaluated out of 20 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

**Course Outcome(s):**

After the completion of the course, the following course outcomes will be able to:

SECV1110	Core Engineering Concepts
CO 1	Understand basic properties of various construction materials.
CO 2	Understand the general rules and regulation of building planning.
CO3	Apply the principles of basic mechanical engineering.
C04	Comprehend the importance of mechanical engineering equipments like IC engine and power transmission elements.
CO5	Understand working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and

	distribution sectors.
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**Mapping of CO with PO:**

SECH1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	3	1	2	1	2	1	1	2	1	1
CO 2	3	3	3	2	2	2	2	1	2	2	1	1
CO 3	3	2	2	2	2	2	2	1	2	2	2	1
CO 4	3	2	2	2	3	2	2	1	2	2	2	1
CO 5	3	3	3	2	3	2	2	1	2	2	2	1

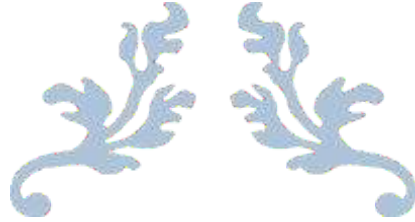
**Mapping of CO with PSO:**

SECH1110	PSO1	PSO2	PSO3
CO 1	2	2	2
CO 2	2	3	2
CO 3	3	3	3
CO 4	3	2	3
CO 5	3	3	2

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Basics of Construction material and techniques	1, 2, 3
2	Building planning and Bye laws	1, 2
3	Basic Electricity Principles	1,2,3
4	Power Transmission Elements	1, 2
5	Basics of I.C Engines	2
6	DC Circuits and AC Circuits	2,3,4
7	Basics of Steam Generators	1, 2



# SECOND YEAR B. TECH.



**P P SAVANI UNIVERSITY**

**SCHOOL OF ENGINEERING**

**TEACHING & EXAMINATION SCHEME FOR SECOND YEAR B.TECH. COMPUTER SCIENCE ENGINEERING (MLAI) PROGRAMME AY: 2023-24**

Sem	Course Code	Course Title	Course Category	Offered By	Teaching Scheme					Examination Scheme						
					Contact Hours				Credit	Theory		Practical		Tutorial		Total
					Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
3	SESH2130	Discrete Structures & Graph Theory	Interdisciplinary	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SECE2210	Database Management System	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SECE2221	Data Structures	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SEIT2210	Object Oriented Programming with Java	Major/Core	IT	3	2	0	5	4	40	60	40	60	0	0	200
	SEIT2220	Software Engineering	Major/Core	IT	3	0	1	4	4	40	60	0	0	100	0	200
	CFLS2140	Upper Intermediate Communicative English	AEC	CFLS	2	0	0	2	2	100	0	0	0	0	0	100
	CLSC2020	IPDC-I	VAC	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
					<b>Total</b>	<b>28</b>	<b>25</b>							<b>1200</b>		
4	SESH2140	Differential Equations & Statistics	Interdisciplinary	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SECE2231	Computer Organization	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SECE2240	Computer Networks	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SEIT2230	Operating System	Major/Core	IT	3	2	0	5	4	40	60	40	60	0	0	200
	SEIT2241	Mobile Application Development	Major/Core	IT	0	4	0	4	2	0	0	40	60	0	0	100
	CLSC2030	IPDC-II	VAC	CLSC	2	0	0	2	2	100	0	0	0	0	0	100

		<b>Total</b>	<b>26</b>	<b>2</b> <b>1</b>		<b>100</b> <b>0</b>
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**P P Savani University  
School of Engineering**

**Department of Science & Humanities**

Course Code: SESH2130

Course Name: Discrete Structures & Graph Theory

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	--	02	05	40	60	--	--	100	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- extend concepts of set theory by the study of relation and lattice.
- illustrate mathematical logic with various techniques of program verification.
- apply knowledge of discrete mathematics for problem-solving skills necessary to succeed in the design and analysis of algorithms, database management, software engineering, and computer networks.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Set, Relation &amp; Function</b> Sets, Set operations, Introduction of Relations, Relations of Sets, Types of Relations, Properties of Relations, Equivalence Relation, Partial Ordering, Hasse Diagram, GLB & LUB, Functions, Classification of functions, Types of functions	08	17
2.	<b>Lattices</b> Definition & properties of Lattice, Lattices as Algebraic System, Sublattices, Types of lattices, Distributive lattices, Modular lattices, Complemented lattices, Bounded lattices, Complete lattices, Finite Boolean algebra	07	16
3.	<b>Group Theory</b> Binary operations, Properties of Group, Groupoid, semigroup & monoid, Abelian group, Subgroup, Cosets, Normal subgroup, Lagrange's theorem, Cyclic group, Permutation group, Homomorphism & Isomorphism of groups.	08	17
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Mathematical Logic and Proof</b> Propositions, logical operators, Algebra of proposition, Predicates & quantifiers, Nested Quantifiers, Rules of Inference, Proof Methods, Program Correctness techniques.	06	14
5.	<b>Graph Theory</b> Graphs and Graph Models, Graph Terminology and Types of graphs, Representing graphs and Isomorphism, Connectivity, Euler and Hamilton Paths-Circuits, Applications of weighted graphs.	08	18

6.	<b>Tree</b> Introduction to Trees, Rooted Tree, Properties of tree, Binary tree, Tree Traversal, Spanning Tree, DFS, BFS, Minimum Spanning Tree, Prim's Algorithm, Kruskal's Algorithm.	08	18
<b>TOTAL</b>		45	100

#### List of Tutorial(s):

Sr. No.	Name of Practical	Hours
1.	Problems based on Set, Relation & Function-1	2
2.	Problems based on Set, Relation & Function-2	2
3.	Problems based on Set, Relation & Function-3	2
4.	Problems based on Lattices	4
5.	Problems based on Group Theory-1	2
6.	Problems based on Group Theory-2	4
7.	Problems based on Mathematical Logic and Proof	2
8.	Problems based on Graph Theory-1	2
9.	Problems based on Graph Theory-2	2
10.	Problems based on Graph Theory-3	4
11.	Problems based on Tree-1	2
12.	Problems based on Tree-2	2
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Discrete Mathematics and its Applications	Kenneth Rosen	McGraw Hill, New York.

#### Reference Book(s):

Title	Author(s)	Publication
A Textbook of Discrete Mathematics	Dr. Swapan Kumar Sarkar	S. Chand & Company Ltd., New Delhi.
Discrete Mathematical Structure with Applications to Computer Science	J.P.Trembly, R. Manohar	Tata McGraw-Hill Publishing Company Ltd. New Delhi.
Graph Theory with Applications to Engineering and Computer Science	Narsingh Deo	PHI Learning Pvt. Ltd. New Delhi.

#### Web Material Link(s):

- <http://nptel.ac.in/courses/111107058/>
- <http://nptel.ac.in/courses/111107058/>
- <http://nptel.ac.in/courses/111104026/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

##### Tutorial:

- Continuous Evaluation consists of the performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks.
- Assignment consists of 20 marks.

- Internal viva consists of 30 marks.

### Course Outcome(s):

After completion of the course, the students will be able to

<b>SESH2130</b>	<b>DISCRETE STRUCTURES &amp; GRAPH THEORY</b>
CO 1	Summarize the concepts of set theory for understanding & fetching data from a database using query.
CO 2	Classify the basic concepts of spanning tree algorithms namely DFA, BFS, prim's and Kruskal's in the design of networks.
CO 3	Construct the algorithm of group theory for data encryption.
CO 4	Combine the design, foundational concepts of notations and results of graph theory used for better understanding of problems.

### Mapping of CO with PO

<b>SESH2130</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	1	1								1
CO 2	3	3	1	1								3
CO 3	2	2	1	1								1
CO 4	3	3	1	1								3

### Mapping of CO with PSO

<b>SESH2130</b>	PSO1	PSO2	PSO3
CO 1	1	2	
CO 2	2	2	
CO 3	1	1	
CO 4	3	1	2

### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1.	Set, Relation & Function	1,2,4,6
2.	Lattices	1,2,3,4,6
3.	Group Theory	1,2,3,5,6
4.	Mathematical Logic and Proof	1,2,3,4,6
5.	Graph Theory	1,2,3,5,6
6.	Tree	1,2,3,5,6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE2210

Course Name: Database Management System

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- learn the basic concept of database design and development of database management system.
- understand Query processing of SQL.
- understand the importance of back-end design and relational database management System (RDBMS).

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to DBMS</b> Introduction and applications of DBMS, Purpose of DBMS, File system versus DBMS, Advantages of DBMS, Database System architecture, Database users, DBA	04	10
2.	<b>Entity-Relationship model</b> Basic concepts, Design process: Attributes, Entity and Relationship, E-R constraints, weak entity sets, extended E-R features: generalization, specialization, aggregation, conversion of E-R diagram into database schema.	07	15
3.	<b>SQL Concepts</b> Basics of SQL, Types of SQL language, Using DDL statements to create and manage tables, defining constraints: primary key, foreign key, unique key, Not null, check, Manipulating data using DML statements, Retrieving data using SQL select statement, SQL conditions in where clause, Built-in functions: numeric, date, string functions, Displaying data from multiple tables using Joins, Aggregate functions with group by and having clause, Subqueries with operators, SQL views, TCL commands: Commit, Rollback, Savepoint, DCL commands: Grant, revoke, query processing steps	12	25
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Relational Model</b> Structure of relational databases, Domains, Relations, Relational algebra: fundamental operators and syntax, inner join, outer join, relational algebra queries	05	12
5.	<b>Normalization</b> Functional Dependency: Definition, trivial and non-trivial FD, closure of attributes, closure of FD set, irreducible set of FD,	07	15

	Decomposition using FD, dependency preservation, Database design anomalies, Normalization: 1NF, 2NF, 3NF, BCNF, Multi-valued dependency, 4NF.		
6.	<b>Transaction Management</b> Transaction concepts, ACID property of transactions, concurrent executions of transactions and related problems, serializability of transactions, testing for serializability, deadlock, solution to concurrency related problems: Locking mechanism, two-phase locking protocol, System recovery, Log-based recovery, Two-phase commit protocol	07	15
7.	<b>Basics of PL/SQL</b> Programming structure of PL/SQL, Datatypes, Exception Handling, Cursor, Stored Procedure, Function, Trigger	03	08
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Draw E-R Diagram of any management system with the use of any tools.	02
2.	Installation of database management system e.g MYSQL, ORACLE, etc.	02
3.	Introduction to SQL, DDL, DML, DCL, database and table creation, alteration, defining constraints, primary key, foreign key, unique, not null, check.	06
4.	Implement different operators and inbuilt SQL functions.	02
5.	Implement different types of join operations and relevant features of SQL.	04
6.	Implement aggregate functions with group by, having, order by features of SQL.	04
7.	Implement the sub-queries and views in SQL.	04
8.	Study and use of Transaction control commands, Commit, Rollback, Save point features of SQL.	02
9.	Introduction to PL/SQL concepts and implementation of Cursors.	02
10.	Study and Implementation of stored procedures, stored function and triggers.	02
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Database System Concept	Abraham Silberschatz, Henry F. Korth, S. Sudarshan	McGraw Hill
SQL, PL/SQL-The Programming Language of Oracle	Ivan Bayross	BPB Publications

#### Reference Book(s):

Title	Author(s)	Publication
Fundamental of Database system	R. Elmasri and S.B Navathe	The Benjamin/Cumming
Oracle: The Complete Reference	George Koch, Kevin Loney	TMH /Oracle Press
An Introduction to Database system	C J Date	Addition-Wesley

#### Web Material Link(s):

- <https://nptel.ac.in/courses/106105175>
- <https://www.youtube.com/watch?v=c5HAWKX-suM>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted out of 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks.
- Viva-voce consists of 30 marks.

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE2210	DATABASE MANAGEMENT SYSTEM
CO1	Understand the importance of back-end design and relational database management system.
CO2	Apply physical data, conceptual data and its conversion into relational databases.
CO3	Practice various database constraints on relational databases.
CO4	Design and develop database for the software projects.

**Mapping of CO with PO**

SECE2210	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	2		2					1		3
CO 2	3	3	2		2							1
CO 3	3	3	2		2					1		1
CO 4	3	3	3	2	3					2	2	2

**Mapping of CO with PSO**

SECE2210	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	3	2	2
CO 3	3	3	2
CO 4	3	3	3

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction to DBMS	1,2
2.	Entity-Relationship model	1,2,3
3.	SQL Concepts	4,6
4.	Relational Model	3,4
5.	Normalization	2,3
6.	Transaction Management	2,3,4
7.	Basic of PL/SQL	2,4,6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE2221

Course Name: Data Structures

Prerequisite Course(s): Introduction to Computer Programming (SECE1020)

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand linear and non-linear data structures and its applications.
- analyze various searching and sorting algorithms and its impacts on data structures.
- develop logic building and problem-solving skills.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Data Structures</b> Basic Terminology, Classification of Data Structures: Primitive and Non-Primitive, Linear and Non-linear, Operations on Data Structures.	04	10
2.	<b>Array</b> Array Representation, Array as an Abstract Data Type, Programming Array in C, Sparse Matrices, Sparse Representations, and its Advantages, Row-measure Order and Column-measure Order representation.	04	10
3.	<b>Searching and Sorting</b> Linear Search, Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Radix sort.	04	10
4.	<b>Stack and Queue</b> Stack Definition and concepts, Operations on stack, Programming Stack using Array in C, Prefix and Postfix Notations and their Compilation, Recursion, Tower of Hanoi, Representation of Queue, Operation on Queue, Programming Queue using Array in C. Types of Queue, Applications of Stack & Queue.	07	15
5.	<b>Linked List-Part I</b> Dynamic Memory Allocation, Structure in C, Singly Linked List Doubly Linked List, circular linked list.	03	05
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
6.	<b>Linked List-II and Applications of Linked List</b> Linked implementation of Stack, Linked implementation of Queue, Applications of Linked List.	03	08
7.	<b>Trees and Graphs</b> Graph Definition, Concepts, and Representation, Types of Graphs, Tree Definition, concepts, and Representation. Binary Tree, Binary Tree Traversals, conversion from general to Binary Tree. Threaded	12	25

	Binary Tree, Heap, Binary Search Tree. Tree for Huffman coding, Breadth First Search, Depth First Search, Spanning Tree, Kruskal's and Prim's Minimum Cost Spanning Tree Algorithms, Dijkstra's Shortest Path Algorithm.		
8.	<b>Hashing</b> The Symbol Table Abstract Data Types, Hash Tables, Hashing Functions, Hash collision Resolution Technique, Linear Probing.	04	10
9.	<b>Advanced Search Structures</b> AVL Trees. 2-3 Trees. 2-3-4 Trees. Red-Black Trees. B-Trees. B+ Tree Splay Trees. Digital Search Trees. Tries.	04	07
	<b>TOTAL</b>	45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Working with the array. <ul style="list-style-type: none"> <li>● Write a program to read numbers and store it in array and display it.</li> <li>● Write a program to demonstrate the concept of one-dimensional array finding the sum of array.</li> <li>● Write a program to insert an element in array.</li> <li>● Write a program to delete an element from an array.</li> <li>● Write a program to add two matrix A and B.</li> <li>● Write a program to concatenate two strings.</li> </ul>	04
2.	Write a program to perform Linear Search.	02
3.	Write a program to perform Binary Search.	02
4.	Write a program to perform Bubble sort.	02
5.	Write a program to perform Selection sort.	02
6.	Write a program to perform Insertion sort.	02
7.	Write a program to implement a stack and perform push, pop operation.	02
8.	Write a program to perform the following operations in a linear queue –Addition, Deletion, and Traversing.	02
9.	Write a program to perform the following operations in singly linked list – Creation, Insertion, and Deletion.	04
10.	Write a program to create a binary tree and perform – Insertion, Deletion, and Traversal.	04
11.	Write a program for traversal of graph (B.F.S., D.F.S.).	04
	<b>TOTAL</b>	30

#### Text Book(s):

Title	Author/s	Publication
An Introduction to Data Structures with Applications	Jean-Paul Tremblay, Paul G. Sorenson	Tata McGraw Hill

#### Reference Book(s):

Title	Author(s)	Publication
Data Structures using C & C++	Tanenbaum	Prentice-Hall
Fundamentals of Computer Algorithms	E. Horowitz, S. Sahni, and S. Rajsekar	Galgotia Publication
Data Structures: A Pseudo-code approach with C	Gilberg & Forouzan	Thomson Learning

#### Web Material Link(s):

- <https://nptel.ac.in/courses/106102064/>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE2221	DATA STRUCTURES
CO 1	Differentiate primitive and non-primitive data structures.
CO 2	Understand the concept of dynamic memory management.
CO 3	Apply algorithm for solving problems like sorting, searching, insertion and deletion of data.
CO 4	Describe the hash function and concepts of collision and its resolution methods.

**Mapping of CO with PO**

SECE2221	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	2	2								
CO 2	2	1	2	1							1	
CO 3	2	2	3	2	1	2						
CO 4	2	1	2	2			1				1	

**Mapping of CO with PSO:**

SECE2221	PSO1	PSO2	PSO3
CO 1	2	3	3
CO 2	2	1	2
CO 3	2	1	1
CO 4	2	2	2

**Level of Revised Bloom's Taxonomy in Assessment:**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction to Data Structures	1,2,4
2.	Array	1,2,3
3.	Searching and Sorting	2,4,5
4.	Stack and Queue	1,2,3,4
5.	Linked List-Part I	1,2,3
6.	Linked List-II and Applications of Linked List	2,3,6
7.	Trees and Graphs	2,3,4
8.	Hashing	2,3,4
9.	Advanced Search Structures	2,3,4

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SEIT2210

Course Name: Object Oriented Programming with Java

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of object-oriented software development.
- Be able to use the Java SDK environment to create, debug and run core Java programs.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Fundamental of Object-Oriented Programming:</b> History of Java, Basic overview of java, Bytecode, JVM, Buzz- words, Application and applets, Constants, Variables, Data Types, Comments, Operators, Control Flow	04	06
2.	<b>Class Fundamentals:</b> General form of class, Creating class Overloading methods, Constructor, Declaring Object, Returning objects, using objects as parameters, assigning object reference variables, Introducing Access control, understanding static, introducing final, the finalize () method, This keyword, Garbage collection.	06	17
3.	<b>Array &amp; String Handling:</b> Array basics, String Array, String class, String Buffer class, String Tokenizer Class and Object Class.	06	10
4.	<b>Inheritance, Interfaces &amp; Packages:</b> Inheritance: Using super creating multilevel Hierarchy, method overriding, Dynamic method dispatch, abstract classes, using final with Inheritance, Using Package: Defining package, finding package and CLASSPATH, Access protection, importing package, Interface: Defining Interface, Implementing Interface, Variables in Interface.	06	17
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
5.	<b>Exceptions Handling:</b> Exception types, Try...Catch...Finally, Throw, Throws, creating your own exception subclasses.	06	14
6.	<b>Multithreaded Programming:</b>	08	18

	Life cycle of thread, thread methods, thread priority, thread exceptions, Implementing Runnable interface, Synchronization.		
7.	<b>GUI Programming &amp; Lambdas and Streams:</b> Introduction to Annotation, Byte streams and character streams, Wrapper classes, Why Lambda Expression, Lambda Expression Syntax, where to use lambda expression, Adopting Patterns like matching, finding and filtering, Swing overview, Swing component classes: AbstractButton, ButtonGroup, ImageIcon, JApplet, JButton, JCheckBox, JComboBox, JLabel, JRadioButton, JScrollPane, JTabbedPane, JTable, JTextField, Jtree.	09	18
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction to Java Environment and NetBeans	02
2.	Implementation of Java programs with classes and objects	02
3.	Implementation of Java programs to create functions, constructors with overloading and overriding	02
4.	Implementation of Java programs to demonstrate different access specifiers	02
5.	Implementation of Java programs for variables, data types, operators	02
6.	Implementation of Java programs to use arrays and string	02
7.	Implementation of Java programs for inheritance (single, multilevel, hierarchical)	02
8.	Implementation of Java programs to demonstrate the use of super keyword	02
9.	Implementation of Java programs for Interface	02
10.	Implementation of Java programs to demonstrate Java packages	02
11.	Implementation of Java programs for exception handling using all keywords (try, catch, throw, throws and finally)	02
12.	Implementation of Java programs to demonstrate the life cycle of thread	02
13.	Implementation of Java programs for the concepts of thread priority, synchronization, inter-thread communication	04
14.	Implementation of Java AWT programs to Create Registration Form	02
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Java The Complete Reference	Herbert Schildt	McGraw Hill

#### Reference Book(s):

Title	Author(s)	Publication
Core Java Volume I - Fundamentals	Cay Horstmann and Gray Cornell	Pearson
Thinking in Java	Bruce Eckel	Pearson
Learning Java	Patrick Niemeyer & Jonathan Knudsen	O'Reilly Media

#### Web Material Link(s):

- <https://docs.oracle.com/javase/tutorial/tutorialLearningPaths.html>
- <http://openjdk.java.net/projects/jigsaw/>
- <https://docs.oracle.com/en/java/javase/14/docs/api/index.html>
- <https://netbeans.apache.org/download/index.html>
- <https://download.eclipse.org/eclipse/downloads/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

#### Practical:

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

#### Course Outcome(s):

After completion of the course, the students will be able to

SEIT2210	Object Oriented Programming with Java
CO 1	Implement Object Oriented programming concept using basic syntaxes of control Structures, strings, and function for developing skills of logic building activity.
CO 2	Use of a variety of basic control structures including selection and repetition; classes and objects in a tiered architecture (user interface, controller, and application logic layers)
CO 3	Demonstrates how to achieve reusability using inheritance, interfaces, and packages and describes faster application development that can be achieved.
CO 4	Demonstrate understanding and use of different exception handling mechanisms and concepts of multithreading for robust faster and efficient application development.
CO 5	Identify and describe common abstract user interface components to design GUI in Java using Swing along with a response to events. Identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture

#### Mapping of CO with PO

SEIT2210	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	3	2	1	2				3	1	1	3
CO 2	2	3	2	2	1				3	1	1	3
CO 3	3	2	3	2	3				3	1	1	3
CO 4	3	2	3	2	1				3	1	1	3
CO 5	1	2	3	2	2		1		3	1	1	3

#### Mapping of CO with PSO

SEIT2210	PSO1	PSO2	PSO3
CO 1	2	3	1
CO 2	1	3	2
CO 3	3	2	1
CO 4	3	3	2
CO 5	2	2	1

#### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Fundamental of Object-Oriented Programming	1,2
2.	Class Fundamentals	1,2

3.	Array & String Handling	3,4
4.	Inheritance, Interfaces & Packages	2,3,4
5.	Exceptions Handling	2,3
6.	Multithreaded Programming	2,3
7.	GUI Programming & Lambdas and Streams	2,3,4

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SEIT2220  
Course Name: Software Engineering  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	--	01	04	40	60	--	--	100	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Study the pioneer of Software Development Life Cycle, Development models, and Agile Software Development.
- Study fundamental concepts in software testing, including software testing objectives, processes, criteria, strategies, and methods.
- Discuss various software testing issues and solutions in software unit tests; integration, regression, and system testing.
- Learn the process of improving the quality of software work products.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Software and Software Engineering</b> The Evolving Role of Software, A Crisis on the Horizon and Software Myths, Layered Technologies, Processes, Methods and Tools, Generic View of Software Engineering, Study of Different Models-Waterfall model, Incremental model, Evolutionary process models- Prototype, Spiral, and RAD model.	06	15
2.	<b>Agile Development</b> Agility and Agile Process model, Extreme Programming, Other process models of Agile Development and Tools.	04	10
3.	<b>Requirement Analysis and Specification</b> Problem Recognition, Understanding the Requirement, Requirement Modelling, Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering.	05	10
4.	<b>Structured Software Design</b> Design Concepts, Design Model, Software Architecture, Data Design, Architectural Design, Component Level Design (Function Oriented Design, Object Oriented Design), User Interface Design, Web Application Design.	08	20
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
5.	<b>Software Coding &amp; Testing</b> Programming principles, Coding Standards and coding Guidelines, Unit testing; Metrics, Software testing fundamentals,	08	20

	Black-box and white box testing, Basis path testing, Control structure testing, Black-box testing - Graph-based testing method, Boundary value analysis; Testing strategies - A strategic approach to software testing, Test strategies for conventional and object-oriented software, test case generation and tool support, Metrics – Coverage analysis-reliability.		
6.	<b>Quality Assurance</b> Quality Control, Assurance, Cost, Reviews, Software Quality Assurance, Approaches to SQA, Reliability, Quality Standards-ISO9000 and 9001.	04	08
7.	<b>Software Project Management</b> Scope and Feasibility, Effort Estimation, Schedule and staffing, Quality Planning, Risk management- identification, assessment, control, project monitoring plan, Detailed Scheduling. Six Sigma for SE, Management Spectrum, People –Product – Process- Project, W5HH Principle, Importance of Team Management.	06	10
8.	<b>Software Maintenance and Configuration Management</b> Types of Software Maintenance, Re-Engineering, Reverse Engineering, Forward Engineering, The SCM Process, Identification of Objects in the Software Configuration, Version Control and Change Control.	04	07
<b>TOTAL</b>		45	100

#### List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	To select the project title and apply requirement engineering to it.	01
2.	To perform the system analysis: Requirement analysis, SRS.	01
3.	To perform the function-oriented diagram: DFD and Structured chart.	01
4.	To perform the user's view analysis: Use case diagram.	01
5.	To draw the structural view diagram: Class diagram.	01
6.	To draw the behavioral view diagram: Sequence diagram, Activity diagram.	02
7.	To study various testing tools.	01
8.	To design test cases.	01
9.	To study cost estimation and preparation of timeline chart.	01
10.	To study the different types of performance testing.	01
11.	To study the usage of regression testing.	01
12.	To understand the usage of software metrics.	01
13.	Project Work: Understand the importance of the SDLC approach & various processes.	02
<b>TOTAL</b>		15

#### Text Book(s):

Title	Author/s	Publication
Fundamentals of Software Engineering	Fundamentals of Software Engineering	Fundamentals of Software Engineering
Rajib Mall	Rajib Mall	Rajib Mall

#### Reference Book(s):

Title	Author(s)	Publication
Software Engineering – An Engineering Approach	James F. Peters & Witold Pedrycz	Wiley
Software Engineering	IAN Sommerville	Pearson Education

**Web Material Link(s):**

- <https://nptel.ac.in/courses/106101061/>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each Tutorial and the average will be converted to 50 marks.
- Internal viva consists of 50 marks.

**Course Outcome(s):**

After completion of the course, the students will be able to

<b>SEIT2220</b>	<b>Software Engineering</b>
CO 1	Cite the process of requirement gathering, classification, specification, and validation in the software engineering process.
CO 2	Demonstrate an ability to design the software by applying the software engineering design principles.
CO 3	Discover system design patterns, and agile methodologies for the development of software using UML and Scrum.
CO 4	Devise project planning, cost estimation, and quality management techniques.
CO 5	Assess the software testing process to analyze the functionality of the application.

**Mapping of CO with PO**

<b>SEIT2220</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
CO 1	3	2	1	2		1						1
CO 2	3	2	3	1	2				1			1
CO 3	2	2	3	2	2				1			1
CO 4	1	2	2	3	2				2		3	1
CO 5	1	3	2	3	3							2

**Mapping of CO with PSO**

<b>SEIT2220</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO 1	2	1	
CO 2	3	2	
CO 3	3	3	
CO 4	2	2	2
CO 5	2	2	

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1.	Introduction to Software and Software Engineering	1,2
2.	Agile Development	2,3
3.	Requirement Analysis and Specification	2,3,4
4.	Structured Software Design	2,3,6

5.	Software Coding & Testing	2,3,4
6.	Quality Assurance	1,2
7.	Software Project Management	2,3,4
8.	Software Maintenance and Configuration Management	2,3,4

**P P Savani University  
School of Engineering**

**Department of Science & Humanities**

Course Code: SESH2140

Course Name: Differential Equations & Statistics

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	--	02	05	40	60	--	--	100	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- recall existing knowledge of calculus and apply it for solving engineering problems involving differential equations.
- introduce partial differential equations with different methods of solution.
- understand periodic functions expressed as a Fourier series and applications of Fourier series to odes.
- introduce the basic statistical data analysis and probability distribution.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Ordinary Differential Equation-I</b> First order ODEs, Formation of differential equations, Solution of differential equation, Solution of equations in separable form, Exact first order ODEs, Linear first order ODEs, Bernoulli Equation <b>Ordinary Differential Equation-II</b> ODEs of Second and Higher order, Homogeneous linear ODEs, Linear Dependence and Independence of Solutions, Homogeneous linear ODEs with constant coefficients, Nonhomogeneous ODEs, Variation of Parameters.	10	20
2.	<b>Partial Differential Equation</b> Formation of First and Second order equations, Solution of First order equations, Linear and Non-linear equations of first, Higher order equations with constant coefficients, Complementary function, Particular Integrals.	07	18
3.	<b>Fourier Series</b> Periodic function, Euler Formula, Arbitrary Period, Even and Odd function, Half-Range Expansions	05	12
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Basics of Statistics</b> Elements, Variables, Observations, Quantitative and Qualitative data, Cross-sectional and Time series data, Frequency distribution, Dot plot, Histogram, Cumulative distribution, Measure of location, Mean, Median, Mode, Percentile, Quartile, Measure of variability, Range, Interquartile Range, Variance, Standard Deviation, Coefficient of Variation.	07	15

5.	<b>Correlation &amp; Regression Analysis</b> Regression Analysis, Regression line and regression coefficient, Karl Pearson's method.	07	15
6.	<b>Probability Distribution</b> Introduction, Conditional probability, independent events, independent experiments, Theorem of total probability and Bayes' theorem, Probability distribution, Binomial distribution, Poisson distribution, Normal distribution, Hypothesis.	09	20
<b>TOTAL</b>		45	100

**List of Tutorial(s):**

Sr. No.	Name of Tutorial	Hours
1.	Ordinary Differential Equation-1	02
2.	Ordinary Differential Equation-2	02
3.	Ordinary Differential Equation-3	04
4.	Partial Differential Equation-1	02
5.	Partial Differential Equation-2	04
6.	Fourier Series-1	02
7.	Fourier Series-2	02
8.	Basics of Statistics-1	02
9.	Basics of Statistics-2	02
10.	Correlation & Regression Analysis	02
11.	Probability-1	02
12.	Probability-2	02
<b>TOTAL</b>		30

**Text Book(s):**

Title	Author/s	Publication
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt. Ltd. New Delhi.
Probability and Statistics for Engineers	Richard A. Johnson Irwin Miller, John Freund	Pearson India Education Services Pvt. Ltd., Noida.

**Reference Book(s):**

Title	Author(s)	Publication
Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers, New Delhi
Advanced Engineering Mathematics	R. K. Jain S.R.K. Iyengar	Narosa Publishing House New Delhi.
Differential Equations for Dummies	Steven Holzner	Wiley India Pvt. Ltd., New Delhi.
Higher Engineering Mathematics	H.K. Dass Er. Rajnish Verma	S. Chand & Company Ltd., New Delhi.

**Web Material Link(s):**

- <http://nptel.ac.in/courses/111105035/>
- <http://nptel.ac.in/courses/111106100/>
- <http://nptel.ac.in/courses/111105093/>
- <http://nptel.ac.in/courses/111108081/>
- <http://nptel.ac.in/courses/111105041/1>

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of the performance of tutorial, which will be evaluated out of 10 per each tutorial and average of the same will be converted to 50 marks.
- Assignment consists of 20 marks.
- Internal viva consists of 30 marks.

**Course Outcome(s):**

After completion of the course, the students will be able to

<b>SESH2140</b>	<b>DIFFERENTIAL EQUATIONS &amp; STATISTICS</b>
CO 1	Describe 1 <sup>st</sup> and 2 <sup>nd</sup> order ODEs and PDEs.
CO 2	Classify differential equations and evaluate linear & non-linear partial differential equations.
CO 3	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO 4	Elaborate analysis of categorical data and quantitative data.
CO 5	Adapt the knowledge of various probability distribution and their applications in mathematical models, sport strategies and insurance.

**Mapping of CO with PO**

<b>SESH2140</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	1									3
CO 2	3	2	1									3
CO 3	3	2	1									3
CO 4	2	1	1									1
CO 5	2	1	1									1

**Mapping of CO with PSO**

<b>SESH2140</b>	PSO1	PSO2	PSO3
CO 1	2	1	
CO 2	2	1	
CO 3	2	1	
CO 4	2		1
CO 5	1		

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1.	Ordinary Differential Equation	1, 2, 3, 5
2.	Partial Differential Equation	1, 2, 4, 5
3.	Laplace Transform	1, 2, 4, 5
4.	Fourier Series & Fourier Integral	1, 2, 3, 4, 5
5.	Basics of Statistics	1, 2, 3, 4, 5
6.	Probability Distribution	1, 2, 3, 4, 5

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE2231

Course Name: Computer Organization

Prerequisite Course(s): NIL

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- provide a comprehensive knowledge of overall basic computer hardware structures.
- learn architectures of various internal and external input output systems.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Basic Computer Organization and Design</b> Data Representation: Decimal, Binary, Octal and Hexadecimal numbers, Instruction codes, Computer registers, Computer Instructions, Timing and Control, Instruction cycle Memory-Reference Instructions, Input-output and interrupt, Design of Accumulator Unit.	06	15
2.	<b>Programming the Basic Computer</b> Introduction Machine Language, Assembly Language, Assembler, Program loops, Programming Arithmetic and logic operations, subroutines, I-O Programming.	05	08
3.	<b>Computer Arithmetic</b> Introduction, Addition and subtraction, Multiplication and Division Algorithms, Floating Point Arithmetic.	06	12
4.	<b>Central Processing Unit</b> Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).	06	15
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %

5.	<b>Pipeline Control and Parallel Processing</b> Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline Hazards, Pipeline Performance, RISC Pipeline.	08	20
6.	<b>Input-Output Organization</b> Types of Peripherals, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA	06	15
7.	<b>Memory Organization</b> Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.	08	15
<b>TOTAL</b>		45	100

#### List of Practical:

Sr No	Name of Practical	Hours
1.	Study and implement programs on number system	08
2.	Study and implement programs on conversion	04
3.	Study and build different logic gates using Logisim.	04
4.	Study and build different circuits using Logisim.	14
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Computer System Architecture	M. Morris Mano	Pearson
Structured Computer Organization, 6 <sup>th</sup> Edition	Andrew S. Tanenbaum and Todd Austin	PHI

#### Reference Book(s):

Title	Author/s	Publication
Computer Architecture & Organization	M. Murdocca & V. Heuring	WILEY
Computer Architecture and Organization	John Hayes	McGrawHill

#### Web Material Link(s):

- <https://nptel.ac.in/courses/106106092/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted out of 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

##### Practical:

- Continuous Evaluation consists of performance of practical, which should be evaluated out of 10 marks per each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.

- Viva/Oral performance consists of 30 marks during End Semester Exam.

### Course Outcome(s):

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

SECE2231	COMPUTER ORGANIZATION
CO 1	Describe the design and working of basic components used to build computer system.
CO 2	Visualize and understand the working of cpu, different instruction formats, addressing modes, pipeline and vector processing and evaluate the performance of pipeline approach.
CO 3	Describe the requirements of different memories and evaluate memory management techniques.
CO 4	Examine the working mechanism of input and output devices and information transfer.

### Mapping of CO with PO

SECE2231	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	1	1	2	2	2		1		1	1
CO 2	3	2	1			1		2	2	1	2	2
CO 3	3	2	1	1	2		1		2	1	2	
CO 4	3	2	1		3				2	2	3	1

### Mapping of CO with PSO

SECE2231	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	3	2	2
CO 3	3	3	2
CO 4	3	3	3

### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Basic Computer Organization and Design	2,4
2	Programming the Basic Computer	2,3,4
3	Computer Arithmetic	2,4,5
4	Central Processing Unit	1,2,5
5	Micro-programmed Control	1,2
6	Pipeline and Vector Processing	2,5
7	Input-Output Organization	2,3,4
8	Memory Organization	2,5,6
9	Multiprocessors	2

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE2240

Course Name: Computer Networks

Prerequisite Course(s): Discrete Mathematics, Data and File Structures

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the communication network design.
- understand state-of-the-art in network protocols, architectures.
- learn to develop an understanding of different components of computer networks, various protocols, technologies and their applications.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction</b> Overview of network and data communication, types of Networks, Network Topology, Protocol hierarchies, and design issues of layers Interfaces, and services. Reference Model: The OSI reference model, TCP/IP reference model, network standards.	04	10
2.	<b>Physical Layer</b> Transmission media, Data and transmission techniques, Multiplexing, Asynchronous Communication, Wireless transmission, ISDN, ATM, Cellular Radio, Switching techniques issues.	07	15
3.	<b>Data Link Layer</b> Layer design issues, services provided to network layers, Framing, Error control, and Flow control, Data link control and protocols – Simplex protocol, sliding window protocol, Utopia, Stop N Wait, Automatic Repeat Request. Go Back N, Selective Repeat Protocols.	07	15
4.	<b>Medium Access Sub Layer</b> Channel Allocations, Multiple Access protocols- ALOHA, CSMA, CSMA/CD protocols, Collision-free protocols, Limited contention protocols, LAN architectures, IEEE 802 and OSI, Ethernet (CSMA/CD), Bus, Token Ring, DQDB, FDDI, Bridges and recent developments.	05	10
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
5.	<b>Network Layer</b> A network Layer design issue, Routing algorithms, and protocols – OSPF, BGP, RIP, Congestion Control Algorithms, Internetworking – IPV4 & IPV6, Addressing, N/W Layer Protocols, and subnets.	09	20
6.	<b>Transport Layer</b> Transport services, Design issues, transport layer protocols – TCP &	07	15

	UDP, Congestion Control, QOS and its improvement.		
7.	<b>Application Layer</b> Client-Server Model, WWW, HTTP, DNS, DHCP, FTP, and Email Protocol – IMAP, POP3, SMTP	06	15
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	To study and prepare LAN cables (cross and straight) using crimping tool, to configure LAN.	02
2.	To study and Physical examine different network device and their usage.	02
3.	Configure switch and router in small network and identify the difference.	02
4.	To Study of network IP – IPv4 & IPv6.	02
5.	Configure Network Topology using Cisco Packet tracer.	04
6.	To monitor network traffic using Wire Shark	02
7.	To get the MAC or Physical Address of the system Using Address Resolution Protocol.	02
8.	To Configure network using Routing Information Protocol (RIP)	04
9.	To configure network state routing protocol (OSPF).	02
10.	To configure Border Gateway Protocol.	02
11.	To configure Application Layer protocols: DHCP and DNS and understand its functionality in Wireshark/ Packet tracer.	02
12.	Understand functionality of TCP & UDP using Wireshark/ Packet Tracer.	02
13.	Understand functionality of HTTP & FTP using Wireshark/ Packet Tracer.	02
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw Hill

#### Reference Book(s):

Title	Author(s)	Publication
Computer Networks	Andrew S Tanenbaum	PHI Learning
Data and Computer Communications	William Stallings	Prentice Hall
TCP/IP Illustrated Volume-I	Kevin R. Fall, W.Richard Stevens	Addition Wesley
Internetworking with TCP/IP Volume-I	Douglas E. Comer	PHI

#### Web Material Link(s):

- <https://www.udemy.com/new-2016-networking-fundamentals-for-beginners/>
- [https://www.cisco.com/c/en\\_in/training-events/training-certifications/certifications.html](https://www.cisco.com/c/en_in/training-events/training-certifications/certifications.html)
- [http://www.tutorialspoint.com/computer\\_fundamentals/computer\\_networking.html](http://www.tutorialspoint.com/computer_fundamentals/computer_networking.html)
- <https://nptel.ac.in/courses/106105080/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE2240	COMPUTER NETWORKS
CO 1	Distinguish the working of network protocols, application and OSI reference model and TCP/IP reference model.
CO 2	Comprehend functionality of various protocols and algorithms with various architecture layer.
CO 3	Design computer network configuration.
CO 4	Recognize the technological trends of Computer Networking

**Mapping of CO with PO**

SECE2240	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1	2		2			3		1
CO 2	3	1	1	2	1		3	1		3		2
CO 3	2	2	2		1		3		1	2		3
CO 4		2	2	1	1	2	2			2		3

**Mapping of CO with PSO**

SECE2240	PSO1	PSO2	PSO3
CO 1	2	3	3
CO 2	3	3	2
CO 3	3	3	3
CO 4	3	3	2

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction	2,4
2.	Physical Layer	1,2,4
3.	Datalink Layer	2,4
4.	Medium Access Layer	1,2
5.	Network Layer	2,3,5,6
6.	Transport Layer	2,4
7.	Application Layer	2,5

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SEIT2230  
Course Name: Operating System  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- To provide a fundamental understanding of the operating system functions, architecture, services, and interconnections among services within operating systems.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Operating System</b> Basics of Operating System: Definition, Types of Operating System, Operating System Structure, Operating System Services, Concept of Virtualization.	03	07
2.	<b>Processes and Threads Management</b> Concept of Process: Definition, Process State, Process State Transition, Process Control Block, CPU Scheduling: CPU-I/O Burst Cycle, Types of Schedulers, Context Switching, Preemptive and Non- Preemptive Scheduling, Scheduling Criteria, Process Scheduling Algorithms: FCFS, SJF, Priority, Round- Robin, Multilevel Queue, and Lottery Scheduling; Threads, Types of Threads, Multithreading	09	20
3.	<b>Inter Process Communication</b> Race Conditions, Critical Regions, Mutual Exclusion with Busy Waiting, Sleep and Wakeup, Semaphores, Mutexes, Monitors, Message Passing, Classical IPC Problems: The Dining Philosopher Problem, The Readers and Writers Problem	07	15
4.	<b>Deadlocks</b> Resources, Conditions for Deadlocks, Deadlock Modelling, , Deadlock Detection and Recovery, Deadlock Avoidance, Deadlock Prevention.	04	08
<b>Section II</b>			
5.	<b>Memory Management</b> Main memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging: Introduction to Paging, Translation look-aside buffer (TLB), Structure of Page Table, Virtual memory: Background, Demand Paging, Page Replacement Algorithms: FIFO, Optimal Page Replacement, Least Recently Used, Not Recently Used, Second Chance Page Replacement, Thrashing.	11	25
6.	<b>File Management</b> File Concepts: File Types, File Attributes, File Access Methods, File Operations, Directories: Directories Structure, Path Types, Directory	05	12

	Operations; File Allocation Methods: Contiguous, Linked, Indexed Allocation.		
7.	<b>Disk Management</b> Disk structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK, Disk Free Space Management, RAID Levels.	06	13
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Study of basic commands of Linux.	02
2.	Study of Advance commands and filters of Linux/UNIX.	02
3.	Write shell scripts to perform several computations like add numbers, subtract numbers, find average, percentage. Also find factorial of a given number. Generate Fibonacci series etc.	04
4.	Simulate any two CPU scheduling algorithms. (E.g. FCFS, SJF, Round Robin etc.)	04
5.	Simulate any two contiguous memory allocation techniques. (E.g. Worst-fit, Best-fit, Next-fit, First-fit)	04
6.	Simulate banker's algorithm for deadlock avoidance.	04
7.	Simulate any two page replacement algorithms. (E.g. FIFO, LRU, Optimal)	04
8.	Simulate any two disk scheduling algorithms. (E.g. FCFS,SCAN,C-SCAN)	04
9.	Case studies: OS in Industries, Protection and Role-based Access Controls of OS.	02
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Operating System Principles	Silberschatz A., Galvin P. and Gagne G	Wiley
Modern Operating System	Andrew S. Tanenbaum	Pearson

#### Reference Book(s):

Title	Author(s)	Publication
Operating Systems: Internals and Design Principles	William Stallings	Pearson
UNIX and Shell Programming	Behrouz A. Forouzan, Richard F. Gilberg	Cengage Learning
Operating Systems	Dhamdhere D. M	Tata McGraw Hill

#### Web Material Link(s):

<https://nptel.ac.in/courses/106106144>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted out of 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

##### Practical:

- Continuous Evaluation consists of performance of practical, which will be evaluated out of 10 per each practical. At the end of the semester, average of the entire practical will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 Marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

<b>SEIT2230</b>	<b>OPERATING SYSTEM</b>
CO 1	Understand the basic principles of operating system.
CO 2	Illustrate the concepts of operating systems services and its components.
CO 3	Evaluate the performance of operating system algorithms and achieve a comprehensive understanding of memory management during process execution.
CO 4	Comprehend how an operating system manages file systems, mass storage, and I/O operations.

**Mapping of CO with PO**

<b>SEIT2230</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	1				1			1		1
CO 2	2	2	2	1	2					2		2
CO 3	3	3	3	3	3		2	1		2		2
CO 4	3	3	3	2	3	1		1	2	3	2	3

**Mapping of CO with PSO**

<b>SEIT2230</b>	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	2	2	1
CO 3	3	3	2
CO 4	3	3	3

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1.	Introduction to Operating System	1, 2, 4
2.	Processes and Threads Management	1, 2, 3, 5, 6
3.	Inter Process Communication	2, 3, 4, 5
4.	Deadlock	2, 3, 4, 6
5.	Memory Management	1, 2, 3, 4, 6
6.	File Management	1, 2, 3
7.	Disk Management	1, 2, 3, 4, 5

**P P Savani University  
School of Engineering**

**Department of Information Technology**

Course Code: SEIT2241

Course Name: Mobile Application Development

Prerequisite Course(s): -- Object Oriented Programming with Java (SEIT2010)

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
--	04	00	02	--	--	40	60	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Understand life cycle of an application/activity.
- Learn design of responsive mobile applications.
- Develop mobile application using open-source technologies.

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Create Hello World Application.	02
2.	Create an application to perform addition, subtraction, multiplication, division operation on given two numbers entered by user.	02
3.	Create an application to convert temperature from Fahrenheit to Celsius.	02
4.	Create a login application to validate Email ID and Password. Display Toast Message on successful login or error message if not login.	04
5.	Create an application UI component: Image Button, Toggle button, Progress Bar, Spinner, Date Picker, Time Picker, Seek Bar , Switch, Rating Bar.	08
6.	Create an application that will change color of the screen, based on selected options from the menu.	04
7.	Create an UI such that, one screen have list of all friends. On selecting of any name, next screen should show details of that friend like Name, Image, Interest, Contact details etc.	04
8.	Create an android app to draw red color circle & blue color rectangle using paint & canvas class.	04
9.	Create an app to send SMS and email.	06
10.	Create an application that will play a media file from the memory card.	04
11.	Create application using Google speech API.	06
12.	Create an application to make Insert, Update, and Delete operation on the database.	04
13.	Android Studio Setup for flutter Development	04
14.	Create an application to demonstrate Dialogs & Expansion tile card in a flutter	06
	<b>TOTAL</b>	<b>60</b>

**Text Book(s):**

Title	Author/s	Publication
Introduction to Android Application Development	Joseph Annuzzi Jr, Lauren Darcey, Shane Conder	Pearson Education
Beginning Android 4 Application Development	Wei Meng Lee	Wrox

**Reference Book(s):**

Title	Author(s)	Publication
Android Application Development for Dummies, 3 <sup>rd</sup> Edition	Donn Felker	Wiley Publication

**Web Material Link(s):**

- <https://nptel.ac.in/courses/106106156/>

**Course Evaluation:****Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SEIT2241	MOBILE APPLICATION DEVELOPMENT
CO 1	Develop user friendly mobile applications by implementing different practicals.
CO 2	Understand the concepts of front-end development using various technologies
CO 3	Analyze and implement frameworks, database and design patterns in mobile applications.
CO 4	Create a small but realistic working mobile application using different application programming interface.

**Mapping of CO with PO**

SEIT2241	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	2	1	1	3	2			1	2	1	1
CO 2	2	1	2	2	3	2	1		1	1	1	2
CO 3		2	3	2	3	2		1	1	2	2	3
CO 4	3	3	3	2	3	3			3	3	3	3

**Mapping of CO with PSO**

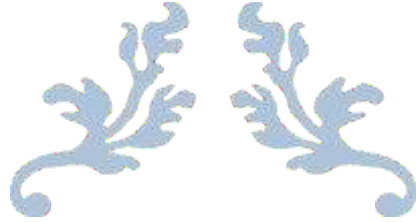
SEIT2241	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	2	3	1
CO 3	3	3	3
CO 4	3	3	3

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Practical No	Content	RBT Level
1.	Introduction of Android	1,2,3
2.	Android Application Design and Resource	2,3,4
3.	Exploring User Interface Screen Elements	2,3,4
4.	Designing User Interfaces with Layouts	2,3,6
5.	Working with Widgets & Control	2,4,5,6
6.	Drawing & Working with Animation	3,4,6

7.	Designing Application , Working with Android Manifest file	2,6
8.	Canvas & Paint Class, Multimedia APIs.	1,2,6
9.	Networking APIs, Android Web APIs.	1,2,5,6
10.	Working with Media Controller.	2,3
11.	Working with Speech to Text & Text to Speech.	3,6
12.	Storage APIs, Working with Database.	4,3,6
13.	Cross Platform Mobile Application using flutter.	2,3
14.	Demonstrate UI Components in flutter	2,3,6



THIRD YEAR B. TECH.



**P P SAVANI UNIVERSITY**

**SCHOOL OF ENGINEERING**

**TEACHING & EXAMINATION SCHEME FOR THIRD YEAR B. TECH. COMPUTER SCIENCE ENGINEERING (ML & AI) PROGRAMME AY: 2023-24**

Sem	Course Code	Course Title	Course Category	Offered By	Teaching Scheme					Examination Scheme						
					Contact Hours				Credit	Theory		Practical		Tutorial		Total
					Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SEML3211	Foundation of Machine Learning	Major/Core	ML	2	2	0	4	3	40	60	40	60	0	0	200
	SEML3220	R Programming	Major/Core	ML	0	4	0	4	2	0	0	40	60	0	0	100
	SEIT3270	Web Technologies	Major/Core	IT	3	2	0	5	4	40	60	40	60	0	0	200
	SECE4221	Artificial Intelligence	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
		<b>Elective-I</b>	Minor		2	2	0	4	3	40	60	40	60	0	0	200
		Language Training Elective Course	AEC	CFLS	3	0	0	3	3	100	0	0	0	0	0	100
		Life Skill Elective Course-I	VAC	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
	SEML3910	Summer Training	Minor	CSE	0	4	0	0	4	0	0	100	0	0	0	100
								<b>Total</b>	<b>27</b>	<b>25</b>						<b>1200</b>
6	SECE3231	Cloud Computing & Applications	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SECE3241	Artificial Intelligence of Things	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SECE4211	Machine Learning	Major/Core	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SECE3560	Project-I	Minor	CE	0	3	0	3	3	0	0	100	0	0	0	100

		<b>Elective-II</b>	Minor		2	2	0	4	3	40	60	40	60	0	0	200
	TNPC3010	Corporate Grooming & Etiquette	SEC	TNPC	3	0	0	3	3	100	0	0	0	0	0	100
	SECE3490	MOOC Course / University Elective	SEC		3	0	0	3	3	100	0	0	0	0	0	100
		Life Skill Elective Course-II	VAC	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
								<b>Total</b>	<b>30</b>	<b>26</b>						<b>1200</b>

**P P SAVANI UNIVERSITY**

**SCHOOL OF ENGINEERING**

**TEACHING & EXAMINATION SCHEME FOR THIRD YEAR B.TECH. COMPUTER SCIENCE ENGINEERING (ML & AI) - ELECTIVE COURSES**

Sem	Course Code	Course Title	Course Category	Offered By	Teaching Scheme					Examination Scheme						
					Contact Hours				Credit	Theory		Practical		Tutorial		Total
					Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SEIT3620	Data Visualization	Minor	IT	2	2	0	4	3	40	60	40	60	0	0	200
	SEML3610	3D Modeling and Rendering	Minor	ML	2	2	0	4	3	40	60	40	60	0	0	200
	SEIT3630	Image Processing	Minor	IT	2	2	0	4	3	40	60	40	60	0	0	200
	SECE3630	Wireless Network & Mobile Computing	Minor	CE	2	2	0	4	3	40	60	40	60	0	0	200
6	SEML3620	Optimization Techniques	Minor	ML	2	2	0	4	3	40	60	40	60	0	0	200
	SEML3630	Business Analytics	Minor	ML	2	2	0	4	3	40	60	40	60	0	0	200
	SECE3620	Service Oriented Computing	Minor	CE	2	2	0	4	3	40	60	40	60	0	0	200
	SECE3650	Blockchain Technology	Minor	CE	2	2	0	4	3	40	60	40	60	0	0	200
	SEIT3640	Advanced Web Technologies	Minor	IT	2	2	0	4	3	40	60	40	60	0	0	200
	SEIT3650	Augmented Reality & Virtual Reality	Minor	IT	2	2	0	4	3	40	60	40	60	0	0	200

**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML3211

Course Name: Foundation of Machine Learning

Prerequisite Course(s): Differential Equations & Statistics (SESH2140)

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	2	0	3	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the basic concepts of machine learning and its comparison with human learning, covering types, tools, and applications.
- To equip students with skills to prepare and preprocess data for machine learning models, ensuring data quality and effective feature engineering.
- develop logic building and problem-solving skills.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Machine Learning:</b> What is human learning? What is Machine Learning? Human learning versus machine learning, Types of machine learning, Issues of Machine Learning, Real World applications of Machine Learning.	06	20
2.	<b>Data Preprocessing and Feature Engineering:</b> Data Preprocessing, Feature Scaling: Standardization, normalization, Feature Selection: Filter, wrapper and embedded methods, Dimensionality Reduction: PCA(Principal Component Analysis)	07	25
3.	<b>Supervised Learning:</b> Example of Supervised Learning, Classification Model, Classification Learning Steps, KNN algorithm, Naive Bayes Algorithm	05	10
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Unsupervised Learning:</b> Unsupervised Learning versus Supervised Learning, Applications of Unsupervised Learning, Clustering, Classification vs Clustering, Finding Pattern using Association Rules, K-means Clustering algorithm, EM Algorithm.	08	30
5.	<b>Modelling and Evaluation:</b> Bias-Variance Tradeoff: Underfitting vs Overfitting, Cross-validation: K-fold cross-validation, Selecting a Model, Evaluation Metrics	04	05
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Introduction of various applications of Machine Learning.	02
2.	Implementation of different distance measures.	02
3.	Introduction to Python for ML(Numpy, Pandas and matplotlib) for data operations.	02
4.	Data Preprocessing: Handle missing data, outliers, encode features.	04
5.	Generate statistics and visualize data distribution.	04
6.	Implement k-NN, evaluate using accuracy, precision, recall, F1 Score.	04
7.	Implement Gaussian Naïve Bayes and evaluate classification performance.	04
8.	Implement K-Means, determine optimal clusters using the Elbow Method.	04
9.	Implement Expectation Maximization algorithm.	02
10.	Perform cross-validation and hyperparameter tuning.	02
<b>TOTAL</b>		<b>30</b>

**Text Book(s):**

Title	Author/s	Publication
Machine Learning	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das	Pearson Education
Machine Learning	Tom M Mitchell	McGraw Hill

**Reference Book(s):**

Title	Author(s)	Publication
Machine Learning	Anuradha Srinivasaraghavan, Vincy Joseph	Wiley India

**Web Material Link(s):**

- [https://onlinecourses.nptel.ac.in/noc21\\_cs24/preview](https://onlinecourses.nptel.ac.in/noc21_cs24/preview)
- <https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PLVedk3nRvxDScQQpgMS6PBqV2lEeXISLj>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

<b>SEML3211</b>	<b>FOUNDATION OF MACHINE LEARNING</b>
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CO 1	Understand the fundamentals of Machine Learning
CO 2	Prepare data for machine learning models
CO 3	Model selection, training, and evaluation
CO 4	Implement supervised learning techniques
CO 5	Explore unsupervised learning approaches

#### Mapping of CO with PO

SEML3211	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	1										
CO 2	2	2	1	1	1							
CO 3	1	1	1	1	1							
CO 4	1	2	1	1	1							
CO 5	1	1	1	1	1							

#### Mapping of CO with PSO

SEML3211	PSO1	PSO2	PSO3
CO 1	2		
CO 2	1	1	
CO 3	1	2	1
CO 4	2	1	1
CO 5	2	2	1

#### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction to Machine Learning	1,2
2.	Data Preprocessing and Feature Engineering	1,2,3
3.	Supervised Learning	2,3,4,5
4.	Unsupervised Learning	2,3,4,5
5.	Modelling and Evaluation	2,3,4,6

**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML3220  
Course Name: R Programming  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
00	04	00	04	00	00	40	60	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the basics in R programming in terms of constructs, control statements, string functions, etc.
- design and write efficient programs using R, to perform routine and specialized data manipulation/management and analysis tasks.
- identify and use available R packages and associated Open-Source software to meet given scientific objectives.
- handle all aspects of Data analysis (exploring, summarizing, statistical analyzing, visualizing).

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Install R and RStudio, explore the R environment, and configure essential settings.	03
2.	Demonstrate the creation and manipulation of variables and objects in R, including arithmetic operations.	03
3.	Create and manipulate vectors and lists, including operations like sorting and filtering.	04
4.	Demonstrate matrix operations (addition, multiplication) and array manipulations.	05
5.	Create data frames, perform operations like filtering, subsetting, merging, and reshaping.	05
6.	Write programs using decision-making structures and loops for control flow.	04
7.	Demonstrate methods for handling NA and NULL values, and converting data types.	03
8.	Work with dates and times using base functions and specialized packages.	03
9.	Perform basic string manipulations and explore advanced operations with string packages.	04
10.	Create custom functions with parameter handling and lazy evaluation concepts.	04
11.	Read and write data in various formats (CSV, Excel, JSON) and explore data-cleaning techniques.	04
12.	Perform advanced data manipulation tasks like filtering, summarizing, and joining with dplyr().	04
13.	Create basic visualizations (bar chart, histogram, scatter plot) using base R graphics.	05
14.	Design advanced plots using ggplot2, including custom themes and multiple charts on a single layout.	05

15.	Perform basic statistical analyses (mean, median, correlation) and use debugging tools (traceback(), browser()).	04
<b>TOTAL</b>		60

**Text Book(s):**

Title	Author/s	Publication
R for Everyone: Advanced Analytics and Graphics	Jared P. Lander	Addison-Wesley
The Art of R Programming: A Tour of Statistical Software Design	Norman Matloff	No starch Press

**Reference Book(s):**

Title	Author(s)	Publication
Beginning R – The Statistical Programming Language	Mark Gardener	Wiley
R Programming for Data Science	Roger D. Peng	Leanpub

**Web Material Link(s):**

- [https://onlinecourses.nptel.ac.in/noc19\\_ma33/preview](https://onlinecourses.nptel.ac.in/noc19_ma33/preview)
- [https://onlinecourses.nptel.ac.in/noc23\\_ma96/preview](https://onlinecourses.nptel.ac.in/noc23_ma96/preview)

**Course Evaluation:**

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SEML3220	R Programming
CO 1	Perform simple arithmetic and statistical operations in r and read data files into r.
CO 2	Apply family of functions for subsetting and basic computations and solve real world problems.
CO 3	Get familiar with r data structures, especially vectors and data frames and perform data manipulation on data frames.
CO 4	Recall the basic principles of r programming students can able to handle all aspects of data analysis.

**Mapping of CO with PO**

SEML3220	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	2	2	3	1	1	1	1	2	1	2
CO 2	3	3	2	3	3	1	1	1	2	3	2	3
CO 3	3	3	3	3	3	2	2	1	3	3	2	3
CO 4	3	3	3	3	3	3	3	2	3	3	3	3

**Mapping of CO with PSO**

SEML3220	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	1	3	3

CO 3	3	3	3
CO 4	2	2	3

### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Install R and RStudio; understand the R Environment	1,2
2.	Introduction to R objects and variables	1,2
3.	Working with vectors and lists	2,3
4.	Matrix and array operations	2,3
5.	Data frames: creation and operations	3,4
6.	Decision making and loops	4
7.	Handling missing and special data	3,4
8.	Date and time in R	2,3,4
9.	String operations and manipulations	3,4
10.	User-defined functions	4,5
11.	Data import and export	2,3,4
12.	Data manipulation with dplyr	3,4,5
13.	Introduction to data visualization	1,2,3
14.	Advanced data visualization with ggplot2	5,6
15.	Statistics and debugging in R	4,5

**P P Savani University  
School of Engineering**

**Department of Information Technology**

Course Code: SEIT3270  
Course Name: Web Technologies  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	5	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the basic components of a computer system.
- identify an appropriate approach to computational problems.
- develop logic building and problem-solving skills.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Web Design:</b> Concept of WWW, Internet and WWW, HTTP Protocol : Request and Response, Web browser and Web servers, Concepts of effective web design, Web design issues including Browser, Display resolution, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation	07	20
2.	<b>HTML:</b> Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5	08	20
3.	<b>Style sheets:</b> Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3	07	10
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>JavaScript:</b> Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: Javascript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and Javascript, Events and buttons.	08	20
5.	<b>PHP:</b> Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies	08	20

	and Sessions, Object Oriented Programming with PHP		
6.	<b>MySQL:</b> Basic commands with PHP examples, Connection to server, PHP my admin and database bugs	07	10
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Design web a page for the department timetable containing a suitable header, footer, description of the course codes and titles, faculty name and initialises, etc., use href, list tags and add University logo as a background. Using table tag and additional features like spanning rows, columns and table borders. [Refer your class timetable]	02
2.	a) Create a form to collect Student feedback. (Use textbox, text area, checkbox, radio button, select box etc.). b) Create a web page using frame. Divide the page into two parts with Navigation links on left hand side of page (width=20%) and content page on right hand side of page (width = 80%). On clicking the navigation Links corresponding content must be shown on the right-hand side.	03
3.	Create a web page using frame. Divide the page into two parts with Navigation links on left hand side of page (width=20%) and content page on right hand side of page (width = 80%). On clicking the navigation Links corresponding content must be shown on the right-hand side.	02
4.	Write HTML code to develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background colour.	03
5.	Create your resume using HTML tags also experiment with colors, text (bold, italic and different headings), image, link, size and also other related tags.	02
6.	Design a web page using CSS with suitable design for the following: i. Demonstrate different font styles ii. Control the repetition of image with background-repeat property iii. Define style for links as a: link, a: active, a: hover, a: visited iv. Demonstrate Element visibility property	03
7.	Design a web page of your institute with an attractive background color, text color, an Image, font etc. (use internal CSS). Use External CSS to format the class timetable.	02
8.	Develop simple calculator for Addition, Subtraction, Multiplication and Division operation using JavaScript. a) Create HTML Page that contains form with fields Name, Email, Mobile No, Gender, Favorite Color and a button. Write a JavaScript code to validate all the fields when the button is clicked, later combine and display the information in textbox.	03
9.	Write an XHTML document which displays a form containing text elements to input register number, sub-code, marks in three tests and a button element. Also write Java script compute the average of two best tests on click of button and print average marks using alert. Validate all the fields using JavaScript.	03
10.	a) Write a PHP script to display today's date in dd-mm-yyyy format. b) Write a PHP script to check whether the number is prime or not when user input a valid number from client side.	03
11.	Create HTML page that contain textbox, submit / reset button. Write PHP script to display this information and also store into a text file.	02
12.	Write a PHP script for login authentication. Design an HTML form which takes Username and Password from user and validate against stored Username and Password in a file.	02

<b>TOTAL</b>	30
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**Text Book(s):**

Title	Author/s	Publication
Web Design with HTML, CSS, JavaScript and jQuery	by Jon Duckett	Wiley-India

**Reference Book(s):**

Title	Author(s)	Publication
Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Black Book	<a href="#">Kogent Learning Solutions Inc.</a>	Dreamtech Press
Developing Web Applications	Ralph Moseley and M. T. Savaliya	Wiley-India

**Web Material Link(s):**

- [Web Technology PDF Download | WT Books, Lecture Notes, Studymaterial](#)

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SEIT3270	WEB TECHNOLOGIES
CO 1	Understand the fundamental concepts of web technologies
CO 2	Understand and implement client-side and server-side programming
CO 3	Learn HTML, CSS, and JavaScript for web page development
CO 4	Work with databases for dynamic web applications

**Mapping of CO with PO**

SEIT3270	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1											
CO 2	1		1									
CO 3					1							
CO 4				1								
CO 5							1					

**Mapping of CO with PSO**

<b>SEIT3270</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO 1	1		
CO 2		1	
CO 3	1		
CO 4	1		
CO 5		1	

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1.	Introduction to Web Design	1,2
2.	HTML	1,2,3
3.	Style sheets	3,4
4.	JavaScript	2,3,4
5.	PHP	2,3
6.	MySQL	2,3

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE4221

Course Name: Artificial Intelligence

Prerequisite Course(s): Data Structures (SECE2221)

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand basics of AI
- develop roles in future and also introduce the intelligence of machine
- design AI

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to AI</b> The AI Problems, The Underlying Assumption, AI techniques, AI Technique, The AI Problems and applications, Major areas of Artificial Intelligence, History of AI.	02	05
2.	<b>Problems, State Space Search &amp; Heuristic Search Techniques:</b> Defining the Problems as a State Space Search, Production Systems: control & search strategies, Depth first and Breadth first search, Hill Climbing, Best first search, A* algorithm	07	15
3.	<b>Knowledge Representation</b> Representations and Mappings, Approaches to Knowledge Representation, Using Propositional logic and Predicate Logic, Resolution, Semantic network, Frame based knowledge, Procedural Versus Declarative Knowledge, Forward Reasoning, Backward Reasoning. Symbolic Reasoning, Under Uncertainty: Non-Monotonic Reasoning, Logics for Non-monotonic Reasoning	09	20
4.	<b>Introduction to Prolog</b> Introduction, Converting English to Prolog Facts and Rules, Goals, Prolog Terminology, Variables, Control Structures, Arithmetic Operators	04	05
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
5.	<b>Uncertain Reasoning and alternatives</b> Probability and Bayes' Theorem, Certainty Factors and Rule-Base Systems, Bayesian Networks, Dempster Shafer Theory, Fuzzy sets, Fuzzy Logic, Fuzzy systems, Hidden Markov model	08	20
6.	<b>Game Theory</b> Introduction to Game playing, The Minimax search procedure, Alpha-Beta procedure, Refinements, Iterative Deepening	05	10

7.	<b>Natural Language Processing</b> Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking.	05	10
8.	<b>Connectionist Models</b> Introduction to Hopfield Network, Learning in Neural Network, Application of Neural Networks, Recurrent Networks, Introduction to multilayer Neural networks	05	15
<b>TOTAL</b>		<b>45</b>	<b>100</b>

#### List of Practical:

Sr. No	Name of Practical	Hours
1.	Overview of Artificial Intelligence systems.	02
2.	Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem)	02
3.	Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)	02
4.	Write a program to Implement A* Algorithm.	04
5.	Prolog Representation of Animals, Mammals, and Behavioral Characteristics	02
6.	Prolog Implementation of a Simple Family Tree with Relationships	02
7.	Explore different python packages which are applicable in AI.	02
8.	Write a program to construct a Bayesian network from given data.	04
9.	Write a program to infer from the Bayesian network.	02
10.	Character recognition application using python.	04
11.	NLP application using python.	04
<b>TOTAL</b>		<b>30</b>

#### Text Book (s):

Title	Author/s	Publication
Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	Pearson, 4th Edition (2020)

#### Reference Book (s):

Title	Author/s	Publication
Artificial Intelligence	Elaine Rich, Kevin Knight, Shivashankar B. Nair	McGraw-Hill, 3rd Edition (2008)
Neural Networks and Deep Learning	Charu C. Aggarwal	Springer, 1st Edition (2018)
Prolog Programming for Artificial Intelligence	Ivan Bratko	Addison-Wesley, 4th Edition (2011)

#### Web Material Link(s):

- <https://nptel.ac.in/courses/106106126/>
- <https://nptel.ac.in/courses/106/105/106105077/>
- <http://www.journals.elsevier.com/artificial-intelligence/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation Consist of two tests, each of 30 Marks and 1 hour of duration and average of the

- same will be converted out of 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of performance of practical, which should be evaluated out of 10 marks
- per each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Mini Project Contains of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After the completion of the course, the following course outcomes will be able to:

SECE4221	ARTIFICIAL INTELLIGENCE
CO 1	Understand the search technique procedures applied to real world problems
CO 2	Understand and use various types of logic and knowledge representation schemes.
CO 3	Use Prolog Programming language using predicate logic
CO 4	Understand various Game Playing techniques and apply them in programs
CO 5	Gain knowledge in AI Applications and advances in Artificial Intelligence

**Mapping of CO with PO**

SECE4221	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	2	3	2	1	1					1
CO 2	3	2	3	2	3	1	1					1
CO 3	2	3	3	2	3					2		1
CO 4	3	3	2	3	2	1	1					3
CO 5	3	2	2	2	3	3	3					3

**Mapping of CO with PSO**

SECE4221	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	3	3	2
CO 3	2	3	3
CO 4	2	3	3
CO 5	2	3	3

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to AI	1,2
2	Problems, State Space Search & Heuristic Search Techniques	1,2,3
3	Knowledge Representation	2,3
4	Introduction to Prolog	2,5,6
5	Uncertain Reasoning and alternatives	2,3,4
6	Game Theory	5,6

7	Natural Language Processing	2,3
8	Connectionist Models	2,3,4

**P P Savani University  
School of Engineering**

**Department of Information Technology**

Course Code: SEIT3620  
Course Name: Data Visualization  
Prerequisite Course(s): -

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	00	03	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Understand Core Concepts – Learn the fundamentals of data visualization and its importance in data analysis and decision-making.
- Develop Technical Skills – Gain hands-on experience with tools and libraries for creating effective visualizations.
- Prepare and Transform Data – Learn techniques for cleaning, processing, and integrating data for visualization purposes.
- Explore Advanced Visualization Techniques – Create interactive, geospatial, and high-dimensional visualizations
- Enhance Storytelling and Presentation – Build data-driven narratives and dashboards to communicate insights effectively.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Data Visualization</b> Overview of Data Visualization: Importance and role in data analysis Types of data: Quantitative, Qualitative Introduction to visual perception and human cognition in data representation Tools & Technologies Introduction to visualization tools (Tableau, Power BI, D3.js, etc.) Basic charts: Bar charts, Line graphs, Pie charts	07	25%
2.	<b>Advanced Data Visualization Techniques</b> Interactive Visualizations: Creating interactive dashboards and visual reports Introduction to libraries like Plotly, Bokeh, and Shiny Data Storytelling Visualizing complex datasets with a narrative approach. Effective use of annotations and interactive elements to enhance storytelling Geospatial Data Visualization Introduction to mapping and geospatial visualizations. Tools for visualizing geographical data (Leaflet, GeoPandas)	08	25%
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
3.	<b>Data Preparation for Visualization</b> Data Cleaning & Transformation: Handling missing data, outliers, and noise, Data wrangling techniques for visualization (using Python or R) Data Integration and Aggregation: Combining data from different sources, Grouping, filtering, and summarizing data for visualization	07	25%

	Data Types and Formats: Handling different types of data (numeric, categorical, temporal) for visualization.		
4.	<b>Advanced Visualizations &amp; Machine Learning Integration</b> Multivariate and High-Dimensional Visualizations: Heatmaps, scatter plots, and pair plots for multivariate analysis Visualizing high-dimensional data using PCA and t-SNE, Time-Series Data Visualization: Techniques for visualizing trends and seasonality, handling temporal data using line charts, candlestick charts, and more, Integrating Machine Learning Models with Visualizations: Visualizing results from machine learning algorithms (e.g., decision trees, clusters)	08	25%
	<b>TOTAL</b>	30	100%

#### List of Practical:

Sr. No	Name of Practical	Hours
1	Introduction to Python Libraries for Data Visualization (Matplotlib, Seaborn, Plotly).	02
2	Create basic charts—Bar Chart, Line Graph, and Pie Chart using Matplotlib and Seaborn.	02
3	Design interactive dashboards using Tableau or Power BI.	04
4	Develop visualizations for categorical and numerical data using histograms and boxplots.	02
5	Implement scatter plots and pair plots for multivariate data visualization.	02
6	Perform data cleaning and preprocessing for visualization using Pandas.	02
7	Build time-series visualizations to analyze trends using Matplotlib and Plotly.	02
8	Create geospatial visualizations using GeoPandas and Folium.	02
9	Develop a data storytelling dashboard with annotations and tooltips in Tableau/Power BI.	04
10	Visualize machine learning results classification boundaries and clusters using Seaborn.	02
11	Design a mini-project to analyze and visualize a real-world dataset (e.g., sales data).	06
	<b>TOTAL</b>	30

#### Text Book (s):

Title	Author/s	Publication
Data Visualization: A Practical Introduction	Kieran Healy	Princeton University Press.

#### Reference Book (s): Mention Any Numbers of Reference Books

Title	Author/s	Publication
Storytelling with Data: A Data Visualization Guide for Business Professionals	Cole Nussbaumer Knaflic	Wiley
Data Visualization: Principles and Practice	Kari L. Jordan and Alexandru C. Telea	CRC Press
Core Python Programming	Wesley J. Chun	Pearson Education

#### Web Material Link(s):

- <https://public.tableau.com>
- <https://learn.microsoft.com/en-us/power-bi/>
- <https://www.datacamp.com>
- <https://plotly.com/python/>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After the completion of the course, the following course outcomes will be able to:

<b>SEIT3620</b>	<b>DATA VISUALIZATION</b>
CO 1	Demonstrate an understanding of fundamental concepts, principles, and importance of data visualization in data analysis and decision-making.
CO 2	Develop proficiency in using modern visualization tools and programming libraries like Tableau, Power BI, Matplotlib, and Seaborn to create effective visualizations.
CO 3	Apply data preprocessing techniques, including cleaning, transformation, and handling different data formats, to prepare datasets for visualization.
CO 4	Design and implement advanced visualizations such as interactive dashboards, geospatial maps, and time-series analyses to gain insights from complex datasets.
CO 5	Create compelling data stories and dashboards to effectively communicate insights and support data-driven decision-making.

**Mapping of CO with PO**

<b>SEIT3620</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
CO 1	1	2	1	2					3		3	1
CO 2	1	3	3	3					3		3	3
CO 3	1	3	3	3	3				3		3	3
CO 4	1	3	3	3	3				3		3	3
CO 5	1	3	3	3					3		3	

**Mapping of CO with PSO**

<b>SEIT3620</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO 1	3	3	3
CO 2	3	3	1
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

**Level of Bloom's Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Introduction to Data Visualization	1, 2, 3
2	Advanced Data Visualization Techniques	3, 4, 6
3	Data Preparation for Visualization	2, 3, 4, 5
4	Advanced Visualizations & Machine Learning Integration	3, 4, 6

**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML3610

Course Name: 3D Modelling and Rendering

Prerequisite Course (s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	--	03	40	60	20	30	--	--	150

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

- understand the fundamentals of modeling and rendering.
- know the working principles of objects in three dimensional space.
- acquire knowledge about the issues in Scene modelling.
- learn rendering algorithms and application of special effects to the modelled objects.
- gain skill in designing real time movie and games.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>MATHEMATICS FOR MODELING</b> Survey of Computer Graphics – Overview of Graphics System: Video Display Devices, Raster System, Input Devices – Interactive Input Methods and Graphical User Interfaces – Vector Tools for Graphics: Dot Product, Cross Product, Representation of Key Geometric Objects, Intersection of lines and planes, Polygon Intersection – Introduction to OpenGL.	06	15
2.	<b>GEOMETRIC PRIMITIVES MODELING</b> Transformation of Objects: 3D Affine Transformation, Geometric Transformation – 2D and 3D Viewing – Modeling Shapes with Polygons Meshes – Curves and Surface Design – Color Models and Color Application – Object Modeling using OpenGL – Introduction to Unity Software.	06	20
3.	<b>OBJECT MODELING</b> Rendering Faces for Visual Realism – Hidden surface removal – Visual Surface Detection Methods – Illumination Models and Surface Rendering Methods – Computer Animation – Hierarchical Modeling – Human Character Modeling – Applying Emotion for the Characters – Vehicle Modeling – Landscape Modeling.	03	15
<b>Section II</b>			
4.	<b>SCRIPTING</b> Physics: Collision Detection, Particles Systems, Rigid Bodies Motion, Deformable Bodies – Artificial Intelligent: Path Finding, Controlled	08	20

	Based Animation, Animation and Modeling: Keyframe, Kinematics, Inverse Kinematics – Rigging – Bones – Adding Speech Movements to Characters – Skinning – Spatial Sorting – Level of Details.		
5.	<b>RENDERING AND SPECIAL EFFECTS</b> Developing 2D and 3D Interactive Scene using OpenGL, Unity and Similar Tools – Overview of Gaming Genre, Atmospheric and Render Effects – Ray Tracing and Mental Ray – Advanced Tools in Rendering – Global Illumination – Shade Effects – Sound – Lighting – Video Post Interface – Atmospheric Effects: Fire, Water, Fog – Impact of Graphics and Animation on Film and Gaming Industry.	07	30
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No	Name of Practical	Hours
1.	Implementing basic 2D geometric objects (lines, circles, polygons) using OpenGL.	02
2.	Implement a OpenGL program that removes the hidden surface of the objects in a scene of five objects that overlaps.	02
3.	Using dot and cross products in 3D graphics for lighting and shading.	02
4.	Create 3D geometric objects (cube, sphere, pyramid) in OpenGL.	02
5.	Implementing transformations like scaling, rotation, and translation in OpenGL.	02
6.	Basic polygon mesh creation and manipulation using OpenGL.	02
7.	Music and audio editing using Audacity.	02
8.	Modeling a simple vehicle and animating its movement.	02
9.	Creating a basic keyframe animation for a character in Unity.	02
10.	Implementing inverse kinematics for character limb movement.	02
11.	Creating an interactive 3D scene with Unity (camera control, lighting).	02
12.	Implementing ray tracing for realistic lighting effects in OpenGL.	02
13.	Designing an atmospheric effect (fog, water, fire) in Unity.	02
14.	Using shaders to create realistic surface shading (Phong or Gouraud).	02
15.	Developing a final scene in Unity with integrated sound, lighting, and post-processing effects.	02
<b>TOTAL</b>		30

**Text Book(s):**

Title	Author/s	Publication
Computer Graphics: Principles and Practice	John F. Hughes, Andries van Dam, Morgan McGuire, David Sklar, James D. Foley, and Steven K. Feiner	Addison Wesley, Latest Edition
Fundamentals of Computer Graphics	Peter Shirley, Michael Ashikhmin, Steve Marschner	CRC Press

**Reference Book(s):**

Title	Author/s	Publication
“3D Animation Essentials”,	Andy Beane	John Wiley & Sons, 2012.

"Practical Algorithms for 3D Computer Graphics",	R. Stuart Ferguson,	Second Edition, CRC Press, 2013.
Auto Desk Maya 2016 Basic Guide",	Kelly L. Murdock	Auto Desk Maya, 2016.
Computer Graphics with OpenGL	Donald Hearn, M. Pauline Baker	Third Edition, Pearson Education, 2012.

### Course Evaluation:

#### Theory

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

#### Practical

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

### Course Outcome(s):

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

<b>SEML3610</b>	<b>3D MODELLING AND RENDERING</b>
C01	Explain the fundamentals of modeling and rendering.
C02	Illustrate the working principles of objects in three dimensional space.
C03	Discuss the working principles of objects in three dimensional space.
C04	Recite the rendering algorithms and application of special effects to the modelled objects.
C05	Discover the skills in designing real time movie and games.

### Mapping of CO with PO

<b>SEML3610</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	1		1	1							
CO 2	1	1		1	3			1				
CO 3	2			2	2							
CO 4	1	1		1	3			1				
CO 5	2	1		1	3			1			2	2

### Mapping of CO with PSO

<b>SEML3610</b>	PSO1	PSO2	PSO3
CO 1	2	2	2
CO 2	1	1	3
CO 3	2	2	2
CO 4	2	1	2
CO 5	1		1

Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Mathematics for Modelling	1, 2, 4
2	Geometric primitives Modelling	2, 3, 5, 6
3	Object Modelling	1, 4, 5, 6
4	Scripting	1, 3, 5, 6
5	Rendering and Special Effects	3, 4, 5, 6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SEIT3630  
Course Name: Image Processing  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	00	03	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

- understand the fundamentals of image processing.
- Apply various processes on the image for image understanding.
- Design and implement algorithms that perform basic image processing

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Digital Image Fundamentals</b> Fundamentals steps in digital Image Fundamentals, Human visual system, Image as a 2D data, Image representation – Grayscale and Color images, image sampling and quantization, Some basic relationships between pixels.	04	10
2.	<b>Image Enhancements</b> In spatial domain: Basic gray level transformations, Histogram processing, Using arithmetic/Logic operations, smoothing spatial filters, Sharpening spatial filters. In Frequency domain: Introduction to the Fourier transform and frequency domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.	07	15
3.	<b>Image Restoration and Reconstruction</b> Image Degradation Models: Noise and Blur. Noise Removal Techniques: Mean, Median, and Adaptive Filters. Inverse Filtering and Wiener Filtering.	04	10
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Color Image Processing</b> Basics of color Models (RGB, CMY, HIS), Pseudocolor image processing.	02	12
5.	<b>Image Compression</b> Introduction, coding Redundancy, Inter-pixel redundancy, image compression methods, Lossy and Lossless compression, Huffman coding, Arithmetic coding, LZW coding, IPEG compression standard.	03	10
6.	<b>Image Segmentation</b> point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough	03	10

	transform.		
7.	<b>Morphological Image Processing</b> Erosion, dilation, opening, closing, Basic Morphological Algorithms: hole filling, connected components, thinning, skeleton.	03	08
8.	<b>Case Studies</b> Object representation, description, and recognition, Application of Image processing in various field.	04	10
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Introduction to Image Processing Toolbox.	04
2.	Read the image and perform 1. RGB to Gray image 2. RGB to Indexed image and 3. Gray to Indexed image	04
3.	Read an 8bit image and then apply different image enhancement techniques: (a) Brightness improvement (b) Brightness reduction (c) Thresholding (d) Negative of an image (e) Log transformation (f) Power Law transformation.	04
4.	Implement different interpolation techniques using MATLAB.	04
5.	Read an image, plot its histogram then do histogram equalization and comment about the result.	04
6.	(a) Implement Gray level slicing (intensity level slicing) in to read cameraman image. (b) Read an 8bit image and to see the effect of each bit on the image. (c) Read an image and to extract 8 different planes i.e. 'bit plane slicing."	06
7.	Implement various Smoothing spatial filter	04
8.	Read an image and apply (1) Gaussian 3x3 mask for blurring (2) High pass filter mask with different masks (3) Laplacian operator with center value positive and negative (4) High boost filtering.	06
9.	Write a program to implement various low and high pass filters in the frequency domain.	04
10.	Write a program for erosion and dilation, opening & closing using inbuilt and without inbuilt functions.	04
11.	Implement and study the effect of Different Mask (Sobel, Prewitt, and Roberts)	04
12.	Implement various noise models and their Histogram	04
13.	Implement inverse filter and Wiener filter over image and comment on them	04
14.	Implement Image compression using DCT Transform	04
<b>TOTAL</b>		60

**Text Book(s):**

Title	Author/s	Publication
Digital Image Processing	Rafael C. Gonzalez, Richard E. Woods	Pearson Education
Fundamentals Digital Image Processing	ITL Education Solutions Limited	Prentice Hall India Learning

**Reference Book(s):**

Title	Author(s)	Publication
Image Processing, Analysis and	Milan Sonka, Vaclav Hlavac,	CL Engineering

Machine Vision	Roger Boyle	
Digital Image Processing	William K. Pratt	John Wiley & Sons

**Web Material Link(s):**

- <https://nptel.ac.in/courses/106105032/>

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SEIT3630	IMAGE PROCESSING
CO 1	Immediate understanding of the concept of digital image.
CO 2	Understand the basic image enhancement techniques in spatial & frequency domains
CO 3	Apply image filtering to solve image restoration, reconstruction, and compression.
CO 4	Create image segmentation and devise object recognition with the help of different case studies.

**Mapping of CO with PO**

SEIT3630	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	1		2							
CO 2	3	3	2	2	2							
CO 3	3	3	3	3	3							
CO 4	3	3	3	3	3	1	1	2	1	2	2	3

**Mapping of CO with PSO**

SEIT3630	PSO1	PSO2	PSO3
CO 1		2	
CO 2		3	
CO 3		3	2
CO 4	3	3	3

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
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1.	Introduction to Digital Image Fundamentals	1,2
2.	Image Enhancements	1,2,4
3.	Image Restoration and Reconstruction	2,3,5
4.	Color Image Processing	2,5
5.	Image Compression	2,5
6.	Image Segmentation	4,5
7.	Morphological Image Processing	2,4,5
8.	Case Studies	3,6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3630

Course Name: Wireless Network & Mobile Computing

Prerequisite Course(s): Computer Networks

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	00	03	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Explain the terminology, principles, architectures, protocols, and methodologies used in Wireless Communication and Mobile Computing Networks.
- Understand the basics of wireless communication technologies, including 3G, 4G, 5G, IoT, and WiMAX.
- Build knowledge of Mobile Computing Algorithms, network layers, and transport protocols for wireless communication.
- Develop skills in designing and implementing wireless applications using modern tools, mobile OS, and Wireless Application Protocols.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Mobile Computing Architecture</b> Types of Networks, <b>Architecture for Mobile Computing:</b> 3-tier Architecture and Design Considerations, Applications. <b>Wireless Transmission:</b> Signals, Antennas, Signal propagation, Multiplexing, Modulation, Cellular Systems. <b>Medium Access Control:</b> Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA.	04	05
2.	<b>Wireless Networks - 1</b> <b>GSM and SMS:</b> Global Systems for Mobile Communication (GSM and Short Service Messages SMS), GSM Architecture, Protocols, Call routing in GSM, Handover, Security. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications.	04	15
3.	<b>Wireless Networks - 2</b> <b>Advanced Data Network Technologies</b> <b>GPRS:</b> GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Introduction to WiMAX.	04	15
4.	<b>Wireless Networks -3</b> 3G,4G, and 5G Networks: Third Generation Networks, Fourth Generation Networks, Vision of 5G. 3G vs. 4G vs. 5G: Features and Challenges and Applications. Introduction to Emerging Wireless Technologies: Wi-Fi 6, Li-Fi, NB-IoT.	04	15
<b>Section II</b>			
Module	Content	Hour	Weightage

No.		s	e in %
5.	<b>Mobile network layer</b> Mobile IP, Dynamic Host Configuration protocol, Mobile ad-hoc networks (MANETs). <b>Mobile Transport layer:</b> Traditional TCP, classical TCP improvements, TCP over 3G/4G wireless networks	04	10
6.	<b>Mobile OS and Computing Environment</b> <b>Smart Client Architecture:</b> <b>The Client:</b> User Interface, Data Storage, Performance, Data Synchronization, Messaging. <b>The Server:</b> Data Synchronization, Enterprise Data Source, Messaging. <b>Mobile Operating Systems:</b> Android, iOS, Introduction to Wearable Device OS. Development Process: Key Considerations for Mobile Applications.	03	15
7.	<b>Building Mobile Internet Applications</b> Thin client Architecture: the client, Middleware, Messaging Servers, Processing a Wireless request. Wireless Applications Protocol (WAP) Overview. Wireless Languages: Markup Languages (HDML, WML, HTML, cHTML, XHTML, VoiceXML).	04	15
8.	<b>Emerging and Future Technologies:</b> The architecture of future Networks, Wireless Sensor Network (WSN), IoT, <b>Edge Computing, Fog Computing</b> , and their role in mobile networks.	03	10
<b>TOTAL</b>		30	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Setup & Configuration of Wireless Access Point (AP)	04
2.	Implementation of Wireless Network with a number of nodes and different parameters using Simulator.	04
3.	Study of WLAN: Ad Hoc & Infrastructure Mode	04
4.	GSM modem study and <b>Modern Messaging Systems:</b> Implement a basic client-server messaging application using <b>MQTT</b> or push notifications.	04
5.	<b>Development of a Progressive Web App (PWA):</b> Build a simple PWA to demonstrate mobile-friendly design and offline capabilities.	04
6.	Design and Program Income Tax and Loan EMI Calculator for Mobile Phones	04
7.	Implementation of Mobile Network using Network Simulator (NS3/GNS3)	06
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Mobile Communications	Schiller	Pearson
Wireless Communications & Networks	William Stallings	Pearson

#### Reference Book(s):

Title	Author(s)	Publication
Principles of Mobile Computing	UIWE Hansman, Other Merk, Martin-S-Nickious, Thomas Stohe	Springer international Edition
Mobile Computing	Ashok K. Teludkar	TMH
Mobile AdHoc Networks	Chai K.ToH	Prentice Hall
Programming with C	Byron Gottfried	Tata McGraw Hill

#### Web Material Link(s):

- <http://alphace.ac.in/downloads/notes/cse/10cs831.pdf>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE3630	WIRELESS NETWORK & MOBILE COMPUTING
CO 1	Understand and relate the fundamentals of wireless communication and mobile computing architectures to real-world applications, including cellular and IoT systems.
CO 2	Analyze the unique characteristics of wireless networks, including security, mobility, energy efficiency, and scalability, with practical insights into current technologies like 3G, 4G, and 5G.
CO 3	Design and evaluate wireless network protocols, including MAC, TCP/IP extensions, and mobile communication systems, using simulation tools
CO 4	Develop the knowledge of TCP/IP extensions for mobile and wireless networking.

**Mapping of CO with PO**

SECE3630	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	1	1	1								1
CO 2	1	2	1	1	1		1					1
CO 3	1	2	1	2	2		2				1	1
CO 4	1	2	1	2	1		2					1

**Mapping of CO with PSO**

SECE3630	PSO1	PSO2	PSO3
CO 1		3	3
CO 2	3	2	2
CO 3	3	3	3
CO 4	3	3	2

**Level of Revised Bloom's Taxonomy in Assessment:**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Mobile Computing Architecture	1,2
2	Wireless Networks – 1	1,2
3	Wireless Networks – 2	2,3,4
4	Wireless Networks –3	2,3,4
5	Mobile network layer, Mobile Transport layer	2,4
6	Mobile OS and Computing Environment	3,6
7	Building Mobile Internet Applications	3,6

8	The architecture of future Networks, Wireless Sensor Network, IoT	3, 5, 6
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**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML3910  
Course Name: Summer Training  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
--	04	--	04	--	--	100	--	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

- have first-hand experience the real time situations in industrial scenario.
- get familiar with engineering applications in industrial spectrum.
- learn to adapt themselves in professional scenario.

**Outline of the Summer Training:**

Sr. No	Content
1.	Selection of Companies
2.	Company Information collection
3.	Report Writing
4.	Presentation & Question-Answer

**Course Evaluation:**

Sr. No.	Evaluation criteria	Marks
1	Actual work carried & Report Submission	50
2	Final Presentation & Question-Answer session	50
<b>Total:</b>		<b>100</b>

**Course Outcome(s):**

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

SEML3910	SUMMER TRAINING
CO1	Construct company profile by compiling brief history, management structure, products/services offered, key achievements and market performance for the company visited during internship.
CO2	Determine the challenges and future potential for his/her internship organization in particular and the sector in general.
CO3	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
CO4	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization.
CO5	Analyze the functioning of internship organization and recommend changes for improvement in processes.

**Mapping of CO with PO**

SEML3910	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1								3	3	3		3

CO 2	3	3	3				2					3
CO 3	2	2	3	2		2			3			3
CO 4						3	2		3	3		
CO 5		3	3				2			3	3	3

### Mapping of CO with PSO

SEML3910	PSO1	PSO2	PSO3
CO 1	1	2	1
CO 2	1	2	2
CO 3	1	2	3
CO 4	1	1	3
CO 5	1	2	3

## Report Writing Guidelines

### A. Report Format:

1. Title Page (to be provided by the respective supervisor)

The title page of the project shall give the following information in the order listed:

- Full title of the project as approved by the Mentor;
- The full name of the student/Group of students with enrollment number;
- The qualification for which the project is submitted;
- The name of the institution to which the project is submitted;
- The month and year of submission.

2. Project Certification Form

[The form should be duly filled signed by the supervisors.]

3. Acknowledgements

[All persons (e.g. supervisor, technician, friends, and relatives) and organization/authorities who/which have helped in the preparation of the report shall be acknowledged.]

4. Table of Contents/Index with page numbering
5. List of Tables, Figures, Schemes
6. Summary/abstract of the report.
7. Introduction/Objectives of the identified problem
8. Data Analysis and Finding of Solution
9. Application of the identified solution
10. Future Scope of enhancement of the Project and Conclusion
11. "Learning during Project Work", i.e. "Experience of Journey during Project Duration"
12. References(must)
13. Annexures (if any)

### B. Guideline for Report Formatting:

- Use A4 size page with 1" margin all sides
- Header should include Project title and footer should contain page number and enrollment numbers
- Chapter Name should be of Cambria font, 20 points, Bold
- Main Heading should be of Cambria font, 14 points, Bold
- Sub Heading should be of Cambria font, 12 points, Bold
- Sub Heading of sub heading should be of Cambria font, 12 points, Bold, Italic
- Paragraph should be of Cambria font, 12 points, no margin at the start of the paragraph
- Line spacing for all content – 1.15, before - 0, after - 0
- No chapter number for references
- Before chapter 1, give page numbers in roman letter

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3231

Course Name: Cloud Computing & Applications

Prerequisite Course(s): Computer Networks, and Operating System

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the principles and paradigm of Cloud Computing
- understand the Service Model with reference to Cloud Computing
- appreciate the role of Virtualization Technologies
- gain ability to design and deploy Cloud Infrastructure
- understand cloud security issues and solutions

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Cloud Computing</b> Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks	05	10
2.	<b>Cloud Architecture, Services and Applications</b> Exploring the Cloud Computing Stack, connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Saas Vs. Paas, Using PaaS Application Frameworks, Software as a Service, Cloud Deployment Models, Public vs Private Cloud, Cloud Solutions, Cloud ecosystem, Service management, Identity as a Service, Compliance as a Service	05	10
3.	<b>Virtualization, Abstraction and Cloud Platform</b> Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hypervisors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Hypervisors	07	15
4.	<b>Cloud Infrastructure and Cloud Resource Management</b> Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards	06	15

<b>Section II</b>			
Module	Content	Hours	Weightage in %
5.	<b>Cloud Security</b> Security Overview, Cloud Security Challenges and Risks, Software-as-a- Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security, Identity and Presence, Identity Management and Access Control, Autonomic Security Establishing Trusted Cloud computing, Secure Execution Environments and Communications, , Identity Management and Access control Identity management, Access control, Autonomic Security Storage Area Networks, Disaster Recovery in Clouds	06	15
6.	<b>AWS Programming, Management Console and Storage</b> Basic Understanding APIs - AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elastic block store - Simple storage service, Define the AWS Cloud and its value proposition, Identify aspects of AWS Cloud economic, List the different cloud architecture design principles, Security and Compliance, Define the AWS shared responsibility model, Define AWS Cloud security and compliance concepts, Identify AWS access management capabilities, Identify resources for security support	09	20
7.	<b>AWS Technology, Billing and Pricing</b> Define methods of deploying and operating in the AWS Cloud, Define the AWS global infrastructure, Identify the core AWS services, identify resources for technology support, Compare and contrast the various pricing models for AWS, Recognize the various account structures in relation to AWS billing and pricing, Identify resources available for billing support	07	15
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1	Cloud Concepts Overview	02
2	Cloud Economics and Billing	02
3	Cloud Global Infrastructure Overview	02
4	Explore Cloud Security Fundamentals	04
5	Networking and Content Delivery	04
6	Explore Compute Services (IAAS)	04
7	Explore Storage Services	04
8	Explore Database Services	04
9	Cloud Architecting	02
10	Auto Scaling and Monitoring	02
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Cloud Computing Bible	Barrie Sosinsky	John Wiley & Sons

#### Reference Book(s):

Title	Author/s	Publication
Amazon Web Services for Dummies	Bernard Golden	Dummies
Amazon Web Services in Action	Michael Wittig and Andreas Wittig	Dreamtech Press

Building Applications in the Cloud: Concepts, Patterns and Projects	Christopher M. Moyer	Pearson Addison-Wesley Professional
Cloud Computing Design Patterns	Thomas Erl	Prentice Hall

**Web Material Link(s):**

- <http://www.cloudbus.org/>
- <https://aws.amazon.com/>
- <http://aws.amazon.com/documentation/>
- <http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html>

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted out of 30 marks.
- Faculty Evaluation consists of 10 marks as per guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks Exam.

**Practical:**

- Continuous Evaluation Consist of Performance of Practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/test of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE3231	CLOUD COMPUTING & APPLICATIONS
CO 1	Describe various cloud computing features, challenges through various models and services.
CO 2	Apply different approaches of cloud computing system for efficient data storage with minimal cost.
CO 3	Identify various management related services of aws.
CO 4	Distinguish various security and compliance related issues with aws.
CO 5	Deploy applications over commercial cloud computing infrastructures such as amazon.

**Mapping of CO with PO**

SECE3231	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			3				1			2
CO 2		3		2	2				2			3
CO 3	2			3							1	3
CO 4	2			2	1							2

**Mapping of CO with PSO**

SECE3231	PSO1	PSO2	PSO3
CO 1	3		2
CO 2	1	3	
CO 3	2		3
CO 4		2	3

**Level of Revised Bloom's Taxonomy in Assessment:**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Introduction to Cloud Computing	1, 2
2	Cloud Architecture, Services and Applications	1, 2
3	Virtualization, Abstraction and Cloud Platform	1, 2, 3
4	Cloud Infrastructure and Cloud Resource Management	1, 2, 3
5	Cloud Security	1, 2, 3
6	AWS Programming, Management Console and Storage	1, 2, 3, 4
7	AWS Technology, Billing and Pricing	3, 4, 5, 6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3241

Course Name: Artificial Intelligence of Things

Prerequisite Course(s): Computer Networks (SECE2240)

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	04	0	04	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Introduce the fundamental concepts relevant to design issues related to Internet of Things.
- Learn how to interface sensors and Actuators with embedded IoT devices.
- Implement connectivity and communication IoT protocols.
- Implement IoT applications with concepts of AI.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction of AI and IoT</b> What is an AI? AI Problems and applications, Major areas of AI, History of AI. What is IoT? Impact of IoT, IoT Challenges, IoT architecture.	02	10
2.	<b>Hardware in IoT</b> Choosing criteria for IoT Hardware, Arduino UNO, NodeMCU, ESP32, Sensing, Actuation, Arduino C, GPIO programming & interfacing IoT hardware.	04	15
3.	<b>Networking in IoT</b> SOA for IoT, IoT Gateways, IoT Protocol stack, Networking Protocols - MQTT: MQTT Communication, SMQTT CoAP, XMPP, AMQP	05	13
4.	<b>Communication in IoT</b> Connectivity protocols - IEEE 802.15.4, Zigbee, 6LowPAN, Wireless HART, Z-Wave, ISA 100, Bluetooth, NFC, RFID, RPL, WiFi, BLE/iBeacon, LORAWan, cellular and Ethernet	04	12
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
5.	<b>Raspberry Pi</b> Raspberry Pi and its variant, Raspberry Pi programming, Choosing a right board, Tools, Sensing IoT Environments	03	12
6.	<b>IoT and AI Platforms</b> Google Cloud IoT, Microsoft Azure IoT Suite, Amazon AWS IoT, IBM Watson IoT Platform, Predix, H2O.	04	13
7.	<b>Security and Privacy in AIoT</b> AI-based IoT security techniques, Privacy challenges in AIoT ecosystems, Ethical considerations in AIoT deployment.	03	10

8.	<b>AIoT Application Development - Case Studies</b> Introduction to tools and platforms essential for building AIoT applications. Practical Aspects of AIoT applications, including: Smart City, Smart Transportation, Smart Manufacturing, Smart Healthcare, Agriculture, Activity Monitoring and Smart Homes.	05	15
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Study the fundamentals of AIOT applications in real world.	02
2.	Familiarization with Arduino/Raspberry Pi and perform necessary software	02
<b>Serial Monitor, LED, Servo Motor – Controlling:</b>		
3.	To interface LED/Buzzer with Arduino and write a program to turn ON LED for 1 sec after every 2 seconds.	02
4.	To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection. (a)Interfacing the RGB LED with the Arduino. (b)Creating different led patterns and controlling them using push button switches. (c)Controlling servo motor with the help of joystick.	06
<b>LDR Sensor, Alarm and temperature, humidity measurement:</b>		
5.	(a)Controlling relay state based on ambient light levels using LDR sensor. (b)Basic Burglar alarm security system with the help of PIR sensor and buzzer. (c)Displaying humidity and temperature values on LCD using Temperature sensor	08
<b>Experiments using ESP8266/ESP32:</b>		
6.	(a)Interfacing and programming of IR sensors (b)Interfacing and programming to detect presence of Gas using GAS Sensor. (c) Program to detect presence of smoke using Smoke Sensor. (d) Program to play melody with a Piezo speaker.	10
<b>Distance Measurement of an object:</b>		
7.	Calculate the distance to an object with the help of an ultrasonic sensor and display it on an LCD.	04
<b>IOT Framework:</b>		
8.	Upload humidity & temperature data to Thing Speak, periodically logging ambient light level to Thing Speak	04
<b>Experiments using R-Pi:</b>		
9.	Getting started with Raspberry Pi and OS Installation	04
10.	Sensing IoT devices with Raspberry Pi using Python	04
11.	Experimenting with Amazon AWS IoT cloud	04
12.	AIoT based mini project	10
<b>TOTAL</b>		60

**Text Book(s):**

Title	Author/s	Publication
Internet of Things (A Hands-on	Vijay Madiseti and Arshdeep Bahga	1 <sup>st</sup> Edition, VPT

Approach)		
Hands-On Artificial Intelligence for IoT	By Amita Kapoor	Packt Publishing, 2019

### Reference Book(s):

Title	Author(s)	Publication
IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete	1st Edition, 2018, Pearson India
21 Internet of Things (IOT) Experiments: Learn IoT, the programmer's way	Yashavant Kanetkar and Shrirang Korde	1st Edition, 2018, BPB Publications

### Web Material Link(s):

- <https://nptel.ac.in/courses/106106126/>
- <https://nptel.ac.in/courses/106/105/106105166/>
- <https://www.tutorialspoint.com/arduino/>
- <https://pythonprogramming.net/introduction-raspberry-pi-tutorials/>

### Course Evaluation:

#### Theory:

- Continuous Evaluation consists of two tests of 30 marks and 1 hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

#### Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/ Oral performance consists of 30 marks during End Semester Exam.

### Course Outcome(s):

After completion of the course, the students will be able to

SECE3241	ARTIFICIAL INTELLIGENCE OF THINGS
CO 1	Understanding Concepts of Artificial Intelligence and Internet of Things.
CO 2	Analyzing the Concepts of Hardware, Networking and Communication in IOT.
CO 3	Elaborating minicomputer in IOT named as Raspberry PI.
CO 4	Introducing Cloud and AI Platforms for IoT Integration
CO 5	Explaining and designing secure AIOT Applications.

### Mapping of CO with PO

SECE3241	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2										2
CO 2	3	3	2	2	2							2
CO 3	3		3		2							2
CO 4	3	2	2	2	2						2	2
CO 5	3	3	3	3	3	2	2	2	2	2	2	2

### Mapping of CO with PSO

SECE3241	PS01	PS02	PS03
CO 1	3	2	2
CO 2	3	3	2
CO 3	3	2	2
CO 4	3	3	3
CO 5	3	3	3

#### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction of AI and IoT	1, 2
2.	Hardware in IoT	2, 3, 4
3.	Networking in IoT	2, 3, 4
4.	Communication in IoT	2, 3, 4
5.	Raspberry Pi	2, 3, 4
6.	IoT and AI Platforms	2, 3, 4
7.	Security and Privacy in AIoT	5, 6
8.	AIoT Application Development - Case Studies	6

**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SECE4211

Course Name: Machine Learning

Prerequisite Course(s): Foundation of Machine Learning (SEML3211)

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Master the concepts of supervised and unsupervised learning, recommendation engine, and time series modeling.
- Implement models such as support vector machines, kernel SVM, naive Bayes, decision tree classifier, random forest classifier, logistic regression, K-means clustering and more in Python.
- Comprehend the theoretical concepts and how they relate to the practical aspects of Machine Learning.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Artificial Intelligence and Machine Learning:</b> Learning Problems, designing a learning system, Issues with machine learning. Concept Learning, Version Spaces and Candidate Eliminations, Inductive bias.	06	10
2.	<b>Supervised learning:</b> Regression: Linear Regression, Polynomial Regression, Support Vector Machine Regression, Decision Tree Regression, Random Forest Regression Classification: Logistic Regression, Support Vector Machines, Decision Trees, Random Forests, Naive Baye	08	20
3.	<b>Artificial Neural networks and genetic algorithms:</b> Neural Network Representation, Appropriate problems for Neural Network Learning, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Remarks on Back Propagation Algorithms. Case Study: face Recognition.	09	20
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Bayesian Learning:</b> Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least squared Error Hypothesis, Maximum likelihood hypothesis for Predicting probabilities, Minimum Description Length, Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier. Case Study: Learning to classify text.	09	20

5.	<b>Unsupervised learning:</b> Unsupervised learning, Applications, challenges, Clustering, Association Rule Learning, Dimensionality Reduction, K-means Clustering, Density-Based Clustering (DBSCAN), Apriori Algorithm, Principal Component Analysis (PCA)	07	20
6.	<b>Overview:</b> Typical application areas, such as Recommender System.	06	10
<b>TOTAL</b>		45	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction	02
2.	Build a decision tree from given data and visualize its structure.	02
3.	Train and test a decision tree classifier on a dataset.	02
4.	Apply K-Means clustering to group data into clusters.	02
5.	Implement k-NN classification and test it on a dataset.	02
6.	Train a Random Forest classifier and analyze its predictions.	04
7.	Implement an SVM classifier and test it on a dataset.	04
8.	Implement the PageRank algorithm to rank web pages.	04
9.	Train a Naïve Bayes classifier for text or numerical data.	04
10.	Build and test a Classification and Regression Tree (CART) model.	04
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Machine Learning	Tom M Mitchell	McGraw Hill

#### Reference Book(s):

Title	Author(s)	Publication
Pattern Recognition and Machine Learning	Christopher Bishop	Springer-Verlag New York Inc.
Real-World Machine Learning	Henrik Brink, Joseph Richards, Mark Fetherolf	DreamTech

#### Web Material Link(s):

- <https://nptel.ac.in/courses/106/105/106105152/>
- [https://wqu.org/programs/datascience/?utm\\_source=datawrkz&utm\\_medium=search&utm\\_campaign=datascience&gclid=EAIaIQobChMir\\_TK5ZO5wIVzQorCh0YdQBvEAAAYASAAEgLb5PD\\_BwE](https://wqu.org/programs/datascience/?utm_source=datawrkz&utm_medium=search&utm_campaign=datascience&gclid=EAIaIQobChMir_TK5ZO5wIVzQorCh0YdQBvEAAAYASAAEgLb5PD_BwE)

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, and average at the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

##### Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.

- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/ Oral performance consists of 30 marks during End Semester Exam.

### Course Outcome(s):

After completion of the course, the students will be able to

SECE4211	MACHINE LEARNING
CO 1	Recognize basic problem with hypothesis and version spaces.
CO 2	Understand and apply the features of machine learning on real world problems.
CO 3	Identify and utilize various algorithms of supervised and unsupervised learning.
CO 4	Recall the concept of neural networks, Bayesian analysis from probability models and methods.
CO 5	Illustrate fundamental concepts of genetic algorithm.

### Mapping of CO with PO

SECE4211	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		2		1								1
CO 2			2	2	3							2
CO 3		2		1	2				1			1
CO 4	1	1		1	1					1		1

### Mapping of CO with PSO

SECE4211	PSO1	PSO2	PSO3
CO 1		3	
CO 2	2	1	2
CO 3	1	1	
CO 4	1		1
CO 5	1		1

### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module	Content	RBT Level
1.	Introduction to Artificial Intelligence and Machine Learning	1,2
2.	Supervised learning	1,2,3,5
3.	Artificial Neural networks and genetic algorithms	2,4,5
4.	Bayesian Learning	2,3,4
5.	Unsupervised learning	2,3,4
6.	Overview	2,3,5

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3560

Course Name: Project-I

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
0	3	-	3	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the current trend or technology.
- aware of future technologies.
- try to learn new technologies and apply them as much as possible.
- 

**Outline of the Project-I**

S. No.	Task	Weightage in %
1.	Group Formation	-
2.	Title Approval and Mentor Allocation	-
3.	First Progress Report	5
4.	First Review	10
5.	Second Progress Report	5
6.	Third Progress Report	5
7.	Second Review	10
8.	Fourth Progress Report	5
9.	Fifth Progress report	10
10.	Final Report Evaluation	25
11.	Final Presentation	25
	<b>TOTAL</b>	<b>100</b>

**Detailed Guideline(s):**

Sr. No.	Content	Weightage in %
1.	<b>Group Formation:</b> Group formation requires a minimum of one member and allows for a maximum of three members per group.	-
2.	<b>Title Approval and Mentor Allocation:</b> In the initial week of the semester, students are tasked with submitting a preliminary review of their project with a suitable title. This submission includes a comprehensive synopsis and outline, accompanied by a discussion on the anticipated project outcomes. This early review acts as the foundation for the project, laying the groundwork and establishing the direction for subsequent work. Additionally, during this stage, mentors are allocated to provide guidance and support throughout the project development process.	-
3.	<b>First Progress Report:</b> Within the initial weeks of commencing the project, students are required to submit a detailed report outlining their progress, achievements, and any	5

	challenges encountered.	
4.	<b>First Review:</b> This report serves as an early checkpoint, allowing for an assessment of whether the project is on track with the proposed timeline and objectives. Students should highlight key accomplishments, provide insights into the methodologies employed, and address any deviations from the initial plan.	10
5.	<b>Second Progress Report:</b> This report explores into the details of the progress made since the First Progress Report and First Review, offering a comprehensive overview of achievements, setbacks, and adaptations to the project plan. Students should reflect on the effectiveness of their methodologies, address any unforeseen obstacles, and demonstrate a proactive approach to overcoming challenges.	5
6.	<b>Third Progress Report:</b> At this stage, students provide a comprehensive update on the continuous evolution of their projects, demonstrating the resilience and adaptability required for successful project development. In the Third Progress Report, students delve into the nuances of their progress since the Second Progress Report, showcasing not only achievements but also a reflective analysis of the journey thus far.	5
7.	<b>Second Review:</b> During this stage, internal evaluators and expert panels engage in a comprehensive assessment of the project's overall development and achievements. The Second Review provides students with an opportunity to present their progress, methodologies, and outcomes to a panel of experts.	10
8.	<b>Fourth Progress Report:</b> In this report, students provide an updated justification of their progress, building on the insights gained from the Second Review. The Fourth Progress Report encapsulates the continuous refinement and optimization of project strategies. Students delve into the accomplishments achieved post-Second Review, addressing any recommendations made by external evaluators.	5
9.	<b>Fifth Progress report:</b> At this stage, students present a comprehensive overview of the project's evolution, encapsulating the lessons learned, achievements attained, and challenges overcome. The Fifth Progress Report serves as a reflection on the entire project lifecycle, providing insights into the iterative process of development. <b>The students should submit the final report to the mentor which will be further sent for evaluation.</b>	10
10.	<b>Final Report Evaluation &amp; Final Presentation:</b> During this phase, students present their comprehensive Final Report, encapsulating the entire project lifecycle, methodologies employed, outcomes achieved, and lessons learned. <b>Final Report Evaluation:</b> The Final Report undergoes a thorough evaluation by faculty members and external experts. This evaluation scrutinizes the depth of content, adherence to project objectives, and the overall quality of documentation. <b>Final Presentation:</b> Students present their projects to a panel of faculty members, peers, and potentially external stakeholders. This presentation offers an opportunity to showcase the project's significance, innovation, and impact.	50
	<b>TOTAL</b>	<b>100</b>

**Course Evaluation:**

S. No.	Evaluation criteria	Marks
1.	First Progress Report	50
2.	First Review	100
3.	Second Progress Report	50
4.	Third Progress Report	50
5.	Second Review	100
6.	Fourth Progress Report	50
7.	Fifth Progress report	100
8.	Final Report Evaluation	250
9.	Final Presentation	250
	<b>TOTAL</b>	<b>1000</b>

**The entire evaluation will be converted equivalent to 100 Marks.**

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE3560	PROJECT-I
CO 1	Analyze user requirements and implement innovative ideas for social and environmental benefits.
CO 2	Apply new technologies and design techniques concerned for devising a solution for a problem statement.
CO 3	Apply project management skills like task scheduling, teamwork, working in confine deadlines etc., for successfully development of the project.
CO 4	Prepare reports and presentations to communicate technical information.

**Mapping of CO with PO**

SECE3560	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	3	3	1	3	2	3			2	2
CO 2	3	1	1	2	3		2	3		1	2	3
CO 3			1					1	3	1	1	1
CO 4			1	1		2	1	1	1	3		3

**Mapping of CO with PSO**

SECE3560	PSO1	PSO2	PSO3
CO 1	2	3	2
CO 2	3	2	3
CO 3			1
CO 4			1

**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML3620

Course Name: Optimization Techniques

Prerequisite Course (s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	--	03	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

- Cast engineering minima/maxima problems into optimization framework.
- Learn efficient computational procedures to solve optimization problems.
- Use Matlab to implement important optimization methods.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Mathematical Preliminaries</b> Linear algebra: Matrices, Vectors, Eigen analysis, Elements of probability theory, Elementary multivariable calculus	08	25
2.	<b>Linear Programming</b> Introduction to linear programming model, Simplex method, Duality, Karmarkar's method, transportation and assignment problems	07	25
<b>Section II</b>			
3.	<b>Unconstrained Optimization</b> One-dimensional search methods, Gradient-based methods, Conjugate direction and quasi-Newton methods	04	15
4.	<b>Constrained Optimization</b> Lagrange theorem, First-Order Necessary Conditions (FONC), Second-Order Necessary Conditions (SONC), and Second-Order Sufficient Conditions (SOSC)	04	15
5.	<b>Non-Linear problems</b> Non-linear constrained optimization models, Karush-Kuhn-Tucker (KKT) condition, Projection methods	07	20
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No	Name of Practical	Hours
1.	Matrix operations in Matlab	02
2.	Differentiation of a vector and matrix in Matlab	02
3.	Integration of a vector and matrix in Matlab	02
4.	Simplex algorithm in Matlab	04

5.	Implementation of Newton's method in Matlab	04
6.	Implementation of Secant method in Matlab	04
7.	Implementation of Lagrange multiplier method in Matlab	04
8.	Implementation of KKT theorem in Matlab	04
9.	Implementation of BFGS method in Matlab	04
	<b>TOTAL</b>	30

**Reference Book(s):**

Title	Author/s	Publication
An introduction to Optimization	Edwin P K Chong, Stainslaw Zak	Wiley Publication
Nonlinear Programming	Dimitri Bertsekas	Athena Scientific

**Course Evaluation:**

**Theory:**

- Internal Evaluation component consists of 30 marks containing two internal exams of 30 marks. Average of the same will be considered for final marking.
- End Semester Examination consists of 60 marks.
- Faculty evaluation component will be cumulative of assignments, exercises, classroom behaviors consisting of 10 marks.

**Practical**

- Continuous Evaluation will be cumulative of practical performances, activities, presentations, viva and submissions consisting of 20 marks.
- Practical performance/quiz/drawing/test/submission of 30 marks during End Semester Exam.

**Course Outcome(s):**

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

SEML3620	OPTIMIZATION TECHNIQUES
CO 1	Recall the theoretical foundations of various issues related to linear programming modeling to formulate real world problems as a l p model.
CO 2	Identify appropriate optimization methods to solve complex problems involved in various industries.
CO 3	Explain the theoretical workings of the graphical, simplex and analytical methods for making effective decisions on variables so as to optimize the objective function.
CO 4	Find the appropriate algorithm for allocation of resources to optimize the process of assignment.

**Mapping of CO with PO**

SEML3620	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	3	2	2	2						2
CO 2	3	3	3	2	3	2						2
CO 3	3	3	3	3	3	3						2
CO 4	3	3	3	3	3	3						2

**Mapping of CO with PSO**

SEML3620	PSO1	PSO2	PSO3
CO 1	3	3	2
CO 2	3	3	2
CO 3	3	3	2

CO 4	3	3	2
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**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Mathematical preliminaries	1, 2,3,4
2	Linear Programming	3,4,5
3	Unconstrained optimization	2,3,4
4	Constrained optimization	3,4,5
5	Non-Linear Problems	2,3,4, 6

**P P Savani University  
School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML3630

Course Name: Business Analytics

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	--	03	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- find a meaningful pattern in data.
- learn to analyze the data using intelligent techniques.
- make better business decisions by using advanced techniques in data analytics.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Business Analytics</b> Definition, importance and applications, Types of analytics: Descriptive, Diagnostic, Predictive, Prescriptive, Technical architecture of Business Intelligence and Analytics (BIA), Fundamentals of data management, Online Transaction Processing (OLTP)	07	25
2.	<b>Statistical and Exploratory Analysis</b> Introduction to Statistical learning, Descriptive Statistics, Inferential Statistics through Hypothesis Tests, Maximum Likelihood Test, correlation Analysis, Exploratory Data Analysis (EDA), Business case applications of EDA	08	25
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
3.	<b>Predictive &amp; Prescriptive Analytics</b> Predictive Analytics using Machine Learning, Regression Analysis and its types, K Nearest Neighbors Regression & Classification Techniques, Clustering, Association Rules Analysis	10	30
4.	<b>Case Studies in Business Analytics</b> Two Case studies in Business analytics from any of the fields like Health care, Retail, Finance, Supply chain, Marketing, etc.	05	20
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No	Name of Practical	Hours
1.	Introduction to Business Analytics Tools	02

2.	Data Preprocessing & Cleaning	04
3.	Exploratory Data Analysis (EDA) & Visualization	04
4.	Regression Analysis (Eg. Linear & Multiple Regression for Sales Prediction)	02
5.	Classification Techniques (Eg. Logistic Regression, Decision Trees for Customer Churn)	04
6.	Clustering & Market Segmentation (K-Means, Hierarchical Clustering)	04
7.	Sentiment Analysis for Customer review analysis	02
8.	Business Intelligence & Dashboard Development	02
9.	Capstone Case Study.	06
	<b>TOTAL</b>	<b>30</b>

**Text Book(s):**

Title	Author/s	Publication
Business Analytics: Data Analysis & Decision Making	S. Christian Albright, Wayne L. Winston	Cengage Learning

**Reference Book(s):**

Title	Author/s	Publication
Intelligent Data Analysis	Michael Berthold, David J. Hand	Springer, 2007
Mining of Massive Datasets	Anand Rajaraman, Jeffrey David Ullman	Cambridge University Press

**Web Material Link(s):**

- [https://onlinecourses.nptel.ac.in/noc24\\_cs65/](https://onlinecourses.nptel.ac.in/noc24_cs65/)
- <https://www.coursera.org/learn/data-analytics-business>

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/ Oral performance consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

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

SEML3630	BUSINESS ANALYTICS
CO 1	Immediate understanding of data with various analysis techniques and business analytics.
CO 2	Compute basis analysis techniques.
CO 3	Explain machine learning and analysis techniques for data.
CO 4	Visualize the outcome of analysis.

### Mapping of CO with PO

<b>SEML3630</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	2	2	3							2
CO 2	3	3	2		1							2
CO 3	2	3	2	3	2							2
CO 4	3	2	2	2	2							2

### Mapping of CO with PSO

<b>SEML3630</b>	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	3	2	2
CO 3	3	3	2
CO 4	3	2	2

### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	Introduction to Business Analytics	1,2
2	Statistical and Exploratory Analysis	2,3,4,5
3	Predictive & Prescriptive Analytics	2,3,4,5
4	Case Studies in Business Analytics	3,4,5,6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3620

Course Name: Service Oriented Computing

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	-	03	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- explain the underlying principles of Service Oriented Architecture.
- describe and understand different terminologies used in Service Oriented Architecture.
- apply the different concepts of SOA to build different applications.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction</b> Introduction to distributed Computing and Web services architectures and standards, Fundamental SOA, Key Principles of SOA. Monolithic vs SOA vs Microservices	04	15
2.	<b>Enterprise architectures</b> Integration versus interoperation, J2EE, .NET, Model Driven Architecture, Concepts of Distributed Computing, XML.	04	15
3.	<b>Basic Concepts</b> Web services framework, Services (Web services: Definition, Architecture, and standards), Service descriptions with WSDL, Messaging with SOAP, UDDI.	07	20
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Principles of Service-Oriented Architecture</b> Message Exchange Pattern, Coordination, Atomic Transactions, Business Activities, Orchestration, Choreography, WS-Addressing, WS-Reliable Messaging, WS-Policy (including WS-Policy Attachments and WS-Policy Assertions), WS-Metadata Exchange, WS-Security (including XML-Encryption, XML-Signature, and SAML).	07	20
5.	<b>Principles of Service-Oriented Computing</b> RPC versus Document Orientation, Service Life Cycle, Service Creation, Service Design and Build, Service Deployment, Publish Web service using UDDI, Service Discovery, Service Selection, Service Composition, Service Execution, and Monitoring, Service Termination.	08	30
<b>TOTAL</b>		30	100

**List of Practical:**

Sr. No.	Name of Practical	Hours
1.	Develop DTD and XSD for University Information System having Exam Enrolment from the beginning of Semester, along with Exam Registration and Marks submission by Teachers to University from Various Colleges and Results in Sheets Generation by University on Online Report.	02
2.	Develop Mark sheet XML Document and display Mark sheet based on CSS and XSL presentation Format.	04
3.	Develop Java Based Program using JAXP or XML API in reading XML file for Students Information and Display HTML Table.	02
4.	Develop Java Based Web Service using REST and SOAP-Based web service in NetBeans for University Course List and Search Course based Course Title and Course ID.	04
5.	Create DTD file for student information and create a valid well-formed XML document to store student information against this DTD file.	02
6.	Create XMS schema file for student information and create a valid well-formed XML document to store student information against this DTD file.	04
7.	Create web calculator service in .NET Beans and create Java client to consume this web service.	02
8.	Develop same web service using JX-WS.	04
9.	Create web calculator service in .NET and Create java client to consume web service developed using Apache AXIS.	02
10.	Using WS -GEN and WS-Import develop the java web service & call it by Java Client.	04
<b>TOTAL</b>		<b>30</b>

**Text Book(s):**

Title	Author/s	Publication
Service Oriented Architecture: Concepts, Technology, and Design	Thomas Erl	Pearson education

**Reference Book(s):**

Title	Author/s	Publication
Applied SOA	Michael Rosen, Boris L, Kevin S., Marc J. B.	Wiley Publication.
SOA based Enterprise Integration	Waseem Roshen	TMH Publication

**Web Material Link(s):**

- <https://www.service-architecture.com/articles/web-services/service-oriented-architecture-soa-definition.html>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal Viva consists of 20 marks.

- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during End Semester Exam.

### Course Outcome(s):

After completion of the course, the students will be able to

SECE3620	SERVICE ORIENTED COMPUTING
CO 1	Explain the difference between monolithic architecture versus service-oriented architecture (soa).
CO 2	Practice real life examples and identify the underlying principles of soa.
CO 3	Implement and integrate service-oriented architecture in the development cycle of web service-based applications.
CO 4	Understand advanced concepts such as service composition, orchestration and choreography.

### Mapping of CO with PO

SECE3620	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		1								1		
CO 2		2	1	1	1							
CO 3		1	2	3	2							2
CO 4		1			1							2

### Mapping of CO with PSO

SECE3620	PSO1	PSO2	PSO3
CO 1		1	
CO 2	3	3	3
CO 3	2	1	1
CO 4	1	1	2

### Level of Revised Bloom's Taxonomy in Assessment:

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1,2
2	Enterprise architectures	1,2,3
3	Basic Concepts	1,2,3
4	Principles of Service-Oriented Architecture	1,2,4
5	Principles of Service-Oriented Computing	1,2,3,4

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3650  
Course Name: Blockchain Fundamentals  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	2	-	3	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Understand blockchain concepts, principles, structure, functionality, and applications.
- Learn the history, evolution, and significance of blockchain in decentralized systems.
- Differentiate between public, private, and consortium blockchains.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Blockchain:</b> The growth of blockchain technology, distributed systems and the history of blockchain, blockchain defined: Peer-to-peer, distributed ledger, cryptographically secure, append-only, and consensus mechanisms, generic elements of a blockchain and how blockchain works, types of blockchains: Public, private, semiprivate, tokenized, and tokenless, consensus mechanisms: CAP theorem, proof of work, and alternative methods, benefits, limitations, and applications of blockchain technology.	05	20
2.	<b>Cryptography in Blockchain:</b> Confidentiality, integrity, and authentication, symmetric cryptography: Block ciphers and stream ciphers, Advanced Encryption Standard (AES): Design and operation, public key cryptography: RSA, Elliptic Curve Cryptography (ECC), and digital signatures, cryptographic hash functions: SHA-256 and SHA-3, Merkle trees, Patricia trees, and Distributed Hash Tables (DHTs), zero-knowledge proofs, blind signatures, and homomorphic encryption.	06	20
3.	<b>Bitcoin:</b> Overview and digital keys, Bitcoin addresses: Private keys, public keys, and Base58Check encoding, transactions in Bitcoin: Lifecycle, inputs, outputs, and transaction malleability, blockchain structure: Blocks, headers, and the genesis block, mining: Proof of Work, rewards, and mining systems (CPU, GPU, FPGA, ASIC), Bitcoin wallets: Types (brain, paper, hardware, mobile, online), innovations in Bitcoin: Bitcoin Improvement Proposals (BIPs), SegWit, and Bitcoin forks (Cash, Gold).	04	10
<b>Section II</b>			
Module	Content	Hour	Weightag

No.		s	e in %
4.	<b>Decentralization and Smart Contracts:</b> Decentralization using blockchain: Disintermediation and ecosystem decentralization, decentralized organizations: DAOs, DACs, and DASs, smart contracts: History, definition, and templates, oracles and smart oracles for real-world data, deploying smart contracts on blockchain platforms, overview of the Ethereum ecosystem: Keys, accounts, and transactions, Ethereum Virtual Machine (EVM): World state, account state, and transaction execution..	07	25
5.	<b>Alternative Cryptocurrencies and Development Tools:</b> Proof of Stake (PoS), Proof of Storage, and other consensus algorithms, privacy and anonymity: Zcash, mixing protocols, and inherent anonymity, Initial Coin Offerings (ICOs): Overview and ERC20 tokens, development tools: Solidity, Truffle, MetaMask, and EthereumJS, programming in Solidity: Types, functions, and control structures, using Web3.js: Interfacing blockchain with JavaScript, developing and deploying Decentralized Applications (DApps).	08	25
<b>TOTAL</b>		<b>30</b>	<b>100</b>

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Creating a Merkle Tree and Understanding its Role in Blockchain	2
2.	Creation of a Block and Understanding Block Structure	2
3.	Implementing Blockchain with Basic Programming Code	2
4.	Creating an ERC20 Token and Deploying on Ethereum	2
5.	Implementing Blockchain with Java and Merkle Tree Integration	2
6.	Java Code to Implement Mining using Proof-of-Work in Blockchain	2
7.	Java Code to Implement Peer-to-Peer Network for Blockchain Transactions	2
8.	Creating a Cryptocurrency Wallet and Understanding Key Management	2
9.	Writing and Deploying a Basic Ethereum Smart Contract	2
10.	Implementing Blockchain Consensus Algorithms	2
11.	Developing a Decentralized Application (DApp) on Ethereum	2
12.	Building a Blockchain Explorer for Transaction Tracking	2
13.	Implementing Layer-2 Solutions for Blockchain Scalability	2
14.	Simulating Blockchain Security Attacks and Countermeasures	2
15.	Final Project: Developing a Blockchain-based System for Real-World Use Cases	2
<b>TOTAL</b>		<b>30</b>

#### Text Book(s):

Title	Author/s	Publication
Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained, 2nd Edition	Imran Bashir	Packt Publishing

#### Reference Book(s):

Title	Author(s)	Publication
Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies is Changing the World	Don Tapscott, Alex Tapscott	Penguin Random House

Ethereum: Smart Contract Programming in Solidity	Rishabh R. Singh	BPB Publications
Hyperledger Fabric: A Distributed Ledger Technology	Nitin Gaur, Bill Lu, Chander Kant Gupta	Wiley

#### Web Material Link(s):

- [https://onlinecourses.nptel.ac.in/noc22\\_cs44/preview](https://onlinecourses.nptel.ac.in/noc22_cs44/preview)
- <https://www.ibm.com/blockchain/what-is-blockchain>
- <https://ethereum.org/en/what-is-ethereum/>
- <https://www.packtpub.com/product/mastering-blockchain-second-edition/9781788621757>
- <https://www.hyperledger.org/use/fabric>
- [https://www.youtube.com/watch?v=SSo\\_EIwHSd4](https://www.youtube.com/watch?v=SSo_EIwHSd4)
- <https://soliditylang.org/docs/>
- <https://www.youtube.com/watch?v=6WG7D47tGb0>
- <https://www.corda.net/corda-platform/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

##### Practical:

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

#### Course Outcome(s):

After completion of the course, the students will be able to

SECE3650	BLOCKCHAIN FUNDAMENTALS
CO 1	Demonstrate an understanding of blockchain technology, its core principles, and cryptographic methods, including public and private key cryptography, and consensus mechanisms.
CO 2	Analyze and compare the key features of Bitcoin and Ethereum, including blockchain structure, transaction types, and the role of mining, wallets, and smart contracts in both ecosystems.
CO 3	Evaluate the significance of smart contracts and their applications in decentralized systems, including a detailed understanding of Hyperledger projects, such as Fabric, Sawtooth, and Corda.
CO 4	Explain the architecture of the Ethereum blockchain, the role of the Ethereum Virtual Machine (EVM), and how Ethereum is used to develop decentralized applications (DApps) and decentralized finance (DeFi) solutions.
CO 5	Identify and assess scalability and security challenges in blockchain technology, with a focus on Ethereum, and explore solutions like Layer-2 protocols and the transition to Ethereum 2.0.

#### Mapping of CO with PO

SECE3650	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	1	2	3				1			1

CO 2	3	3	2	1	3				1			1
CO 3	3	3	2	1	2				1			1
CO 4	3	3	2	1	3				1			1
CO 5	3	3	2	1	3				1	1		1

#### Mapping of CO with PSO

SECE3650	PSO1	PSO2	PSO3
CO 1	3	1	2
CO 2	3	2	1
CO 3	3	2	2
CO 4	3	3	1
CO 5	2	1	3

#### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction to Blockchain and Cryptography	1, 2
2.	Bitcoin and Ethereum Fundamentals	1, 2, 3
3.	Smart Contracts and Hyperledger Technology	2, 3, 4
4.	Ethereum and Its Applications	2, 3, 4, 5
5.	Blockchain Scalability and Security Challenges	3, 4, 5, 6

**P P Savani University  
School of Engineering**

**Department of Information Technology**

Course Code: SEIT3640

Course Name: Advanced Web Technologies

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	00	03	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Write backend code in Python/Java, PHP languages and writing optimized front end code HTML and JavaScript.
- Understanding MVC architecture in Web based applications, with Advanced PHP concepts and Laravel Framework along with Node.js and Angular.js.
- Give basic understanding of URL methods, MVC Framework, Unit Testing, Web Services, API Node Servers, and routing.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>PHP</b> Introduction to PHP and its syntax, combining PHP and HTML, understanding PHP code blocks like Arrays, Strings, Functions, looping and branching, file handling, processing forms on the server side, cookies, and sessions.	08	10
2.	<b>Object-Oriented PHP</b> Object-Oriented Programming with PHP – Classes, Properties, Methods, Constructor, Destructor, Getters and Setters, Encapsulation, Inheritance, Data Abstraction, Polymorphism.	08	20
3.	<b>PHP &amp; MySQL</b> Introduction to PHPMyAdmin, connection to MySQL server from PHP, execution of MySQL queries from PHP, receiving data from the database server, and processing it on the webserver using PHP. Web Scraping using cURL, Regular Expressions, Mail functions, Web Services, and APIs.	06	20
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>PHP MVC Framework – Laravel</b> Introduction to Laravel and MVC, Environment Setup, Routes, Namespaces, Controllers, Views, Blade Templates, Migrations, Request-Response cycle, Redirections, Forms, Sessions, Cookies, Database Connectivity, and CRUD operations.	09	15
5.	<b>Node.js and Angular</b> Basic web development, environmental setup, callbacks, node package manager (NPM) utilization, streams and buffers,	08	15

	Express framework basics, MongoDB basics, and REST API creation. Setup Node.js with Angular.		
6.	<b>Web Sockets</b> Introduction to Web Sockets, Web Socket URIs, Web Socket APIs, Opening Handshake, Data Framing, Sending and Receiving Data, Closing Connections, Error Handling, and Web Socket Security.	06	20
	<b>TOTAL</b>	45	100

#### List of Practical:

Sr. No	Name of Practical	Hours
1.	Install and Configure PHP and MySQL	04
2.	Develop a Simple Web Page in PHP Using Class, Object, Inheritance, and Function	02
3.	Develop a Web Application in PHP Using Constructor and Destructor	02
4.	Write a PHP Program to Calculate Date and Time Functions	02
5.	Create a Web Page to Advertise a Product of the Company Using Images and Audio	02
6.	Create a PHP Page for Login System Using Session	02
7.	Create a Web Page for a Travel Agency with Database Connectivity	02
8.	Develop a Small Project Using the Laravel Framework	04
9.	Develop a Web Application as a Mini Project Using Node.js	10
	<b>TOTAL</b>	<b>30</b>

#### Text Book (s):

Title	Author/s	Publication
Black Book, Web Technologies	Kogent Learning Solutions Inc	Dreamtech Press
Full Stack Web Development for Beginners	Riaz Ahmed	Atlantic publisher

#### Reference Book (s):

Title	Author/s	Publication
Web Technologies-A Computer Science Perspective	Jeffrey C. Jackson	Pearson Education
AngularJS: Up and Running Enhanced Productivity with Structured Web Apps	Brad Green, Shyam Seshadri	O'Reilly Media
Learning React Functional Web Development with React and Redux	Alex Banks, Eve Porcello	O'Reilly Media

#### Web Material Link(s):

- [https://www.w3schools.com/whatis/whatis\\_fullstack.asp](https://www.w3schools.com/whatis/whatis_fullstack.asp)
- <https://www.geeksforgeeks.org/web-technology/>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted out of 30 marks.
- Faculty Evaluation consists of 10 marks as per guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks Exam.

##### Practical:

- Continuous Evaluation Consist of Performance of Practical which will be evaluated out of 20 marks for each practical and average of the same will be converted to 20 marks.
- Internal Viva consists of 20 marks.

- Practical performance/quiz/test of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

### Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

<b>SEIT3640</b>	<b>ADVANCED WEB TECHNOLOGIES</b>
CO1	Identify the basic concepts of web & markup languages.
CO2	Develop web applications using scripting languages & frameworks.
CO3	Creating controller working with and displaying in angular js and nested forms with ng-form.
CO4	Working with the files in react js and constructing elements with data.
CO5	Develop dynamic web pages with usage of server-side scripting NodeJS and MongoDB.

### Mapping of CO with PO

<b>SEIT3640</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		3	3	2	3	2		3	1			1
CO 2		3	3	2	3	2		3	3		2	2
CO 3		3	3	2	3	2		3	3		3	3
CO 4		3	3	2	3	2		3	3		2	3
CO 5		3	3	2	3	2		3	3		3	3

### Mapping of CO with PSO

<b>SEIT3640</b>	PSO1	PSO2	PSO3
CO 1	2	2	1
CO 2	1	3	3
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

<b>Module No</b>	<b>Content</b>	<b>RBT Level</b>
1	PHP	1,2,3
2	Object Oriented PHP	2,3
3	Advance PHP	2,3,6
4	PHP MVC Framework – Laravel	2,3
5	PHP & MySQL	2,3,4,6
6	Web Sockets	2,3,4,6

**P P Savani University  
School of Engineering**

**Department of Information Technology**

Course Code: SEIT3650

Course Name: Augmented Reality and Virtual Reality

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	2	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- Understand the principles, architecture, and components of AR and VR systems and their applications in real-world scenarios.
- Design and develop basic AR/VR applications using appropriate tools and technologies for immersive user experiences.
- Analyze the challenges and limitations of AR/VR systems, including hardware, software, and user interaction considerations.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Augmented Reality (AR)</b> History of AR - Augmented reality characteristics, Difference between Augmented Reality and Virtual Reality, AR technological components, Technologies used in AR, Feature Extraction, Hardware component, AR devices, Importance of AR, Real world uses of AR - AR types, Software tools available for AR.	03	12
2.	<b>AR Hardware and Software</b> Sensory hardware; Limitations and interactions; AR and VR together; Introduction to AR headset and smart glasses; Various AR software available; Introduction to Spark AR; Create a face detection app	04	15
3.	<b>Technology Integration and Implementation of AR</b> Technology use and integration in industrial settings, Assistive training to faculty members, Planning and administration for implementation, AR implications.	05	15
4.	<b>Augmented Reality and Virtual Reality for Micro Learning</b> Micro learning techniques, Utilizing VR for learning, VR for Practical online assessment, VR info graphics, Virtual case considerations, Utilizing AR for learning, Accessible learning, sensible data elevated learner engagement, VR technology, Components of VR, VR Hardware, VR applications, Civil Engineering, Real Estate, Biology and Medicine, Virtual Mall, VR in Education, Virtual Laboratory, Factory Planning, Automobile Industry.	05	15
<b>Section II</b>			
Module No.	Content	Hours	Weightage in %
5.	<b>VR Development Tools and Frameworks</b>	04	16

	Introduction to VR development platforms (Unity, Unreal Engine), Creating 3D environments for VR, Basics of VR interactions and animations, Integration of audio and spatial effects in VR		
6.	<b>Interaction Techniques in AR/VR</b> Interaction design principles for AR/VR, Gesture recognition and tracking, Voice and eye-tracking in AR/VR systems	05	15
7.	<b>AR/VR Project Implementation</b> Project planning and development lifecycle, Designing an end-to-end AR/VR solution, Presentation and evaluation of projects	04	12
<b>TOTAL</b>		30	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction to Spark and the Fundamentals Function	04
2.	Create a Face Detection App using spark.	08
3.	Introduction to Unity and its installation.	04
4.	Introduction to AR foundation; Installing AR foundation SDK; SDK setup	10
5.	Introduction to C-sharp and its Basics	04
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
Innovating with Augmented Reality: Applications in Education and Industry	Taylor & Francis Group	CRC Press,
Understanding Virtual Reality: Interface, Application and Design	William R Sherman and	Understanding Virtual Reality: Interface, Application and Design

#### Reference Book(s):

Title	Author(s)	Publication
Designing Virtual Systems: The Structured Approach”	Gerard Jounghyun Kim	WILEY
“3D User Interfaces, Theory and Practice	Doug A Bowman, Ernest Kujiff, Joseph J LaViola	Addison Wesley

#### Web Material Link(s):

- <https://nptel.ac.in/courses/106/106/106106138/>
- <https://www.coursera.org/learn/introduction-virtual-reality>

#### Course Evaluation:

##### Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

##### Practical:

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.

- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

### Course Outcome(s):

After completion of the course, the students will be able to

SEIT3650	Augmented Reality and Virtual Reality
CO 1	Develop a strong understanding of AR/VR concepts, technologies, and applications across various industries, enhancing career prospects.
CO 2	Gain proficiency in AR/VR development tools and frameworks, enabling the creation of interactive and immersive experiences.
CO 3	Acquire skills in designing user interactions, integrating 3D models, and optimizing AR/VR applications for diverse platforms and devices.
CO 4	Address challenges in AR/VR deployment, including ethical considerations and privacy concerns, while exploring future trends like XR and MR.

### Mapping of CO with PO

SEIT3650	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3		1	3					2	3	1
CO 2	2	3	3		3	2		1				1
CO 3	2	3	2	1	2	3		1	2	2	3	1
CO 4	3	2	2			2			3	2		1
CO 5	3	3	1		2					1	3	1

### Mapping of CO with PSO

SEIT3650	PSO1	PSO2	PSO3
CO 1	3	3	1
CO 2	2	1	3
CO 3	1	2	
CO 4	3	1	1
CO 5	2	2	3

### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction to Augmented Reality (AR)	2,4
2.	AR Hardware and Software	2,3,4
3.	Technology Integration and Implementation of AR	2,4,5
4.	Augmented Reality and Virtual Reality for Micro Learning	1,2,5
5.	VR Development Tools and Frameworks	2,3,4,6
6.	Interaction Techniques in AR/VR	2,3,5
7.	AR/VR Project Implementation	2,3

**P P Savani University**  
**Training and Placement Cell**

Course Code: TNPC3010

Course Name: Corporate Grooming & Etiquette

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
01	02	00	02	0	0	50	50	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- learn corporate and professional structure and mannerisms.
- acquire self-development skills to balance casual and formal situation.
- polish their personal skills for apt behavior in the context of corporate structure.
- develop adequate Skill set required for the workplace.
- become aware about the professional etiquettes and tactics to follow them.

**Course Content:**

<b>Section - I</b>			
Module No.	Content	Hours	Weightage in %
1	<b>Corporate Grooming</b> Introduction to corporate culture Corporate Expectations Need of Self-Grooming to the Corporate Expectations Understanding and importance of Professionalism	03	25
2	<b>Personal Skills</b> Behavioral skills, Language Skills, Knowledge Skills, Problem Solving Skills, Developing professional attitude	04	25
<b>Section - II</b>			
3	<b>Management Skills</b> Self-management, Time management, Work life balance	04	25
4	<b>Organizational Etiquettes</b> General Workplace Etiquettes Presentation Etiquettes Meeting Etiquettes	04	25

**List of Practical:**

Sr. No	Name of Practical	Hours
1	Corporate Grooming (Video session/ Role Play/ Skit)	04
2	Personal Skills (Games/ Quiz/ Activities)	08
3	Management Skills (Management Activities/ Video Sessions)	06
4	Organizational Etiquettes (Case Study/ Activities/ Video Sessions)	06
5	Computer Assisted Activities of Corporate Grooming	06

**Reference Book(s):**

Title	Author/s	Publication
Grooming and Etiquette for Corporate	John Chibaya Mbuya	2009

Men and Women		
Effective Communication Skills for Public Relations	Andy Green	Kogan Page, 2006
Personality Development and Soft Skills	Barun Mitra	Oxford University Press, 2016
The EQ Edge: Emotional Intelligence and Your Success	Stein, Steven J. & Howard E. Book	Wiley & Sons, 2006.
Cross Cultural Management: Concepts and Cases	Madhavan	Oxford University Press, 2016
Corporate Grooming and Etiquette	Sarvesh Gulati	Rupa Publications India Pvt. Ltd., 2012
Behavioral Science: Achieving Behavioral Excellence for Success	Dr. Abha Singh	John Wiley & Sons, 2012

### Course Evaluation:

#### Practical

- Continuous Evaluation consists of Performance of Practical to be evaluated out of 10 for each practical and average of the same will be converted to 30 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test/submission of 25 marks during End Semester Exam.
- Viva/Oral performance of 25 marks during End Semester Exam.

### Course Outcome(s):

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

TNPC3010	CORPORATE GROOMING & ETIQUETTE
CO 1	Understand the importance of professional etiquettes and ways to improve the same.
CO 2	Gain the knowledge and practice of skill sets required in corporate set up.
CO 3	Learn personal management skills in the organizational context.
CO 4	Develop an awareness about the corporate etiquettes.
CO 5	Understand the importance of self-grooming

### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Corporate Grooming	1,2,3,4,5
2	Personal Skills	1,2,3,4,5,6
3	Management Skills	1,2,3,4,5
4	Organizational Etiquettes	2,3,4,5

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE3490

Course Name: MOOC Course / University Elective

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	100	-	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help the learners to

- Learn new subjects as per recent trends in the industry from national experts.

**Course Content:**

Performance analysis will be based on any one of the following subjects:

1. Deep Learning
2. Computer Graphics
3. Computer Vision
4. Design Engineering
5. Neural Networks
6. Applied Natural Language Processing
7. Social Networks
8. Virtual Reality
9. Augmented Reality
10. Real time systems
11. Big Data
12. Advanced graph theory
13. Theory of computation
14. Design And Engineering Of Computer Systems
15. Ethical Hacking
16. UI & UX
17. Data Analytics
18. Data Visualization
19. Algorithms For Big Data
20. Compiler Design

Or any other MOOC course; available time to time.

**Course Evaluation:**

**Practical:**

- Continuous Evaluation as per the guidelines of Course assignments/Internal Exams.
- The Course assignments/Internal Exams score will be directly fetched and converted out of 100.

**Course Outcome(s):**

After the completion of the course, the following course outcomes will be able to:

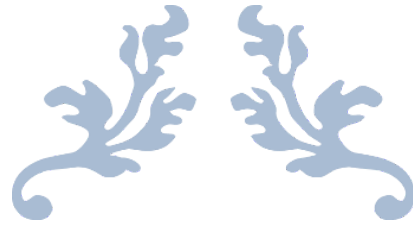
<b>SECE3490</b>	<b>MOOC COURSE / UNIVERSITY ELECTIVE</b>
CO 1	Inculcate mode of self-learning.
CO 2	Exposure to relevant and newest tools and technologies.
CO 3	Value addition when the student is applying for jobs.
CO 4	Use MOOC program for GATE and high studies preparation.
CO 5	Facilitate students to attain certificate and to make them employable in the industry or pursue higher education program.

#### Mapping of CO with PO

<b>SECE3490</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1		1		2	1	1		1			1
CO 2	1		2	2	2				1	1		2
CO 3		2	2	2	2			1		2		
CO 4	2	1		1	1	1				1		2
CO 5						1		1		2		3

#### Mapping of CO with PSO

<b>SECE3490</b>	PSO1	PSO2	PSO3
CO 1	2	2	3
CO 2	3	2	2
CO 3	2	3	3
CO 4	3	3	2
CO 5	3	3	3



FOURTH YEAR B. TECH.



P P SAVANI UNIVERSITY																
SCHOOL OF ENGINEERING																
TEACHING & EXAMINATION SCHEME FOR FOURTH YEAR B.TECH. COMPUTER SCIENCE & ENGINEERING - MACHINE LEARNING & ARTIFICIAL INTELLIGENCE																
PROGRAMME AY: 2023-24																
7	SEML4212	Neural Networks and Deep Learning	Major/Core	ML	3	2	0	5	4	40	60	40	60	0	0	200
	SEML4221	Natural Language Processing	Major/Core	ML	3	2	0	5	4	40	60	40	60	0	0	200
	SECE4240	Computer Vision	Major/Core	CE	2	2	0	4	3	40	60	40	60	0	0	200
	SECE4560	Project-II	Minor	CE	0	3	0	3	3	0	0	100	0	0	0	100
		<b>Elective-III</b>	Minor		2	2	0	4	3	40	60	40	60	0	0	200
	TNPC3020	Creativity, Problem Solving & Innovation	SEC	TNPC/ SOE	2	0	0	2	2	100	0	0	0	0	0	100
	SECE4950	Project/Summer Internship	Minor	CE	0	5	0	0	5	0	0	100	0	0	0	100
									<b>Total</b>	<b>23</b>	<b>24</b>					
8	SECE4960	Project/Training	RP/OJT	CE	0	24	0	24	24	0	0	200	30 0	0	0	500

**P P SAVANI UNIVERSITY**

**SCHOOL OF ENGINEERING**

**TEACHING & EXAMINATION SCHEME FOR FOURTH YEAR B. TECH. COMPUTER SCIENCE & ENGINEERING - MACHINE LEARNING & ARTIFICIAL INTELLIGENCE – ELECTIVE COURSES**

Sem	Course Code	Course Title	Course Category	Offered By	Teaching Scheme					Examination Scheme						
					Contact Hours				Credit	Theory		Practical		Tutorial		Total
					Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
7	SEML4610	Research Methodology	Minor	ML	3	0	0	3	3	40	60	0	0	0	0	100
7	SEIT4630	Cyber Security	Minor	IT	2	2	0	4	3	40	60	40	60	0	0	200
7	SEIT4610	DevOps and Agile Foundation	Minor	IT	2	2	0	4	3	40	60	40	60	0	0	200

**P P Savani University**  
**School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML4212

Course Name: Neural Networks and Deep Learning

Prerequisite Course(s): Foundation of Machine Learning & Machine Learning

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

5. understand the foundations of artificial neural networks and deep learning architectures.
6. learn mathematical models, training algorithms, and optimization techniques for neural networks.
7. develop the ability to design, implement, and evaluate deep learning models for real-world applications.

**Course Content:**

Module No.	Content	Hours	Weightage in %
<b>SECTION-I</b>			
1.	<b>Introduction to Neural Networks</b> Biological neuron model, Artificial neuron, Neural network architecture, Learning paradigms (supervised, unsupervised, reinforcement), Perceptron, MLP, Activation functions.	05	10
2.	<b>Mathematics of Neural Networks</b> Linear algebra basics, Gradient descent, Loss functions, Backpropagation algorithm, Regularization (L1/L2, dropout), Overfitting & underfitting.	06	12
3.	<b>Deep Learning Basics</b> Deep neural network architecture, Vanishing/exploding gradients, Optimization algorithms (SGD, Momentum, RMSProp, Adam).	05	10
4.	<b>Convolutional Neural Networks (CNNs)</b> Convolution, pooling, padding, stride, CNN architectures (LeNet, AlexNet, VGG, ResNet). Applications: image classification.	08	18
<b>SECTION-II</b>			
5.	<b>Recurrent Neural Networks (RNNs)</b> Sequence modeling, RNN architecture, BPTT, LSTM, GRU, Applications in NLP.	06	13
6.	<b>Autoencoders &amp; Representation Learning</b> Undercomplete/Overcomplete autoencoders, Denoising autoencoder, Sparse autoencoder, Applications in feature extraction.	05	10
7.	<b>Generative Models</b> GANs (architecture, training challenges), Variational Autoencoders (VAE), Applications of generative models.	05	12
8.	<b>Advanced Topics &amp; Deployment</b> Transfer learning, Fine-tuning, Model compression, ONNX introduction, Deployment on cloud/edge devices, Real-world case	05	15

	studies.		
		<b>TOTAL</b>	<b>45</b>
			<b>100</b>

**List of Tutorial:**

Sr. No	Name of Tutorial	Hours
•	Python & DL frameworks setup (TensorFlow/PyTorch).	02
•	Implement perceptron & activation functions.	02
•	Build and train a deep neural network.	02
•	Implement CNN for image classification.	02
•	Use transfer learning with pretrained models.	02
•	Implement RNN/LSTM for text sequence.	02
•	Autoencoder training & denoising.	02
•	GAN implementation.	02
•	Model hyperparameter tuning.	02
•	Deploy model for inference.	02
	<b>TOTAL</b>	<b>30</b>

**Text Book(s):**

Title	Author/s	Publication
Deep Learning	Ian Goodfellow, Yoshua Bengio, Aaron Courville	MIT Press

**Reference Book(s):**

Title	Author/s	Publication
Deep Learning with Python	François Chollet	

**Web Material Link(s)**

- [https://onlinecourses.nptel.ac.in/noc20\\_cs62/preview](https://onlinecourses.nptel.ac.in/noc20_cs62/preview)

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical/Tutorial:**

10. Continuous Evaluation consists of performance of Practical/Tutorial which should be evaluated out of 10 for each practical and average of the same will be converted to 20 Marks.
11. Internal viva consists of 20 marks.
12. Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
13. Viva/Oral performance of 30 marks during End Semester Exam.

**Course Outcome(s):**

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

SECE4212	Neural Networks and Deep Learning
C01	Understand neural network architectures and their mathematical foundations.
C02	Apply deep learning algorithms for classification and prediction tasks.
C03	Analyze and optimize neural network performance using training strategies and regularization.
C04	Design and implement deep learning models using modern DL frameworks.

C05	Evaluate and deploy trained models for real-world applications.
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#### Mapping of CO with PO

SECE4212	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12
C01	3	3	2	3	2	-	1	1	-	2	1	2
C02	3	2	3	2	3	-	1	1	-	2	1	2
C03	2	3	3	3	2	-	2	1	-	3	1	2
C04	3	2	3	2	3	-	1	1	2	2	2	2
C05	2	3	2	3	2	1	2	1	1	3	2	3

#### Mapping of CO with PSO

SECE4212	PSO 1	PSO 2	PSO 3
C01	2	3	1
C02	3	2	1
C03	2	3	2
C04	3	2	2
C05	2	3	3

#### Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
•	Introduction to Neural Networks	1,2,3
•	Mathematics of Neural Networks	2,3,4
•	Deep Learning Basics	2,3,4
•	Convolutional Neural Networks (CNNs)	2,3,4
•	Recurrent Neural Networks (RNNs)	2,3,4
•	Autoencoders & Representation Learning	3, 4, 5
•	Generative Models	3, 4, 5
•	Advanced Topics & Deployment	4, 5, 6

**P P Savani University**  
**School of Engineering**

**Department of Computer Science & Engineering (ML & AI)**

Course Code: SEML4221

Course Name: Natural Language Processing

Prerequisite Course (s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	05	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

6. comprehend the key concepts of NLP which are used to describe and analyze language.
7. illustrate computational methods to understand language phenomena of word sense.
8. design and develop applications with natural language capabilities.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
4.	<b>Introduction</b> Overview and History of NLP, Advantages, and Limitations of NLP, Challenges in NLP, Phases of NLP, Applications of NLP in various domains, NLP Tools and Libraries	6	15
5.	<b>Language Modelling and Text Representation</b> Language Modelling: Unigram, Bigram, Trigram, N-gram models, Applications of Language Models, Bag-of-Words and TF-IDF Representations, Word Embeddings: Word2Vec (Skip-gram, CBOW), GloVe, Lexical Semantics and Feature Weighting Techniques, Morphology and POS Tagging	10	20
6.	<b>Parsing and Syntax Analysis</b> Constituency and Dependency Parsing Grammar and Parsing Techniques: Top-down and Bottom-up Parsing, Syntax Tree Representation and Dependency Relations, Semantic Role Labelling	7	15
<b>Section II</b>			
7.	<b>Word Sense Disambiguation</b> Word Sense Disambiguation (WSD: Overview and Importance, Knowledge-based, Supervised, and Unsupervised WSD, Use of WordNet and other Lexical Databases	06	15

8.	<b>Text Analytics and Summarization</b> Sentiment Analysis and Opinion Mining, Text Classification and Feature Extraction, Information Extraction and Retrieval, Text Summarization: Extractive and Abstractive, Question Answering Systems and Chatbots, Evaluation Metrics: Precision, Recall, F1, BLEU, ROUGE	10	20
9.	<b>Machine Translation and Multilingual NLP</b> Fundamentals of Machine Translation (MT), MT Approaches: Direct MT, Rule-Based and Knowledge-Based MT, Statistical MT, Neural MT, Cross-lingual NLP and Multilingual Embeddings	06	15
	<b>TOTAL</b>	45	100

**List of Practical:**

Sr. No	Name of Practicals	Hours
1.	Introduction to NLP and related packages in Python	02
2.	Text Normalization	02
3.	Part of Speech tagging experiments	02
4.	Root word conversion (stemming and Lemmatization)	02
5.	Morphological analysis of text	02
6.	N-gram analysis of text	02
7.	Implementation of Bag of word model with different weighing techniques	04
8.	Implementation of word sense disambiguation models	02
9.	WordNet usage-based experiment	04
10.	Text Classification based experiment	04
11.	Name Entity based experiment	04
	<b>TOTAL</b>	30

**Reference Book(s):**

Title	Author/s	Publication
Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition,	Jurafsky, David, and James H. Martin	PEARSON
Foundations of Statistical Natural Language Processing.	Manning, Christopher D., and HinrichSchütze.	Cambridge, MA: MIT Press
Natural Language Understanding.	James Allen.	The Benjamin/Cummings Publishing Company Inc..
Handbook of natural language processing.	Dale, R., Moisl, H., & Somers, H.,	CRC Press.

**Web material link:**

10. <https://nptel.ac.in/courses/106/105/106105158/>

11. <http://www.nptelvideos.in/2012/11/natural-language-processing.html>

**Course Evaluation:**

**Theory:**

15. Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration, which will be converted to 30 marks.
16. Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
17. End Semester Examination consists of 60 marks.

**Practical:**

1. Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
2. Internal viva consists of 20 marks.
3. Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
4. Viva/ Oral performance consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

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

<b>SEML422 1</b>	<b>NATURAL LANGUAGE PROCESSING</b>
CO 1	Understand the fundamental concepts, phases, challenges, and applications of Natural Language Processing along with its tools and libraries.
CO 2	Apply statistical and vector-based language modelling and text representation methods such as N-gram models, TF-IDF, and word embeddings for textual data processing.
CO 3	Analyze syntactic structures using parsing techniques, grammar formalisms, and dependency relations to interpret sentence meaning.
CO 4	Implement and evaluate semantic processing techniques such as Word Sense Disambiguation, Sentiment Analysis, Text Summarization, and Question Answering using suitable NLP approaches.
CO 5	Design and compare various Machine Translation and Multilingual NLP systems using Rule-based, Statistical, and Neural approaches.

**Mapping of CO with PO**

<b>SEML422 1</b>	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO 1	3	2	1	1	2					2		2
CO 2	3	2	2	1	3					1		2
CO 3	2	3	2	2	2					1		2
CO 4	2	2	3	2	3			1	1	2	1	2
CO 5	2	3	3	2	3	1	1	1	1	2	2	3

**Mapping of CO with PSO**

<b>SECE4080</b>	PSO1	PSO2	PSO3
CO 1	2	1	2
CO 2	3	2	2
CO 3	2	2	1
CO 4	3	3	2
CO 5	3	3	2

**Level of Revised Bloom's Taxonomy in Assessment**

1: Remember	2: Understand	3: Apply
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4: Analyze	5: Evaluate	6: Create
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Module No	Content	RBT Level
1	Introduction	1,2
2	Language Modelling and Text Representation	3,4
3	Parsing and Syntax Analysis	3,4,6
4	Word Sense Disambiguation	4,5,6
5	Text Analytics and Summarization	3,4,5
6	Machine Translation and Multilingual NLP	3,4,5

**P P Savani University**  
**School of Engineering**

Department of Computer Engineering

Course Code: SECE4240

Course Name: Computer Vision

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	--	03	40	60	40	60	--	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to,

- understand the fundamental concepts, mathematical models, and image processing techniques used in computer vision.
- analyze key computer vision algorithms for feature extraction, object detection, motion understanding, and image segmentation.
- apply deep learning-based methods to solve modern vision tasks such as classification, detection, and recognition.
- design and evaluate end-to-end computer vision applications for real-world problems using classical and deep learning techniques.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in%
1.	<b>Introduction</b> What is Computer Vision, Human vs computer vision, Digital image formation & perception, Sampling, quantization, intensity transformations, Basics of convolution & correlation, Requirements and Issues, Edge detection, Computer Vision Applications	05	15
2.	<b>Image Processing Foundations</b> Color models (RGB, HSV, LAB), Morphological operations (erosion, dilation, opening, closing), Image smoothing & sharpening filters, Image pyramids, Hough Transform for lines and circles	05	15
3.	<b>Feature extraction and Matching</b> Feature detection and description, Harris corner detector, SIFT, SURF, ORB features, Feature descriptors, Feature matching and Model fitting, Image stitching, panorama creation	05	20
<b>Section II</b>			

4.	<b>Object Detection &amp; Segmentation</b> Classical object detection, Background subtraction, Image segmentation: Thresholding, Region growing, Watershed, Image Detection, Face Recognition, Evaluation metrics	05	20
5.	<b>Deep Learning for Vision</b> Review of neural networks, CNN architecture: convolution, pooling, activation, training, Popular CNN models, Transfer learning, Image classification using CNNs	05	15
6.	<b>Advanced Vision Applications</b> Object detection models, Semantic & Instance segmentation, Applications in healthcare, agriculture, surveillance, robotics	05	15
	<b>TOTAL</b>	30	100

**List of Practical:**

Sr. No	Name of Practical	Hours
1.	Implement Basic Image operations.	02
2.	Implement Color model conversations.	02
3.	Implement Edge Detection.	04
4.	Morphological operations on grayscale & binary images.	02
5.	Implement Segmentation method.	04
6.	Implement Object detection models.	04
7.	Face Detection and Recognition.	02
8.	Implement Image classification using CNN.	02
9.	Create Application based on real world problem using computer vision.	04
10.	Implement methods of deep learning for object recognition.	04
	<b>TOTAL</b>	30

**Text Book(s):**

Title	Author/s	Publication
Computer Vision: Algorithms and Applications	Richard Szeliski	Springer

**Reference Book(s):**

Title	Author/s	Publication
Computer Vision - A modern approach	<u>David Forsyth, Jean Ponce</u>	Pearson
Image Processing, Analysis and Machine Vision	Milan Sonka, Vaclav Hlavac, Roger Boyle	Global Engineering: Timothy L. Anderson

**Course Evaluation:**

**Theory**

- Continuous Evaluation consists of two tests of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

## Practical

- Continuous Evaluation will be cumulative of practical performances, activities, presentations, viva and submissions consisting of 40 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

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

SECE4240	COMPUTER VISION
CO 1	Explain fundamental concepts of computer vision and digital image processing.
CO 2	Apply classical image processing and feature extraction techniques to analyze visual data.
CO 3	Implement object detection, feature matching, and segmentation techniques for real-world images.
CO 4	Develop deep learning models (CNNs) to classify and detect objects in images.
CO 5	Design, evaluate, and deploy complete computer vision applications using classical and deep learning methods.

## Mapping of CO with PO

SECE4240	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1	1	1					1	
CO 2	3	3	2	2	2				1	1	
CO 3	3	3	3	2	2				1	1	1
CO 4	3	3	3	3	3				1	1	2
CO 5	3	3	3	3	3				2	2	3

## Mapping of CO with PSO

SECE4240	PSO1	PSO2	PSO3
CO 1	3		2
CO 2	3	2	
CO 3	3	3	2
CO 4	3	2	2
CO 5	3	2	3

## Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1, 2, 3
2	Image Processing Foundations	2, 3, 4
3	Feature extraction and Matching	2, 3, 4, 5
4	Object Detection & Segmentation	2, 3, 4
5	Deep Learning for Vision	2, 3, 4, 5
6	Advanced Vision Applications	2, 3, 4, 5, 6

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE4560  
Course Name: Project-II  
Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	03	-	03	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help students to

1. understand the current trend or technology.
2. aware of future technologies.
3. try to learn new technologies and apply them as much as possible.

**Outline of the Project-II:**

Sr. No	Project-II Guidelines
1.	Selection of Title
2.	Literature Review
3.	Gap Identification
4.	Proposed Scheme
5.	Implementation of the proposal
6.	Report Writing
7.	Presentation & Question-Answer

**Detailed Guideline(s):**

Sr. No	Content
1.	<b>Selection of Title</b> Select a topic according to the specialization of students or future technology. After selecting the topic and proposed title, get approval from the concerned faculty.
2.	<b>Literature Review</b> Study of various technology or area to select a topic of the project.
3.	<b>Gap identification and Proposal</b> Students must identify the gaps in the existing research and design a proposal which will help in overcome the same.
4.	<b>Implementation</b> Students must implement their proposal in any of the programming languages.
5.	<b>Report Writing</b> The report must be prepared as per suggested guidelines consisting of Preamble, Objectives, Scope, Introduction, Conclusions, Recommendations and Annexure.
6.	<b>Presentation &amp; Question-Answer</b> At the end of the semester, the student/group of students shall give a presentation of their work followed by a viva-voce examination.

**Course Evaluation:**

Sr. No.	Evaluation criteria	Marks
1.	Selection of the topic related field (Within first 30 Days of commencement of semester)	25
2.	Initial Presentation of the topic (Within 31 to 40 Days of commencement of semester)	25
3.	An actual work carried out (Within 41 to 60 Days of commencement of semester)	25
4.	Report writing as per guidelines	25
5.	Final Presentation & Question-Answer session	25
<b>Grand Total:</b>		<b>100</b>

The entire evaluation will be converted equivalent to 200 Marks.

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE4560	PROJECT-II
CO 1	Distinguish and analyze the issues related to various existing system.
CO 2	Experiment on problem with the help of latest technologies.
CO 3	Utilize and implement knowledge in the application development.
CO 4	Facilitate society with recent technological advancement.

**Mapping of CO with PO**

SECE4560	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3		2				3	2			3
CO 2			3		3			2	3			3
CO 3	2	2			2			3	3	2		3
CO 4	3			3					2			3

**Mapping of CO with PSO**

SECE4560	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	3	3	3
CO 3	3	3	3
CO 4	3	3	3

**P P Savani University  
School of Engineering**

**Department of Computer Engineering**

Course Code: SECE4950

Course Name: PROJECT / SUMMER INTERNSHIP

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	05	-	05	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

1. have first-hand experience the real time situations in industrial scenario.
2. get familiar with engineering applications in industrial spectrum
3. learn to adapt themselves in professional scenario

**Outline of the Project/Summer Internship:**

Sr. No	Content
1.	Selection of Company / Project
2.	Learning and implementation.
3.	Report Writing.
4.	Presentation & Question-Answer

**Course Evaluation:**

Sr. No.	Evaluation criteria	Marks
1	Actual work carried & Report Submission	50
2	Final Presentation & Question-Answer session	50
<b>Grand Total:</b>		<b>100</b>

**Course Outcome(s):**

After completion of the course, the students will be able to

SECE4950	PROJECT / SUMMER INTERNSHIP
CO 1	Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
CO 2	Determine the challenges and future potential for his/her internship organization in particular and the sector in general.
CO 3	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
CO 4	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization.
CO 5	Analyze the functioning of internship organization and recommend changes for improvement in processes.

### Mapping of CO with PO

SECE4950	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO 1	3							3	3			3
CO 2								2		3	3	3
CO 3	3							3			2	3
CO 4	2							3		3	2	3
CO 5								3	2			3

### Mapping of CO with PSO

SECE4950	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	2	3	3
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

## Report Writing Guidelines

### A. Report Format:

1. Title Page (to be provided by the respective supervisor)

The title page of the project shall give the following information in the order listed:

1. Full title of the project as approved by the Mentor;
2. The full name of the student/Group of students with enrollment number;
3. The qualification for which the project is submitted;
4. The name of the institution to which the project is submitted;
5. The month and year of submission.

Project Certification Form

[The form should be duly filled signed by the supervisors.]

Acknowledgements

[All persons (e.g. supervisor, technician, friends, and relatives) and organization/authorities who/which have helped in the preparation of the report shall be acknowledged.]

Table of Contents/Index with page numbering

List of Tables, Figures, Schemes

Summary/abstract of the report.

Introduction/Objectives of the identified problem

Data Analysis and Finding of Solution

Application of the identified solution

Future Scope of enhancement of the Project and Conclusion

“Learning during Project Work”, i.e. “Experience of Journey during Project Duration”

References(must)

Bibliography

Annexures (if any)

### B. Guideline for Report Formatting:

5. Use A4 size page with 1" margin all sides
6. Header should include Project title and footer should contain page number and enrollment numbers
7. Chapter Name should be of Cambria font, 20 points, Bold
8. Main Heading should be of Cambria font, 14 points, Bold
9. Sub Heading should be of Cambria font, 12 points, Bold
10. Sub Heading of sub heading should be of Cambria font, 12 points, Bold, Italic
11. Paragraph should be of Cambria font, 12 points, no margin at the start of the paragraph
12. Line spacing for all content – 1.15, before - 0, after - 0
13. No chapter number for references Before chapter 1, give page numbers in roman letter.

**P P Savani University**  
**School of Engineering**

**Department of Computer Engineering**

Course Code: SECE4960

Course Name: Project/Training

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	24	-	24	-	-	200	300	-	-	500

CE: Continuous Evaluation, ESE: End Semester Exam

**Outline of the Project/Training:**

**Project**

- The project will be aligned with the aims of the engineering programme and its areas of specialization and shall be based on the recent trends in technology.
- The student shall carry out a comprehensive project at relevant academic / R&D / industrial organization.
- The student is required to submit a project report based on the work carried out.

**Training**

- The aim of this course is to use the internship experience to enable students to develop their engineering skills and practices.
- The student will be placed in industry/organization for 12 to 18 weeks and assessed for academic credit.
- The students may select industry on their own or one which is offered by institute.
- Students are expected to experience a real-life engineering workplace and understand how their engineering and professional skills can be utilized in industry.
- The student is required to submit a project report based on the work carried out.

**Course Outcome(s):**

After completion of the course, the students will be able to

<b>SECE4930</b>	<b>PROJECT/TRAINING</b>
CO 1	Support the theoretical learning with practice and integrate knowledge for engineering applications
CO 2	Adapt to real time industry exposure and experience
CO 3	Solve challenging projects for commercial, societal and environment benefit.
CO 4	Explain the importance of planning, documentation, punctuality and work ethics.
CO 5	Document the work which is carried out in proper format with industry standards.

**Mapping of CO with PO**

<b>SECE4930</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
CO 1	3	3		3			2	3				3
CO 2			3		3			3	3	3		3
CO 3		3					3	2		2		3
CO 4	2			2			3	3	2			3
CO 5								3	2			3

**Mapping of CO with PSO**

<b>SECE4930</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO 1	3	3	2
CO 2	3	3	2
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

**P P Savani University  
School of Engineering**

**Department of Computer Science Engineering (ML & AI)**

Course Code: SEML4610

Course Name: Research Methodology

Prerequisite Course (s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	--	00	03	40	60	--	--	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help students to,

7. provide brief knowledge about research and its various terminologies.
8. Understand the possible area of research in computer science.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
1.	<b>Introduction</b> Introduction to research problem, sources of finding a research problem, characteristics of a research problem, pitfalls in selecting a research problem, scope and objectives of research problem, approaches of investigation of solutions for research problem.	03	10
2.	<b>Data Collection, Literature Search and Organization</b> Sources of Data, Methods of Collecting data, Research Lifecycle, Virtual research environment, Scientific publishing process, Global publications, Research & Discovery, Authoring & Research Output, Peer Review, Publication & Distribution, Post publication, Research proposal, publication and writing order, literature search, keywords, Search engines, Sources for searching, Basic search strategies, Search operators, Organization of literature review, Alerts from search engines etc., Scientific network.	05	15
3.	<b>Research steps and writing</b> Types of Research Writing, Structure and components, Types of Research Paper, Different steps in writing report, Research Writing Strategies and references style.	05	15
4.	<b>Research Methods and Methodology</b> Differentiating between methodology and methods,	02	10

	Qualitative or quantitative Research		
<b>Section II</b>			
5.	<b>Intellectual Property Rights</b> Introduction and significance of intellectual property rights, types of Intellectual Property Rights, copyright and its significance, introduction to patents and its filing, introduction to patent drafting, best practices in national and international patent filing, copyrightable work examples.	05	15
6.	<b>Patent Right</b> Patents and its basics, patentable items, designs, process of filing patent at national and international level, process of patenting and development, technological research and patents, innovation, patent and copyright international intellectual property, procedure for grants of patents, need of specifications, types of patent applications, provisional and complete specification, patent specifications and its contents, trade and copyright.	05	20
7.	<b>New Developments in Intellectual Property Rights (IPR)</b> Administration of patent system in India, India's stand in the world of IPs, new developments in IPR at national and international level, prosecution (filing) PCT / international filing, national phase filing, scope of patent rights, licensing and transfer of technology, patent information and databases, geographical indications, basic laws related to patent filing, case studies- IPR of Hardware, computer software.	05	15
	<b>TOTAL</b>	30	100

**List of Tutorials:**

Sr. No.	Name of Tutorial	Hours
1.	Conduct good literature survey.	03
2.	Preparation of research proposal.	03
3.	Study reference management tools.	03
4.	Study new development in intellectual property rights and patent rights.	03
5.	Write research article.	03
	<b>TOTAL</b>	15

**Reference Book(s):**

<b>Title</b>	<b>Author/s</b>	<b>Publication</b>
Research Methodology – Methods & Techniques	C R Kothari	New Age International Publishers
Resisting Intellectual Property	Halbert	Taylor & Francis Ltd
Introduction to Design	Rajesh Kariya	Prentice Hall
Research methodology: an introduction for science & engineering students	Stuart Melville and Wayne Goddard	Juta & Co Ltd
Intellectual Property Rights Under WTO	T. Ramappa	S. Chand, 2008
Research Methodology: A Step by Step Guide for Beginners	Ranjit Kumar	Pearson

**Additional Readings:**

4. Students will be assigned and will select additional readings based on their research areas.

**Web material link:**

9. <https://nptel.ac.in/courses/121/106/121106007/>

**Course Evaluation:****Theory:**

10. Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration, which will be converted to 30 marks.
11. Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
12. End Semester Examination consists of 60 marks.

**Tutorial:**

5. Continuous Evaluation consists of the performance of tutorials which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks.

**Course outcome(s):**

After the completion of course, the students will be able to,

<b>SEML4610</b>	<b>RESEARCH METHODOLOGY</b>
CO 1	Identify and formulate research problems by understanding their characteristics, sources, scope, objectives, and common pitfalls.
CO 2	Apply appropriate data collection methods and perform effective literature searches using databases, search strategies, keywords, and research lifecycle tools.
CO 3	Write structured research papers and reports by following proper writing steps, formats, components, and referencing styles.
CO 4	Differentiate between qualitative and quantitative research methodologies and

	select suitable methods for solving research problems.
CO 5	Evaluate Intellectual Property Rights and patent systems by examining filing procedures, drafting requirements, licensing practices, and emerging global developments.

#### Mapping of CO with PO

SEML4610	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	2	2	1				1	2	1	2
CO 2	2	3	2	3	2				1	2	1	3
CO 3	1	2	1	2	1				2	3	3	2
CO 4	3	3	2	3	2				1	2	1	3
CO 5	2	2	2	1			3	1	1	3	2	2

#### Mapping of CO with PSO

SEML4610	PSO1	PSO2	PSO3
CO 1	2	3	3
CO 2	2	3	3
CO 3	1	3	3
CO 4	2	2	3
CO 5	1	3	3

#### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1,2
2	Data Collection, Literature Search and Organization	2,3,4
3	Research steps and writing	3,4,6
4	Research Methods and Methodology	2
5	Intellectual Property Rights	2,4
6	Patent Right	2,4
7	New Developments in Intellectual Property Rights (IPR)	2,4

**P P Savani University**  
**School of Engineering**

**Department of Information Technology**

Course Code: SEIT4630

Course Name: Cyber Security

Prerequisite Course(s):

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	2	0	3	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

- To introduce the fundamentals of cyber security concepts and challenges.
- To understand common cyber threats, attacks, and defense mechanisms.
- To provide students with a comprehensive understanding of cryptography, network, and web security concepts, along with insights into cyber laws, ethical practices, and modern security advancements.

**Course Content:**

Module No.	Content	Hours	Weightage in %
1.	<b>Introduction to Cyber Security</b> Overview of Cybersecurity: Importance, Scope, Challenges, and Careers, Cybersecurity Goals: Confidentiality, Integrity, Availability (CIA), Understanding Threat Actors: Hackers, Hacktivists, Cybercrime, Cyberspace, Importance of Cybersecurity in Modern Society: Cyber Security Jobs and Industry Trends	04	13
2.	<b>Cyber Attack &amp; Defense Mechanism</b> Security Challenges in Modern Computing Environments, Common Cyber Threats and Vulnerabilities, Overview of Cyber Defense Mechanisms: Security layered approach, firewalls, antivirus, and intrusion detection/prevention systems (IDS/IPS), Principles of least privilege and access control, Security monitoring and incident response basics	04	12
3.	<b>Foundation of Cryptography</b> Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography.	05	15
4.	<b>Network Security</b> Network Security Basics: OSI Layers, Firewalls, IDS/IPS, Secure Protocols: VPNs, SSL/TLS, HTTPS, SFTP, SCP, Network Threats: DDoS, ARP/DNS/DHCP Spoofing, Network Scanning Tools: Nmap, Wireshark, Case Study: Real-World Network Attack Analysis.	04	13
5.	<b>Web and Application Security</b> Web-based attacks: SQL Injection, Cross-Site Scripting (XSS), CSRF OWASP Top 10 vulnerabilities, Secure web design and coding principles, Role of authentication and session management, Overview of vulnerability assessment and penetration testing	03	10

6.	<b>Cyberspace Standards, Compliance and the Law</b> Introduction, Cyber Security Regulations, Cybersecurity Standards: ISO 27001, NIST, GDPR, HIPAA, PCI-DSS, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013	03	10
7.	<b>Digital Forensics and Incident Response</b> Basics of digital forensics: scope and objectives, Stages of forensic investigation: identification, preservation, analysis, reporting, Tools used in forensics: EnCase, FTK, Autopsy (overview), Concepts of incident response lifecycle, Log analysis and tracing attacks, Role of Computer Emergency Response Teams (CERT-In)	04	15
8.	<b>Emerging Areas and Future Trends</b> Cloud security challenges and best practices, Internet of Things (IoT) vulnerabilities and mitigation, Artificial Intelligence and Machine Learning in cyber defense, Blockchain security concepts, Quantum cryptography overview, Recent global cyber incidents and lessons learned	03	12
<b>TOTAL</b>		<b>30</b>	<b>100</b>

#### List of Tutorial:

Sr. No	Name of Practical	Hours
●	Study of cybersecurity fundamentals, vulnerabilities & threat types.	02
●	Perform malware analysis using online sandbox tools.	02
●	Network scanning using Nmap and Zenmap.	02
●	Packet capture and analysis using Wireshark.	02
●	Configure basic firewall rules on a system or VM.	02
●	Demonstrate hashing & encryption algorithms using Python/online tools.	02
●	Explore SSL/TLS certificate analysis for websites.	02
●	Establish a Secure Connection using VPN or SSH.	02
●	Perform SQL Injection & Cross-Site Scripting (XSS) attack testing on a sample vulnerable website (DVWA).	02
●	Perform disk image acquisition and metadata analysis using Autopsy or FTK Imager.	02
●	Conduct email header analysis for phishing detection.	02
●	Network forensics: Extract metadata from pcap files.	02
●	Study of digital evidence collection and chain of custody.	02
●	Case study: Analysis of a major cyber-attack in industry.	02
●	Mini Project: Vulnerability analysis and reporting.	02
<b>TOTAL</b>		<b>30</b>

#### Text Book(s):

Title	Author/s	Publication
Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole & Sunit Belapure	Wiley India.
Network Security Essentials: Applications and Standards	William Stallings	Pearson Education

**Reference Book(s):**

Title	Author/s	Publication
Security in Computing	Charles P. Pfleeger	Pearson
Security Engineering	Ross J. Anderson	Wiley

**Web Material Link(s)**

[https://onlinecourses.nptel.ac.in/noc23\\_cs127/preview](https://onlinecourses.nptel.ac.in/noc23_cs127/preview)

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical/Tutorial:**

14. Continuous Evaluation consists of performance of Practical/Tutorial which should be evaluated out of 10 for each practical and average of the same will be converted to 20 Marks.
15. Internal viva consists of 20 marks.
16. Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
17. Viva/Oral performance of 30 marks during End Semester Exam.

**Course Outcome(s):**

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

SEIT4630	Cyber Security
CO1	Understand the fundamental concepts of cyber security, its scope, importance, and the goals of information protection in digital systems.
CO2	Identify and analyze various cyber threats, vulnerabilities, and corresponding defense mechanisms in modern computing environments.
CO3	Apply the principles of cryptography, network, and web security to protect data and communication systems from cyber attacks.
CO4	Describe the role of cyber laws, policies, and international standards in ensuring legal compliance, data protection, and ethical practices in cyberspace.
CO5	Analyze the impact of emerging technologies such as cloud computing, IoT, blockchain, and artificial intelligence on cyber security strategies and solutions.

**Mapping of CO with PO**

SEIT4630	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	1		2					1		2
CO 2	3	3	2	2	3	1						2
CO 3	2	2	3	2	3				1	1	1	2
CO 4	2	2	2	1	2	3	2	3	1			3
CO 5	2	2	2	2	3	2	2	2	1	2		3

**Mapping of CO with PSO**

SEIT4630	PSO 1	PSO 2	PSO 3
CO1	2	1	2
CO2	3	2	2
CO3	3	3	2

CO4	2	2	3
CO5	3	2	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
•	Introduction to Cyber Security	1, 2
•	Cyber Attack & Defense Mechanisms	2, 3
•	Foundation of Cryptography	1, 2, 3
•	Network Security	3, 4
•	Web and Application Security	3, 4
•	Cyberspace Standards, Compliance and the Law	1, 2
•	Digital Forensics and Incident Response	2, 3, 4
•	Emerging Areas and Future Trends	2, 4, 5

**P P Savani University**  
**School of Engineering**

**Department of Information Technology**

Course Code: SEIT4610

Course Name: DevOps and Agile Foundation

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	00	03	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

9. Understand Agile values, principles, and practices.
10. Apply DevOps principles to shorten feedback loops and improve delivery.
11. Gain practical knowledge of CI/CD, containerization, Infrastructure as Code, and monitoring.
12. Build the ability to plan, execute, and improve agile-DevOps projects.

**Course Content:**

<b>Section I</b>			
Module No.	Content	Hours	Weightage in %
•	<b>Introduction to Agile &amp; DevOps</b> Agile Manifesto & principles Scrum framework: roles, events, artifacts Kanban method and Lean principles DevOps culture and “Three Ways” (Flow, Feedback, Learning)	03	10
•	<b>Agile Planning &amp; Project Management</b> User stories, acceptance criteria, estimation techniques Velocity, burn-down charts, backlog grooming Continuous planning & team ceremonies	03	12
•	<b>Version Control &amp; Collaboration</b> Git basics, branching strategies (GitFlow, trunk-based) Code review practices Collaboration tools (GitHub/GitLab, Jira, Trello)	04	13
•	<b>Continuous Integration</b> Build automation & test automation pyramid CI servers and pipelines (GitHub Actions/GitLab CI/Jenkins) Static code analysis & quality gates	05	15
<b>Section II</b>			

●	<b>Containerization &amp; Environment Management</b> Docker fundamentals (images, containers, Compose) Introduction to Kubernetes: Pods, Deployments, Services Environment parity & reproducibility	05	15
●	<b>Infrastructure as Code</b> Infrastructure provisioning (Terraform basics) Configuration management (Ansible basics) Secrets and config management	03	10
●	<b>Continuous Delivery &amp; Monitoring</b> Deployment strategies: Blue/Green, Canary, Rolling Observability: logs, metrics, tracing Monitoring tools (Prometheus, Grafana basics)	04	15
●	<b>DevSecOps &amp; Scaling Agile-DevOps</b> Security in CI/CD: SAST, DAST, dependency scanning Feature toggles, trunk-based development Scaling Agile (SAFe overview, value stream mapping) Measuring performance (DORA metrics)	03	10
<b>TOTAL</b>		30	100

#### List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction to Agile tools – create Scrum board with backlog and sprint planning.	02
2.	Git & GitHub – branching, pull requests, merge conflicts.	02
3.	CI setup using GitHub Actions/Jenkins – build & test automation.	02
4.	Containerize a sample app with Docker & run with Docker Compose.	02
5.	Deploy microservice on Minikube with Kubernetes Deployments & Services.	04
6.	Provision simple VM/cluster using Terraform.	02
7.	Apply Ansible playbook for app configuration.	02
8.	Implement Blue/Green deployment with containers.	02
9.	Monitor service with Prometheus & visualize metrics in Grafana.	02
10.	Integrate security scanning in CI/CD pipeline.	02
11.	Implement feature toggles in a small project.	02
12.	Capstone mini-project: End-to-end Agile-DevOps pipeline for a sample web app.	06
<b>TOTAL</b>		30

#### Text Book(s):

Title	Author/s	Publication
The DevOps Handbook (2nd Edition)	Gene Kim, Jez Humble, Patrick Debois, John Willis, Nicole Forsgren,	IT Revolution (2021).

**Reference Book(s):**

Title	Author(s)	Publication
Accelerate: The Science of Lean Software and DevOps	Nicole Forsgren, Jez Humble, Gene Kim.	Wiley Publication.
The Phoenix Project	Gene Kim, Kevin Behr, George Spafford.	TMH Publication
<b>Agile Estimating and Planning</b>	Mike Cohn.	

**Web Material Link(s):**

11. <https://www.agilealliance.org>
12. <https://www.devopsinstitute.com>
13. <https://www.atlassian.com/agile>
14. <https://docs.docker.com>
15. <https://kubernetes.io/docs>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of practical performance which should be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva-voce consists of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the students will be able to

SEIT4610	DevOps and Agile Foundation
CO 1	Explain Agile and DevOps principles and their role in modern software development.
CO 2	Apply Agile project management techniques (Scrum/Kanban) for team-based projects.
CO 3	Implement CI/CD pipelines using industry-standard tools.
CO 4	Containerize, deploy, and monitor applications in a DevOps environment.
CO 5	Integrate security and scaling practices into Agile-DevOps workflows.

**Mapping of CO with PO**

SEIT4610	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	2	2	1		2	1	1				2
CO 2	1	2	3	2	2			3	3	3	2

CO 3	2	3	3	3	3			2	2	2	2
CO 4	2	3	3	3	3	2		2		3	2
CO 5	2	3	3	3	3	3	2	2	2	3	3

### Mapping of CO with PSO

SEIT4610	PSO1	PSO2	PSO3
CO 1	2	2	1
CO 2	2	3	2
CO 3	3	3	2
CO 4	3	3	3
CO 5	3	3	3

### Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1.	Introduction to Agile & DevOps	1,2
2.	Agile Planning & PM	2,3,4
3.	Version Control	2,3,4
4.	Continuous Integration	2,3,4,6
5.	Containerization	2,3,4,5
6.	Infrastructure as Code	2,3,4,5
7.	Continuous Delivery & Monitoring	2,3,5,6
8.	DevSecOps & Scaling Agile-DevOps	3,4,5,6



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