

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS HME 2023)**  
**TCET Autonomy Scheme (w.e.f. A.Y. 2024-25)**

B.E. (Information Technology)					T.E. (SEM: V)				
Course Name: Soft Skills and Interpersonal Communication					Course Code: HSMC501				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment/ Evaluation				
Hours Per Week					Theory (100)		Practical/ Oral (25)	Term Work (00)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE	OR	TW
2	-	2	4	3	20	20	60	-	-
<p style="text-align: center;"><b>ISA: In-Semester Examination- Paper Duration – 1 Hour</b>  <b>ESE: End Semester Examination - Paper Duration - 2 Hours</b>  <b>The weightage of marks for continuous evaluation of Term work/ Report:</b> Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)</p>									
<b>Prerequisite-</b> Communication Skills, English language, and Organization culture									

**Course Objective:** The course intends to understand basics of soft skills, learn essential life skills, understand and develop self, and incorporate ethics and etiquette in day-to-day life.

**Course Outcomes:** Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive Levels of Attainment as per Revised Bloom's Taxonomy
1	Understand the basics of soft skills	L1, L2, L3
2	Learn essential life skills to develop a humanitarian approach	L1, L2, L3
3	Understand and develop intrapersonal skills	L1, L2, L3
4	Develop effective relationships with the community	L1, L2, L3
5	Develop a career in the interested fields by developing the basics required for employment, entrepreneurship, and higher studies	L1, L2, L3
6	Incorporate ethics and etiquette in personal and professional life	L1, L2, L3

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive Levels of Attainment as per Revised Bloom's Taxonomy
1	<b>Introduction to Soft Skills</b>	06	L1, L2, L3
	1.1. Meaning and Concept 1.2. Importance of Soft Skills 1.3. Soft Skills for Lifelong learning for building a better world 1.4. Soft Skills and Culture 1.5. Soft Skills, Employment 1.6. Entrepreneurship		
2	<b>Essential Soft Skills</b>	08	L1, L2, L3
	2.1 Personal integrity 2.2 Taking responsibility and accountability 2.3 Professionalism, Communication, Networking and Socializing 2.4 Customer awareness, relationship, and satisfaction 2.5 Critical and Adaptive Thinking 2.6 Creativity and innovation 2.7 Social and cultural awareness; Financial and Legal literacy 2.8 Diversity and inclusion with gender sensitivity		
3	<b>Self-Development</b>	08	L1, L2, L3
	3.1 Importance of 21 <sup>st</sup> Century skills 3.2 Self-assessment. Awareness, and Personal memory 3.3 Perception, Attitude 3.4 Values and Beliefs 3.5 Personal goal setting, Self-esteem, 3.6 Career planning 3.7 Listening, Speaking, Rapid reading and Taking notes 3.8 Complex problem solving		
4	<b>Interpersonal Skills</b>	07	L1, L2, L3
	4.1 Teamwork, Mentorship, Motivation and Leadership 4.2 Problem-Solving, Decision Making 4.3 Strategic thinking and planning 4.4 Time Management 4.5 Emotional Intelligence 4.6 Persuasion and Negotiation Skills 4.7 Stress Management		
5	<b>Career Development</b>	08	L1, L2, L3
	5.1 Cover letter, Resume 5.2 SOP and LOR 5.3 Group discussion 5.4 Presentation skills and Interview skills 5.5 Identifying employment process and portals for internship, apprenticeship, projects, entrepreneurship, and job 5.6 Identifying potential entrepreneurship opportunities and sources of funding agencies and legal literacy 5.7 Career planning for Higher Studies 5.8 Preparedness for professional career		

6	<b>Introduction to Corporate Ethics and Etiquette</b>	08	L1, L2, L3
	6.1 Business etiquette: Meeting etiquette, Dining etiquette 6.2 Interview etiquette, Professional and work etiquette, 6.3 Social skills 6.4 Greetings and art of conversation 6.5 Dressing and grooming 6.6 Ethical codes of conduct in business organization 6.7 Industry Image and Meeting customer needs and demands 6.8 Understanding and adapting industry culture for productivity and excellence		
<b>Total</b>		<b>45</b>	

#### Books and References:

Sr. No	Name of the Book	Name of the Author	Publisher	Edition	Year of Publication
1	The 7 Habits of Highly Effective People	Stephen Covey	Free Press	2016 Edition	2016
2	Presence: Bringing Your Boldest Self to Your Biggest Challenges	Amy Cuddy	Little, Brown Spark	1 <sup>st</sup>	2015
3	Trust Factor: The Science of Creating High-Performance Companies	Paul J. Zak	Amacom	1 <sup>st</sup>	2017
4	Leader's Guide to Mindfulness: How to Use Soft Skills to Get Hard Results	Audrey Tang	FT Publishing International	1 <sup>st</sup>	2018
5	Personality Development and Soft Skills	Barun Mitra	Oxford University Press	2 <sup>nd</sup>	2016
6	Life's Amazing Secrets: How to Find Balance and Purpose in Your Life	Gaur Gopal Das	Penguin Ananda	1 <sup>st</sup>	2018
7	Soft Skills: An Integrated Approach to Maximise Personality	Gajendra Singh Chauhan and Sangeeta Sharma	Wiley	1 <sup>st</sup>	2015

#### Online References:

Sr. No.	Website Name	URL	Modules Covered
1	NPTEL	<a href="#"><u>NPTEL: Humanities and Social Sciences - NOC:Developing Soft Skills and Personality</u></a>	M1 to M6
2	NPTEL	<a href="#"><u>NPTEL: Humanities and Social Sciences - NOC:Soft skills</u></a>	M1 to M6
3	NPTEL	<a href="https://onlinecourses.nptel.ac.in/noc21_hs02/"><u>https://onlinecourses.nptel.ac.in/noc21_hs02/</u></a>	M1 to M6

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**Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS HME 2023)**  
**TCET Autonomy Scheme (w.e.f. A.Y. 2024-25)**

B.E. (Information Technology)								T.E. (SEM: V)		
Course Name: Operating System								Course Code: PCC-IT 501		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)					
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment/ Evaluation					
Hours Per Week					Theory (100)			Practical/ Oral (25)	Term Work (00)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE	PR	TW	150
3	-	2	5	4	20	20	60	25	25	
ISA: In-Semester Examination- Paper Duration – 1 Hour										
ESE: End Semester Examination - Paper Duration - 2 Hours										
The weightage of marks for continuous evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)										
Prerequisite- C programming language, Data Structures, UNIX Programming										

### Course Objective:

The course intends to deliver the fundamentals of OS, its components & their functions, and study the process management and scheduling, various issues in Inter Process Communication (IPC), concepts about Memory management policies and virtual memory. Concepts of an OS as a resource manager, file system manager and Secondary Storage management

**Course Outcomes:** Upon completion of the course, student will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy	PO Mapping	PSO Mapping
1	Define operating System& understand the objective of an OS & their functions.	L1, L2	PO1, PO2	PSO1, PSO2
2	Describe Process, PCB & process management using scheduling Algorithm.	L1,L2,L3, L4,L5	PO1, PO2	PSO1, PSO2
3	Evaluate the requirement for process synchronization and coordination handled by operating system.	L2,L3,L4, L5	PO1, PO2, PO4	PSO1, PSO2
4	Describe and analyze the memory management and its allocation policies. Also knows the utilization of virtual memory	L2,L3,L4, L5	PO1, PO2, PO3	PSO1, PSO2
5	Describe File Concepts, File Structure, and analyze file management techniques.	L2,L3,L4, L5	PO1, PO2	PSO1, PSO2
6	Identify use and evaluate the storage management policies with respect to different storage management technologies.	L2,L3,L4, L5	PO1, PO2, PO3	PSO1, PSO2

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Introduction to Operating Systems</b>	07	L1, L2
	<b>Basics of Operating System:</b> Definition, Types of Operating Systems, OS Structure and operations, Process management, Memory management, storage management, Distributed and special purpose Systems; <b>System Structure:</b> Operating system services and interface, System calls and its types, System programs, Operating System Design and implementation, OS structure, Virtual machines.		
2	<b>Process Management</b>	08	L1,L2,L3,L4,L5
	<b>Processes:</b> Definition , Process states , Process State transitions , Process Control Block ,Context switching – Threads – Concept of multithreads , Benefits of threads – Types of threads <b>Process Scheduling:</b> Definition, Scheduling objectives ,Types of Schedulers ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Preemptive and Non-preemptive , FCFS – SJF– RR, Thread Scheduling and Multiple Processor Scheduling;		
3	<b>Process coordination</b>	08	L2,L3,L4,L5
	<b>Synchronization:</b> The critical Section Problem, Peterson's Solution, synchronization Hardware and semaphores, Classic problems of synchronization: Reader's & Writer Problem, Dining Philosopher Problem, Producer Consumer Problem; <b>Deadlocks:</b> System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.		
4	<b>Memory Management</b>	08	L2,L3,L4,L5
	<b>Memory Management strategies:</b> Background, Logical and Physical address map , Memory allocation : Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction ,Swapping, Contiguous Memory Allocation, Paging , Structure of the Page Table, Segmentation; Virtual Memory – Basics of Virtual Memory – Hardware and control structures – Locality of reference, Demand Paging, Page replacement Algorithms, Thrashing		
5	<b>File Management</b>	07	L2,L3,L4,L5
	<b>File system:</b> File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection; Implementing file System: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery		
6	<b>Secondary Storage Structure</b>	07	L1,L2,L3,L4,L5
	Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling: FIFO, SSTF, SCAN, CSCAN, LOOK, CLOOK, Disk Management, RAID Structure,. Case Study :Advance Operating System		
	<b>Total Hr.</b>	<b>45</b>	



### List of Practical/ Experiment:

Sr. No	Type of Experiment	Title of Experiment	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Basic Experiments</b>	Linux Commands(Basic and Advanced)	2	L1, L2
2		Implement FCFS Scheduling Algorithm	2	L1,L2,L3,L4,L5
3		Implement SJF Scheduling Algorithm	2	L1,L2,L3,L4,L5
4		Implement RR Scheduling Algorithm	2	L1,L2,L3,L4,L5
3	<b>Design Experiments</b>	To study and implement Peterson's Algorithm	2	L2,L3,L4,L5
4		To study and implement Dinning Philosophers problem and its solution	2	L2,L3,L4,L5
5		To Study and Implementation of Deadlock Avoidance Algorithm	2	L2,L3,L4,L5
6		Design Producer Consumer problem	2	L2,L3,L4,L5
		Implementation of FIFO& LRU Page Replacement Algorithm.	2	L2,L3,L4,L5
7	<b>Advanced Experiments</b>	Case Study on Reader Writer Problem	2	L2,L3,L4,L5
8		Case Study on Advance Operating System	2	L1,L2,L3,L4,L5

### Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1.	Operating System Concepts	Abraham Silberschatz, Greg Gagne, Peter Baer Galvin,	Wiley	8th edition	2008
2.	Modern Operating System,	Tanenbaum,	Prentice Hall India,	3rd	2009
3.	Operating Systems: Internal and Design Principles	William Stallings	Pearson Education.	6th	2009
4.	Operating System Design and Implementation	A Tanenbaum	Pearson	3rd	2007
5.	Operating Systems	D.M. Dhamdhare	Tata McGraw Hill	2nd	2001
6.	Principles of Operating Systems	Naresh Chauhan,	Oxford Higher Education	Ist	2014

### Online Resources:

S. No.	Website Name	URL	Modules covered
1.	<a href="https://nptel.ac.in">https://nptel.ac.in</a>	<a href="https://nptel.ac.in/courses/106/105/106105214/">https://nptel.ac.in/courses/106/105/106105214/</a>	All
2.	<a href="https://www.tutorialspoint.com/">https://www.tutorialspoint.com/</a>	<a href="https://www.tutorialspoint.com/operating_system/index.htm">https://www.tutorialspoint.com/operating_system/index.htm</a>	All
3.	<a href="https://www.guru99.com/">https://www.guru99.com/</a>	<a href="https://www.guru99.com/operating-system-tutorial.html">https://www.guru99.com/operating-system-tutorial.html</a>	M1
4.	<a href="https://www.geeksforgeeks.org">https://www.geeksforgeeks.org</a>	<a href="https://www.geeksforgeeks.org/operating-systems/">https://www.geeksforgeeks.org/operating-systems/</a>	All

**T.E. Semester –V**
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**
**Proposed TCET Autonomy scheme with effect from A.Y. 2024-25**

BE ( Information Technology )					T.E.(SEM : V)				
Course Name :Automata Theory					Course Code :PCC –IT 502				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/O ral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE	PR	TW
03	01	-	04	04	20	20	60	-	25



## Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Introduction</b>		
	Alphabets, Strings and Languages, automata and Grammars. Finite Automata (FA) -its behavior; DFA -Formal definition, simplified notations (state transition diagram, transition table), Language of a DFA. NFA - Formal definition, Language of an NFA. An Application: Text Search, FA with epsilon-transitions, Eliminating epsilon-transitions, NFAs into DFAs Conversion Equivalence of DFAs and NFAs. DFA Minimization. Finite automata with output(Moore and Mealy Machine), Equivalence of Moore and Mealy Machine. Applications and Limitation of FA(Traffic light control, Medical diagnosis etc) JFLAP software to design FAs	<b>09</b>	L1,L2,L3,L4
2	<b>Regular Expression &amp; Finite Automata</b>		
	Regular expressions (RE) - Definition, Algebraic laws for RE, applications of Res,FA and RE, RE to FA, FA to RE,Regular grammars and FA, FA for regular grammar, Regular grammar for FA,. Equivalence between two FAs Some decision properties of Regular languages -emptiness, finiteness, membership. RegEx in Python, JFLAP software to convert RE into FA and Vice versa	<b>05</b>	L1,L2,L3,L4
3	<b>Regular languages &amp; Pumping Lemma</b>		
	Regular languages and its properties, Proving languages to be non-regular - Pumping Lemma, and its applications. Some closure properties of Regular languages - Closure under Boolean operations, reversal, homomorphism, inverse homomorphism, etc. Myhill-Nerode Theorem.	<b>06</b>	L1,L2,L3,L4
4	<b>Context-free Grammar and Context Free Language</b>		
	Formal definition, sentential forms, leftmost and rightmost derivations, the language of a CFG. Derivation tree or Parse tree- Definition, Relationship between parse trees and derivations. Parsing and ambiguity, Application of CFGs, Ambiguity in grammars and Languages. Simplification of CFGs - Removing useless symbols, epsilon-Productions, and unit productions, Normal forms - CNF and GNF. Proving that some languages are not context free -Pumping lemma for CFLs, applications. Some closure properties of CFLs -Closure under union, concatenation, Kleene closure, substitution, Inverse homomorphism, reversal, intersection with regular set, etc. Some more decision properties of CFLs, Review of some undecidable CFL problems. Context sensitive Grammar and linear bounded Automata. Applications of CFG(Sentiment Analysis, NLP etc)	<b>10</b>	L1,L2,L3,L4 L5,L6
5	<b>Pushdown Automata &amp; Context Free Language</b>		
	Formal definition, behavior and graphical notation, Instantaneous descriptions (Ids), Types of PDA, Problems on PDA. Equivalence of PDAs and CFGs, CFG to PDA, PDA to CFG. Languages of DPDAs and NPDAs, Applications of PDA(Tower of Hanoi Problem, Syntax Analysis etc) JFLAP software to design PDAs	<b>07</b>	L1,L2,L3,L4,L5 L6

6	<b>Turing Machines, Undecidability and Recursively Enumerable Languages</b>	08	L1,L2,L3,L4,L5,L6
	Formal definition and behavior, Transitions (diagrams, Functions and Tables) Language of a TM, Design of TM as generator, decider and acceptor. , etc. Variants of TM: Non-deterministic, Multitrack, Multitape, Universal TM. Design of TMs as a computer of simple functions: Unary, Binary (Logical and Arithmetic), String operations (Length, Concat, Match, Substring Check, etc),The Halting problem, JFLAP software to design TMs, Case study on Applications of FAs in latest IT field		
<b>Total Hours</b>		<b>45</b>	

### Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1.	Introduction to languages and the Theory of Computation	J.C.Martin	Tata McGraw Hill	2 <sup>nd</sup>	2009
2.	Theory of Computation A Problem Solving Approach	Kavi Mahesh	Wiley India	1 <sup>st</sup>	2011
3.	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft, Jeffrey D. Ullman	Pearson Education.	3 <sup>rd</sup>	1979
4.	Theory of Computation	Vivek Kulkarni	Oxford University	1 <sup>st</sup>	2013
5.	Theory of Computer Science, Automata Languages & Computations	N. Chandrashekhar & K.L.P. Mishra	PHI publications.	3 <sup>rd</sup>	2006
6.	Introductory Theory of Computer Science	Krishnamurthy E.V	East-West press	2 <sup>nd</sup>	2009
7.	JFLAP: An Interactive Formal Languages and Automata	Susan H. Rodger and Thomas W. Finley	Package Jones & Bartlett Publishers, Sudbury, MA	2 <sup>nd</sup>	2006(c)

### List of Tutorials:

Sr. No	Tutorials topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	Design Finite State Machine(FSM) for the given language	1	L1,L2,L3,L4
2	Construct Deterministic Finite Automata(DFA) accepting the given language	1	L1,L2,L3,L4
3	Construct a Non-Deterministic Finite Automata (NFA) for each of the given language and find equivalent DFA for given NFA. Design FAs using JFLAP Software	2	L1,L2,L3,L4
4	Design Moore & Mealy machine for given language ,Convert given	1	L1,L2,L3,L4

	Moore machine into Mealy machine & Convert following Mealy machine into Moore machine		
5	Construct a regular expression (RegEx) for given language and describe the language of the RegEx as concisely as possible. Implement in python language	1	L1,L2,L3,L4
6	Write Context Free grammar for given problem statement. Convert CFG into Chomsky Normal Form(CNF).	1	L1,L2,L3,L4
7	Design Push Down Automata(PDA) for the given Context Free Grammar and language Design PDAs using JFLAP Software	2	L1,L2,L3,L4,L5
9	Design Turing Machines for the given languages Design Turing Machines using JFLAP Software	2	L1,L2,L3,L4,L5,L6
	<b>Total Hours</b>	15	

### Online References:

Sr. No	Website Name	URL	Modules covered
1.	<a href="https://www.tutorialspoint.com">https://www.tutorialspoint.com</a>	<a href="https://www.tutorialspoint.com/automata_theory/index.htm">https://www.tutorialspoint.com/automata_theory/index.htm</a>	M1 to M6
2.	<a href="https://www.javatpoint.com">https://www.javatpoint.com</a>	<a href="https://www.javatpoint.com/automata-tutorial">https://www.javatpoint.com/automata-tutorial</a>	M1 to M6
3.	<a href="http://www.infolab.stanford.edu">http://www.infolab.stanford.edu</a>	<a href="http://www.infolab.stanford.edu/~ullman/ialc.html">http://www.infolab.stanford.edu/~ullman/ialc.html</a>	M1 to M6
4.	<a href="http://www.jflap.org/">http://www.jflap.org/</a>	<a href="http://www.jflap.org/">http://www.jflap.org/</a>	M1 to M6
5.	<a href="https://nptel.ac.in">https://nptel.ac.in</a>	<a href="https://nptel.ac.in/courses/111103016/">https://nptel.ac.in/courses/111103016/</a>	M1 to M6
6.	<a href="https://www.udemy.com">https://www.udemy.com</a>	<a href="https://www.udemy.com/course/theory-of-automata/">https://www.udemy.com/course/theory-of-automata/</a>	M1 to M6

**T.E. Semester –V**

Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)

Proposed TCET Autonomy Scheme (w.e.f. A.Y. 2024-25)

B.E (Information Technology)					SEM: V				
Course Name: Web Programming					Course Code: PCC-IT 503				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Project (25)	PPT/ Report (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE	PR	TW
3	-	2	5	4	20	20	60	25	25
ISE: In-Semester Examination - Paper Duration – 1 Hours IE: Innovative Examination ESE: End Semester Examination - Paper Duration - 2 Hours The weightage of marks for continuous evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)									
Prerequisite: Basic HTML Programming and Python Programming									

**Course Objective:** On completion of this course, a student will be familiar with client side and server side technologies and able to develop a web application using same. Students will gain the skills and project-based experience needed for entry into web application and development careers.

**Course Outcomes:** Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy	PO Mapping (Write only Number/s)	PSO Mapping (Write only Number/s)
1	Implement interactive web page(s) using HTML	L1, L2, L3, L6	PO 1,2,3,5,9	PSO 1,3
2	Create Responsive Web Design with CSS & Bootstrap	L1, L2, L3, L6	PO 1,2,3,5,9	PSO 1,3
3	Design and develop web applications using JavaScript	L1, L2, L3, L5, L6	PO 1,2,3,5,9	PSO 1,3
4	Build Dynamic web site using server-side PHP Programming and Database connectivity.	L1, L2, L3, L5, L6	PO 1,2,3,5,9	PSO 1,3
5	Create web applications using NodeJs	L1, L2, L3, L4, L6	PO 1,2,3,5,9	PSO 1,3
6	Demonstrate web application using Python web Framework- Django	L1, L2, L3, L6	PO 1,2,3,5,9	PSO 1,3

**Detailed Syllabus:**

Module No.	Topics	Hours	Cognitive levels of attainment as per Bloom's Taxonomy
01	<b>Introduction to Web Technologies &amp; HTML</b>	08	L1, L2, L3, L6
	<b>Introduction to Web Development</b>  <b>HTML:</b> Introduction to HTML, HTML Elements and Tags, HTML Forms and Input Elements, Lists, Tables, Forms <b>HTML5:</b> HTML5 Semantic Elements, Multimedia in HTML5, Advanced HTML5 Features (Graphics, API-Geolocation, DRAG & DROP)		
02	<b>Responsive Web Design with CSS &amp; Bootstrap</b>	08	L1, L2, L3, L6
	<b>CSS:</b> Introduction to CSS, CSS Selectors and Properties, CSS3: CSS3 Transitions and Animations, Advanced CSS3 Features, <b>Bootstrap:</b> What is Bootstrap? Benefits of using Bootstrap for web development, Bootstrap grid system (container, rows, columns), Typography, colors, Jumbotron, buttons, Alerts		
03	<b>JAVASCRIPT</b>	08	L1, L2, L3, L5, L6
	Introduction to Javascript, Variables, Operators, Conditions, Loops, Functions, Events, Classes and Objects, Error handling, Validations, Arrays, String, Date. Introduction to React- Installation and Configuration. JSX, Components, Props, State, Forms, Events, Routers, React Hooks		
04	<b>Server-Side Programming: PHP</b>	07	L1, L2, L3, L5, L6
	Introduction, How to set PHP development environment in Windows? XAMP installation, Coding Standards, Basic Syntax, Variables, Display O/P- echo and print, Data Types, Strings Constants, Magic Constants, Decision Making, Functions in PHP and its types Loops, Superglobals, Regular Expressions PHP and MySQL database connectivity with example.		
05	<b>NodeJs</b>	09	L1, L2, L3, L4, L6
	Introduction to Node.js, Installation of Node.js on Windows, TypeScript language introduction Node.js Basics, Node.js First Application Node.js REPL (READ, EVAL, PRINT, LOOP) Node.js NPM (Node Package Manager), Modules in Node, Creating Custom Modules in Node.js, fs module, url module demonstration, create a static website using the modules,		

	Introduction to Express, Steps to create an Express.js Application, Perform CRUD Operations using MongoDB, REST API using Node.js and MongoDB, create dynamic project using Node.js, Express and MongoDB		
06	<b>Python Web Framework: Django</b>	05	L1, L2, L3, L6
	Introduction to Django, Django Project MVT Structure, How to Create a Basic Project using MVT in Django? How to Create an App in Django?		
Total Hrs.		45	

### **Books and References:**

Sr. No	Title	Authors	Publisher	Edition	Year
1	"Web Technologies: Black Book"	Kogent Learning Solutions Inc. and Dreamtech Press Authors	Dreamtech publication	First	2009
2	Responsive Web Design with HTML5 and CSS3	Ben Frain	PACKT Publication	Second	2012
3	HTML 5 Black Book:	DT Editorial Services	Kogent Learning solutions	Second	2016
4	HTML5 Cookbook	Christopher Schmitt & Kyle Simpson	O'Reilly Media	First	2011
5	Advanced Internet Technologies	Dr. Deven Shah,	Dreamtech publication	First	2014
6	Core Python Applications Programming	Wesley J Chun	Pearson Publication	Third edition	2011
7.	"Learning PHP 5"	David Sklar	O'Reilly Publication	First	2004

### **Online References:**

Sr. No.	Website Name	URL	Module's Covered
1.	<a href="http://www.w3schools.com">www.w3schools.com</a> <a href="http://www.geeksforgeeks.com">www.geeksforgeeks.com</a>	<a href="https://www.w3schools.com/html/default.asp">https://www.w3schools.com/html/default.asp</a> <a href="https://www.geeksforgeeks.org/html/?ref=lbp">https://www.geeksforgeeks.org/html/?ref=lbp</a>	M1
2.	<a href="http://www.w3schools.com">www.w3schools.com</a> <a href="http://www.geeksforgeeks.com">www.geeksforgeeks.com</a>	<a href="https://www.w3schools.com/css/default.asp">https://www.w3schools.com/css/default.asp</a> <a href="https://www.geeksforgeeks.org/css/?ref=lbp">https://www.geeksforgeeks.org/css/?ref=lbp</a> <a href="https://www.geeksforgeeks.org/bootstrap/?ref=lbp">https://www.geeksforgeeks.org/bootstrap/?ref=lbp</a>	M2
3.	<a href="http://www.geeksforgeeks.com">www.geeksforgeeks.com</a>	<a href="https://www.geeksforgeeks.org/javascript/?ref=lbp">https://www.geeksforgeeks.org/javascript/?ref=lbp</a>	M3
4.	<a href="http://www.geeksforgeeks.com">www.geeksforgeeks.com</a>	<a href="https://www.geeksforgeeks.org/php-tutorial/?ref=lbp">https://www.geeksforgeeks.org/php-tutorial/?ref=lbp</a>	M4



5.	<a href="http://www.geeksforgeeks.com">www.geeksforgeeks.com</a>	<a href="https://www.geeksforgeeks.org/nodejs/?ref=lbp">https://www.geeksforgeeks.org/nodejs/?ref=lbp</a> <a href="https://www.geeksforgeeks.org/express-js/?ref=lbp">https://www.geeksforgeeks.org/express-js/?ref=lbp</a>	M5
6.	<a href="http://www.w3schools.com">www.w3schools.com</a>	<a href="https://www.w3schools.com/django/index.php">https://www.w3schools.com/django/index.php</a>	M6

### List of Practical/Experiments:

Sr. No	Type of Experiment	Title of Experiment	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	Basic Experiments	Introduction to Git and IDE like Visual Studio Code ,installing dependencies , project setup	2	L1, L2, L3, L6
2		Create a basic web page using HTML elements like headings, paragraphs, images, and links.	2	L1, L2, L3, L6
3		Create a contact form with various input elements like text fields, radio buttons, checkboxes, and a submit button	2	L1, L2, L3, L6
4	Design Experiments	Apply CSS to style an HTML page with different properties like color, font-size, margin, padding, and borders.	2	L1, L2, L3, L6
5		Use Bootstrap to create a responsive layout webpage and a login form	2	L1, L2, L3, L6
6		a)Add interactivity to a web page using JavaScript b)Create a Web application for BMI Calculation using JavaScript	2	L1, L2, L3, L6
7	Advanced Experiments	a) Implement form validation using JavaScript. b) Use JavaScript to dynamically add, remove, and modify HTML elements.	2	L1, L2, L3, L6
8		Create a simple React application that displays a list of items	2	L1, L2, L3, L6
9		Connect a PHP application to a MySQL database and perform CRUD operations	2	L1, L2, L3, L6
10		Creating a REST API with Node.js and Express (Node.js, Express, and MongoDB)	2	L1, L2, L3, L6
11		To implement application using python Django Web Framework.	2	L1, L2, L3, L6
12	Mini/Minor Projects/ Seminar/ Case Studies	Mini Project (Based on entire curriculum)	8	L1, L2, L3, L6

**T.E. Semester –V**

**Choice-Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**  
**TCET Autonomy scheme with effect from 2024-25**

B.E.( Information Technology )								T.E.(SEM : V)				
Course Name: Cryptography & Network Security								Course Code: PCC-IT 502				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)							
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation							
Hours Per Week					Theory (100)			Practical/Oral (25)		Term Work (25)		Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE	OR		TW		150
3	-	2	5	4	20	20	60	25		25		
ISE: In-Semester Examination - Paper Duration – 1 Hour												
IE: Innovative Examination												
ESE: End Semester Examination - Paper Duration - 2 Hours												
The total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%), and Attendance /Learning Attitude (20%).												
Prerequisite: Computer Networks, Basic concepts of OSI Layer												

**Course Objective:**

The course intends to deliver the fundamentals of encryption techniques, and cryptographic algorithms including secret key cryptography, hashes and message digests, public key algorithms, authentication protocols, and PKI standards, and apply them to techniques such as Kerberos, IPsec, and SSL/TLS and email, analyze cryptographic utilities, authentication mechanisms to design secure applications.

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

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy	PO Mapping	PSO Mapping
1	Identify information security goals, and classical encryption techniques and acquire fundamental knowledge of the concepts of Symmetric cipher models.	L1, L2, L3	1,2,3	1,2
2	Understand, compare, and apply different encryption and decryption techniques to solve problems related to confidentiality and Authentication	L1, L2, L3	1,2,3	1,2
3	Apply the knowledge of cryptographic checksums and different digital signature algorithms to achieve authentication and create secure applications.	L1, L2, L3, L4	1,2,3,4	1,2
4	Understand Secure Programs, Program Errors, and Other Malicious Code and identify Objects to be Protected, and Use of Passwords for – Additional Authentication Information.	L1, L2, L3	1,2,3	1,2
5	Apply network security basics, analyze different attacks on networks, and evaluate the performance of firewalls and security protocols like SSL, IPsec, and PGP.	L1, L2, L3, L4	1,2,3,4	1,2
6	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure application	L1, L2, L3,L4	1,2,3,4	1,2

### Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Introduction &amp; Classical Cryptography</b> Principle of security, Service Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, mono-alphabetic and poly-alphabetic substitution techniques: Vignere cipher, Playfair cipher, Affine cipher, Hill cipher, transposition techniques: keyed and keyless transposition ciphers).	05	L1, L2, L3
2	<b>Block Ciphers &amp; Public Key Cryptography</b> Block cipher principles-block cipher modes of operation, Data Encryption Standard, Triple DES, Advanced Encryption Standard (AES)-Blowfish- RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA Cryptosystem, Rabin Cryptosystem, Elgamal Cryptosystem, Elliptic Curve Cryptosystems. Key management – Diffie Hellman Key exchange Introduction to Light weight Cryptography: Need, TEA Algorithm	08	L1, L2, L3
3	<b>Cryptographic Hashes &amp; Digital Signatures</b> Authentication requirement – Authentication function, Types of Authentication, MAC – Hash function – Security of hash function and MAC MD5 Message-Digest Algorithm, Secure Hash Algorithm, Digital signature, and authentication protocols: Needham Schroeder Authentication protocol, Digital Signature Schemes – RSA. Cryptography in Blockchain: Role, Benefits and drawback	07	L1, L2, L3, L4
4	<b>Protection of Computing Resources and Security Features</b> Secure Programs Non-malicious Program Errors – Buffer Overflows, Incomplete Mediation; Viruses and Other Malicious Code – Methods of Control – Developmental Controls, Objects to be Protected; User Authentication – Use of Passwords, Additional Authentication Information, Attacks on Passwords, Exhaustive Attack, Password Selection Criteria.	08	L1, L2, L3
5	<b>Network Security</b> Network security basics: TCP/IP vulnerabilities (Layer wise), Packet Sniffing, ARP spoofing, port scanning, IP spoofing, TCP syn flood, DNS Spoofing. Denial of Service: Classic DOS attacks, Source Address spoofing, ICMP flood, SYN flood, UDP flood, Distributed Denial of Service, and Defenses against Denial of Service Attacks. Firewalls, Intrusion Detection Systems: Host-Based and Network Based IDS, Honey pots	10	L1, L2, L3, L4
6	<b>Network Security Applications</b> Authentication Applications, Kerberos, Internet Security Protocols: SSL, TLS, IPSEC: AH, ESP, Secure Email: PGP and S/MIME, Key Management.	07	L1, L2, L3, L4
	<b>Total Hr.</b>	45	

**List of Practical-Tutorials/ Experiment:**

Sr. No	Type of Experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Basic experiment</b>	To implement conventional cryptographic techniques Ceaser Cipher, and Vernam cipher.(Substitution cipher)	4	L1, L2, L3
2		Study the use of network reconnaissance tools like WHOIS, dig, and traceroute ns lookup to gather information about networks and domain registrars.	2	L1, L2, L3, L4
3		To implement conventional cryptographic techniques Rail Fence cipher. (Transposition cipher)	2	L1, L2, L3, L4
4	<b>Design Experiment</b>	Implementation of Diffie Hellman Key exchange algorithm	2	L1, L2, L3, L4
5		Demonstrate and test the integrity of the message using SHA-1, For varying message size and analyze the performance.	4	L1, L2, L3, L4
6		Implementation and analysis of RSA cryptosystem.	2	L1, L2, L3, L4
7		Study of packet sniffer tools Wireshark, :- 1. Observer performance in promiscuous as well as non-promiscuous mode. 2. Show the packets can be traced based on different filters	2	L1, L2, L3, L4
8		Demonstrate the use of NMAP with different options to scan open ports, perform OS fingerprinting, ping scan, tcp port scan, udp port scan, etc.	2	L1, L2, L3, L4
9		Study and Simulation of DOS attack using Hping and other tools	2	L1, L2, L3, L4
10		Setup Snort and study the logs.	4	L1, L2, L3, L4
11	<b>Group Activity/ Case Study</b>	Case study	4	L1, L2, L3, L4
<b>Total Hrs</b>			<b>30</b>	

**Books and References:**

Sr. No.	Title	Authors	Publisher	Edition	Year
1	Information Security Principles and Practice	Mark Stamp, Deven Shah	Cengage Learning	2 <sup>nd</sup> Edition	2011
2	Cryptography & Network Security	Behrouz A. Ferouzan	Tata Mc Graw Hill	2nd Edition	2008

3	Cryptography and Network Security, Principles and Practice	William Stallings	Pearson Education	6th Edition	2013
4	Cryptography & Network Security	Bernard Menezes	Cengage Learning	1st Edition	2010
5	Cryptography and Network Security	Atul Kahate	Mc Graw Hill education.	2nd Edition	2008
6	Security in Computing	Charles P. Pfleeger ,	Pearson Education	5 <sup>th</sup> Edition	2015
7	Information System Security	Nina Godbole	Wiley	2 <sup>nd</sup> Edition	2017

### **Online Resources:**

Sr. No	Website Name	URL	Modules covered
1.	<a href="https://nptel.ac.in">https://nptel.ac.in</a>	<a href="https://nptel.ac.in/courses/106105031/">https://nptel.ac.in/courses/106105031/</a>	M1 to M6
2.	<a href="https://www.coursebuffet.com">https://www.coursebuffet.com</a>	<a href="https://www.coursebuffet.com/course/814/nptel/cryptography-and-network-security-iit-kharagpur">https://www.coursebuffet.com/course/814/nptel/cryptography-and-network-security-iit-kharagpur</a>	M1 to M6
3.	<a href="https://www.owasp.org">https://www.owasp.org</a>	OWASP TOP 10: <a href="https://www.owasp.org/index.php/Top_10_2013">https://www.owasp.org/index.php/Top_10_2013</a>	M1 to M6

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2020)**  
**TCET Autonomy scheme with effect from 2024-25**

B.E.( Information Technology)					T.E. (Sem V)				
Course Name : Indian Constitution					Course Code: MC-IT 501				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory		Practical/Oral	Term Work	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR	TW	
1	-	-	1	-	-	-	-	25	25
The weightage of marks for evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/ Learning Attitude (20%)									

**Course Objective:**

The objective of this course is to give knowledge of Indian Constitution to students in order to ensure that the rules and regulations under which Central & State Govt function. Students would also be acquainted with various provisions, articles, important autonomous Govt bodies, Judiciary and the rights of every citizen of India. An engineer must have general idea of Constitution of India.

**Course Outcomes:** Upon completion of the course students will be able to:

SN	Course outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Learn the salient features and importance of Indian Constitution	L1, L2
2	Understand the fundamental rights and duties	L1, L2
3	Learn about election methods and powers of Government of the Union	L1, L2
4	Learn about election methods and powers of Government of the State	L1, L2
5	Understand Indian Judiciary system	L1, L2
6	Understand about various Govt bodies and establishments of India	L1, L2



**Detailed Syllabus:**

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Constitution – Structure and Principles</b>	2	L1, L2
	Meaning and importance of Constitution , : Making of Indian Constitution – Sources , Salient features of Indian Constitution		
2	<b>Fundamental Rights and Directive Principles</b>	2	L1, L2
	Fundamental Rights, Fundamental Duties, Directive Principles, Union List& State List, Concurrent List		
3	<b>Government of the Union</b>	3	L1, L2
	President of India – Election and Powers, Prime Minister and Council of Ministers , Lok Sabha – Composition and Powers ,Rajya Sabha – Composition and Powers		
4	<b>Government of the States</b>	3	L1, L2
	Governor – Powers Chief Minister and Council of Ministers Legislative Assembly – Composition and powers Legislative Council – Composition and powers Local Govt & Panchayati Raj		
5	<b>The Judiciary</b>	2	L1, L2
	Features of judicial system in India, : Supreme Court –Structure and jurisdiction , High Court – Structure and jurisdiction		
6	<b>Administrative organization and constitution</b>	3	L1, L2
	Federalism in India – Features, Local Government-Panchayats–Powers and functions; 73rd and 74th amendments, Election Commission – Organization and functions , Comptroller & Auditor General of India (CAG), Attorney General of India& Advocate General of State, Central Vigilance Commission (CVC), Citizen oriented measures – RTI and PIL – Provisions and significance, UPSC & State PSC		
<b>Total Hours</b>		<b>15</b>	

**Books and References:**

Sr No.	Title	Authors	Publisher	Edition	Year
1	India's Constitution	M.V.Pylee	New Delhi; S. Chand Pub	16	2017
2	Indian Polity	M Laxmikanth	McGraw Hill Chennai	05	2017
3	The Constitutional Law of India	J.N. Pandey	Allahabad; Central Law Agency	55	2018
4	Introduction to the Constitution of India	Durga Das Basu	Gurgaon; LexisNexis	23	2018

**Online References:**

Sr. No	Website Name	URL	Modules Covered
1	India.gov.in.	<a href="https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf">https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf</a>	All

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2020)**  
**TCET Autonomy scheme with effect from 2022-23**

B.E. (Information Technology)					S.E. SEM: V			
Course Name: Summer Internship					Course Code: SI-IT501			
Teaching scheme (during Week End / Semester Break/ End of Semester(Between 21st and 25th Week))					Assessment/Evaluation Scheme			
					Presentation		Report	TW
Theory	AC	Practical	Contact Hours	Credits	AC		AC	
-	-	-	160*	-	-		-	-
AC- Activity evaluation TW – Term Work Examination <b>Total weightage of marks for continuous evaluation of Term work/Report:</b> Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).								
<b>Prerequisite:</b> Fundamental knowledge of Information Technology related tools								
* This is part of Summer Internship but can start in winter. Students may go up to 160 hrs. to acquire maximum 4 credits in Semester 6. Total hrs. mentioned should be completed till end of Semester 6. Credits will be awarded at the end of 6th Semester and will be reflected in the Grade Card of 6th Semester. Student will get 1 year span to acquire the credits. Students should collectively acquire total contact hrs. in below given activities in a span of 1 year. Student will submit a report to earn term work marks in internship.								

### Course Objectives:

To get industry like exposure in the college laboratories by carrying out projects using subject studied till 6<sup>th</sup> semester.  
 Also design innovative techniques / methods to develop the products.  
 To gain knowledge of marketing and publicizing products developed.

### Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To apply subjects knowledge in the college laboratories for carrying out projects	L1, L2,L3
2	Able to developed innovative techniques / methods to develop the products	L1, L2,L3
3	Able to do marketing and publicity of products developed	L1, L2,L3

### Detailed Syllabus:

Module No.	Topics	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Program Specific Internship</b>	L1, L2, L3
	Training and certification on emerging technologies in domains offered by Department of Computer Engineering  Applying classroom and laboratory knowledge to design , develop and deploy the products	
2	<b>Inter disciplinary Internship</b>	L1, L2, L3
	<ul style="list-style-type: none"> <li>To explore and understand issues and challenges in the other disciplines (EXTC, ELEX, MECH and CIVIL)</li> <li>Design , develop and deploy cost effective products using multidisciplinary approach</li> </ul>	
3	<b>Industry Specific Internship</b>	L1, L2, L3
	<ul style="list-style-type: none"> <li>To explore and understand issues and challenges in industry</li> <li>Developing solutions for industry specific problems</li> <li>Design , develop and deploy products for startup and SMEs</li> </ul>	
4	<b>Interpersonal Internship</b>	L1, L2, L3
	<ul style="list-style-type: none"> <li>To develop interpersonal skills such as leadership, marketing ,publicity and corporate ethics and communication</li> <li>To get competence in problem solving , presentation , negotiation skills</li> </ul>	
5	<b>Social Internship</b>	L1, L2, L3
	<ul style="list-style-type: none"> <li>Identify and study different real life issues in the society</li> <li>Identify societal problems and provide engineering solutions to solve these problems</li> </ul>	
6	<b>Academic Internship</b>	L1, L2, L3
	<ul style="list-style-type: none"> <li>Study report preparation, preparation of presentations, copy table book preparation , business proposal and IPR</li> <li>Capture aspirations &amp; expectations through interviews of students.</li> <li>Ways to connect research in technical institutes with industry.</li> <li>Taking inputs from self, local stakeholders and global stakeholders which will help to develop process with comparative and competitive study.</li> </ul>	

### Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	The Ultimate Guide to Internships: 100 Steps to Get a Great Internship and Thrive in It (Ultimate Guides)	Eric Woodard	Allworth	I	2015

**Online References:**

Sr. No.	Website Name	URL	Modules Covered
1	<a href="https://www.letsintern.com/">https://www.letsintern.com/</a>	<a href="https://www.letsintern.com/internships/summer-internships">https://www.letsintern.com/internships/summer-internships</a>	M1-M6
2	<a href="https://codegnan.com">https://codegnan.com</a>	<a href="https://codegnan.com/blog/benefits-of-internships-and-importance">https://codegnan.com/blog/benefits-of-internships-and-importance</a>	M1-M6
3	<a href="https://www.honorsociety.org">https://www.honorsociety.org</a>	<a href="https://www.honorsociety.org/articles?category=internships">https://www.honorsociety.org/articles?category=internships</a>	M1-M6

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**  
**Proposed TCET Autonomy Scheme (w.e.f. A.Y. 2024-25)**

B.E (Information Technology)								SEM: V		
Course Name: Professional Skill IV (Full Stack Development I - Basic)								Course Code: HME ITPS 501		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)					
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation					
Hours Per Week					Theory (100)			PR	TW	Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE			
-	-	2	2	1	-	-	-	15	10	25
PR,TW will be part of theory evaluation										
The weightage of marks for continuous evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)										
Prerequisite: HTML, CSS, JavaScript, Object oriented concepts, networking fundamentals, computer programming and software development concepts										

**Course Objective:** This course aims to equip participants with comprehensive skills in operating the command line, including shell scripting and cron job scheduling. Additionally, it covers relational database management with PostgreSQL, focusing on class and ER diagrams, ORM mapping, and writing DDL and DML scripts. Furthermore, it delves into CI/CD practices using GitLab and Gradle builds with an emphasis on version control, branching, and Jenkins deployment. Finally, it provides hands-on experience in REST API and microservices development.

**Course Outcomes:** Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Gain a strong understanding of shell scripting fundamentals and syntax. Students will demonstrate the ability to schedule tasks using cron jobs and manage environment variables effectively.	L1,L2
2	Comprehend the principles of relational databases and PostgreSQL. Students will demonstrate proficiency in ORM concepts and mapping using Hibernate or similar frameworks.	L2,L3
3	Understand the concept of CI/CD pipelines and their importance in software development and gain hands-on experience with GitLab for version control and Jenkins for automation.	L1,L2,L3
4	Grasp the principles of RESTful services and HTTP protocols and also be proficient in developing REST APIs using Java Spring Boot and JPA for database interactions	L1,L3
5	Familiar to advanced frameworks like Quarkus and Kogito for building efficient RESTful services.	L1,L2,L3
6	Revise and enhance deployment practices using Jenkins scripted pipelines and understand the importance of code linting and static code analysis using tools like SonarQube, and integrate it into the development pipeline	L1,L2,L3

### Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Shell Scripting and Cron Jobs</b>	3	L1,L2
	Introduction to Shell Scripting, Basics of Shell Commands and Syntax Writing Scripts to Automate Tasks, Introduction to Cron Jobs, Scheduling Tasks with Cron, Environment Variables and Their Usage, Writing a Backup Script for Scheduled Backups.		
2	<b>Relational Databases and Object-Relational Mapping (ORM)</b>	5	L1,L2,L3
	Overview of Relational Databases, Introduction to PostgreSQL, Understanding ORM Concepts, Class Diagram and Entity-Relationship (ER) Diagram, ORM Mapping with Hibernate or similar framework, Writing DDL Scripts for Database Creation, Writing DML Scripts for Data Manipulation		
3	<b>Introduction to Continuous Integration/Continuous Deployment (CI/CD)</b>	6	L1,L2,L3
	Overview of CI/CD Pipelines, Introduction to GitLab for Version Control, Basics of Gradle Builds, Branching and Merging Strategies, Using Jenkins for Automation, Deploying Applications on PostgreSQL, Automating Deployment Pipelines		
4	<b>REST API Development with Spring Boot</b>	6	L1,L3. L4
	Understanding RESTful Services, Introduction to Java Spring Boot Database Interactions with JPA, Handling HTTP Protocols and Error Messages, Managing Error Responses and Java Exceptions, Localization and Globalization with Resource Bundles, Externalization of Properties and Configuration, Maven and Gradle Builds, Test Automation with Postman, Integration of Postman Scripts into Build Automation		
5	<b>Advanced REST API Development with Quarkus and Kogito</b>	5	L1,L2,L3
	Introduction to Quarkus and Kogito, Building BPMN Workflows for Approval Processes, Test Suite Building and Test Case Management Implementing RESTful Web Services, Workflow Use Cases Implementation		
6	<b>Deployment and DevOps Practices</b>	5	L1,L2,L3 ,L4
	Revision of Jenkins Deployment with Scripted Pipelines, Enhancing CI Pipeline with Nexus for Artifact Storage, Automated Deployment to Development, SIT, and UAT Servers, Nightly Builds and Snapshot Movement in Nexus, Integration of SonarQube for Code Linting and Static Code Analysis		
	<b>Total Hours</b>	<b>30</b>	



### **Books and References:**

Sr. No.	Title	Authors	Publisher	Edition	Year
1	UNIX and Linux System Administration Handbook	Evi Nemeth, Garth Snyder, Trent R. Hein	Pearson	5th	2021
2	Database Systems: The Complete Book	Hector Garcia-Molina, Jeffrey D. Ullman	Pearson	2nd	2008
3	Java Persistence with Hibernate	Christian Bauer, Gavin King	Manning Publications	2nd	2015
4	Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation"	Jez Humble, David Farley	Addison-Wesley Professional	1st	2010
5	The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations	Gene Kim, Patrick Debois, John Willis, Jez Humble	IT Revolution Press	1st	2016

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**  
**Proposed TCET Autonomy Syllabus (w.e.f. A.Y. 2024-2025)**

<b>B.E. (Information Technology)</b>					<b>T.E. SEM : V</b>			
<b>Course Name:</b> Professional Skills IV (Dept Specific Skill - Cloud Architecture I)					<b>Course Code : HME –IT PS501</b>			
<b>Teaching Scheme (Program Specific)</b>					<b>Examination Scheme (Academic)</b>			
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>			
Theory	Tutorial	Practical	Contact Hours	Credits	Presentation	Report	TW	25
					AC	AC		
-	-	2	2	1	15	10	25	
<b>The weightage of marks for continuous evaluation of Term work/Report:</b> Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)								
<b>Prerequisite:</b> Computer Basics, Procedural Programming Languages, Infrastructure Security, Cloud Infrastructure								

**Course Objective:** To comprehend cloud concepts involves grasping the fundamental principles of on-demand resource provisioning, scalability, and virtualization, while understanding the cloud environment entails familiarity with the infrastructure, services, and deployment models. Utilizing cloud services involves efficiently leveraging platforms, software, and infrastructure provided by cloud service providers to meet diverse computing needs.

**Course Outcomes:** Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy	PO Mapping (Write only Number/s)	PSO Mapping (Write only Number/s)
1	Configure, test and deploy secure and cost-effective cloud infrastructure	L1-L6	1-5, 9-11	1,2
2	Provide secure and easy access to the cloud services	L1-L6	1-5, 9-11	1,2
3	Automate cloud infrastructure deployment and management	L1-L6	1-5, 9-11	1,2
4	Use cloud monitoring and deployment tools	L1-L6	1-5, 9-11	1,2
5	Deploy and utilize machine learning model on cloud computing environment	L1-L6	1-5, 9-11	1,2
6	Compliance of cloud infrastructure with the various standards	L1-L6	1-5, 9-11	1,2

### List of Experiments:

Sr. No.	Practical/Experiment topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1.	Design and deploy the cloud-based application with scalability feature.	2	L1,L2.L3,L4
2.	Create Virtual Private Cloud for the cloud-based application.	2	L1,L2.L3,L4
3.	Create security groups for the cloud instances.	2	L1,L2.L3,L4,L5,L6
4.	Deploy load balancer for the application deployed on to distribute the load among multiple instances.	2	L1,L2.L3,L4,L5,L6
5.	Create and modify the firewall rules of Virtual Private Cloud.	2	L1,L2.L3,L4,L5,L6
6.	Design the secure network architecture for the cloud-based application.	2	L1,L2.L3
7.	Create the serverless computing models (e.g., AWS Lambda, Azure Functions).	2	L1,L2.L3,L4,L5,L6
8.	Create API and access the cloud services using the API.	2	L1,L2.L3,L4,L5,L6
9.	Automate the Deployment of Networks in cloud computing environment with Terraform.	2	L1,L2.L3,L4,L5,L6
10.	Explore and configure parameters and tools to monitor and manage cloud services.	2	L1,L2.L3
11.	Implement the application which uses the cloud services to create machine learning model.	2	L1,L2.L3,L4,L5,L6
12.	Implement the application which uses the Natural Language API service of cloud computing.	2	L1,L2.L3,L4,L5,L6
13.	Implement the application which uses the audio to text API service of cloud computing.	2	L1,L2.L3,L4,L5,L6
14.	Case study on various standards developed for the efficient use and high security of cloud computing.	2	L1,L2.L3
15.	Mini Project	2	L1,L2.L3,L4,L5,L6
<b>Total Hrs.</b>		30	

### Online References:

Sr. No.	Website Name	URL	Practical's
1	www.aws.amazon.com	<a href="https://aws.amazon.com/getting-started/hands-on/?nc2=h_q1_le_gs_t&amp;getting-started-all.sort-by=item.additionalFields.content-latest-publish-date&amp;getting-started-all.sort-order=desc&amp;awsf.getting-started-category=*all&amp;awsf.getting-started-content-type=*all">https://aws.amazon.com/getting-started/hands-on/?nc2=h_q1_le_gs_t&amp;getting-started-all.sort-by=item.additionalFields.content-latest-publish-date&amp;getting-started-all.sort-order=desc&amp;awsf.getting-started-category=*all&amp;awsf.getting-started-content-type=*all</a>	1-15

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**  
**Proposed TCET Autonomy Scheme (w.e.f. A.Y. 2024-25)**

B.E (Information Technology)								SEM: V		
Course Name: Industry Practice-III (Full Stack Development 1-Advanced)								Course Code: HME-IP 501		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)					
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation					
Hours Per Week					Theory (100)			PR	TW	Total
Theory	Tutorial	Practical	Contact Hours	Credits	ISE	IE	ESE			
-	-	2	2	1	-	-	-	15	10	25
The weightage of marks for continuous evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)										
Prerequisite: HTML, CSS, JavaScript, Object oriented concepts, networking fundamentals, computer programming and software development concepts										

**List of Practical/ Experiments:**

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hr s.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Basic Experiments</b>	Create a shell script to automate system monitoring tasks (e.g., checking disk space, CPU usage) and schedule it using cron.	2	L1,L2
2		Develop a backup script that utilizes environment variables for backup location and scheduling with cron.	2	L1,L2
3	<b>Design/Develop Experiments</b>	Set up a PostgreSQL database and write DDL scripts for table creation based on an ER diagram..	2	L2,L3
4		Use Hibernate (or another ORM framework) to map Java classes to database entities and perform CRUD operations using DML scripts..	2	L2,L3
5		Create a basic CI/CD pipeline using GitLab CI/CD for a Java Spring Boot application.	2	L2,L3
6		Explore branching and merging strategies in GitLab, and automate deployment to PostgreSQL using Gradle builds.	2	L1,L2,L3
7		Develop RESTful services with Java Spring Boot and implement JPA for database interactions.	2	L1,L3
8		Handle HTTP protocols, error messages, and exceptions in your REST API, and automate testing using Postman scripts integrated into your CI pipeline.	2	L1,L3

9		Build BPMN workflows for approval processes using Quarkus and Kogito, and test workflow use cases with a test suite..	2	L1,L3
10		Implement RESTful web services in Quarkus, integrate with existing workflows, and automate testing within your CI/CD pipeline..	2	L1,L2,L3
11	Case studies	<b>Automating Deployment and Monitoring for E-commerce Platform</b> <b>Scenario:</b> You are part of a team developing an e-commerce platform using Java Spring Boot for backend services and PostgreSQL for data storage. The platform needs to handle high traffic during peak hours and ensure continuous availability.	2	L1,L2,L3
12		<b>DevOps Transformation for Software Development Company</b> <b>Scenario:</b> A software development company is undergoing a DevOps transformation to improve collaboration, automate deployment processes, and enhance code quality across multiple projects	2	L1,L2,L3
13	Mini Project	Develop an Automated Employee Management System using modern technologies and DevOps practices to streamline HR processes, improve data management, and enhance employee experience.	6	L1,L2,L3,L4
<b>Total Hours</b>			<b>30</b>	

### Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	UNIX and Linux System Administration Handbook	Evi Nemeth, Garth Snyder, Trent R. Hein	Pearson	5th	2021
2	Database Systems: The Complete Book	Hector Garcia-Molina, Jeffrey D. Ullman	Pearson	2nd	2008
3	Java Persistence with Hibernate	Christian Bauer, Gavin King	Manning Publications	2nd	2015
4	Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation"	Jez Humble, David Farley	Addison-Wesley Professional	1st	2010
5	The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations	Gene Kim, Patrick Debois, John Willis, Jez Humble	IT Revolution Press	1st	2016

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**  
**Proposed TCET Autonomy Syllabus (w.e.f. A.Y. 2023-2024)**

<b>B.E. (Information Technology)</b>					<b>T.E. SEM: V</b>		
<b>Course Name: Industry Practices-III (Employability Skills)</b> (Node/Express/JSON/MongoDB)					<b>Course Code: HME-ITIP501</b>		
<b>Teaching scheme (Holistic and Multidisciplinary Education-HME)</b>					<b>Examination Scheme (Academic)</b>		
<b>Modes of Teaching / Learning / Weightage</b>					<b>Assessment/Evaluation Scheme</b>		
Theory	Tutorial	Practical	Contact Hours	Credits	Presentation	Report	Term Work
					AC	AC	
-	-	2	2	1	15	10	25
<b>Prerequisite:</b> JavaScript							

**Note:-** IP Syllabus is designed looking into the current market scenario & industry trends. In future contents may be revised based on industry requirements.

**Course Objective:** The course intends to make students learn Node.js and MongoDB to develop web applications. The course intends to develop professional skills necessary for becoming technically skilled personnel.

**Course Outcomes:** Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy	PO Mapping (Write only Number/s)	PSO Mapping (Write only Number/s)
1	Comprehend the working of Node Package Manager (NPM)	L1, L2	1,2,3,5,1 1	1,2
2	Execute Node.js applications in Express framework	L1, L2	1,2,3,5,9 ,10,11,1 2	1,2,3
3	Explain the constructs of JSON and MongoDB	L1, L2, L3	1,5	1,2
4	Compare Relational and Non-Relational DBMS Architecture	L1, L2, L3, L4	1,2,3,4,5	1,2,3
5	Analyze the design issues of NoSQL Database	L1, L2, L3, L4	1,2,3,4,5	1,2,3
6	Develop web applications using Node.js and MongoDB	L1, L2, L3, L4, L6	1,2,3,5,6 ,7,8,9,10 ,11,12	1,2,3 ,4



### Detailed Syllabus:

Module No.	Topics	Hrs.	Self Study	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Introduction to Node.js</b>	4	2	L1, L2
	Introduction to NPM, Installing Node.js, Initializing a Node Project, Managing Dependencies, Installing Local and Global Packages, Updating Packages, Uninstalling Packages, Directory Structure, Main Entry Point, Creating Modules, Using External Modules, Using Common JS Modules			
2	<b>Express.js Framework</b>	5	2	L1, L2
	Setting up an Express Application, Handling HTTP Requests, Routing in Express, Route Parameters, Route Handlers and Middleware, Request and Response Objects, Express Router, Static Files and Middleware, Error Handling, Redirects and URL Rewriting, Route Organization and Modularization			
3	<b>JSON and Basics of MongoDB</b>	5	2	L1, L2, L3
	Introduction to JSON Format: JSON Syntax and Data Types, JSON Objects and Arrays, Parsing and Stringifying JSON, Reading and Writing JSON Files, Introduction to MongoDB: Installing and Configuring MongoDB, MongoDB Data Model: Collections and Documents, Querying and Filtering Data in MongoDB, Indexing and Performance Optimization in MongoDB			
4	<b>Non-Relational DBMS Architecture</b>	5	2	L1, L2, L3, L4
	Goals, Distributed Computing Models, Hardware Concepts, Software Concepts, Architecture of DOS, Design Issues: Transparency, Flexibility, Scalability, Reliability, Performance, fault tolerance			
5	<b>NoSql DB Design</b>	5	2	L1, L2, L3, L4
	Understanding the Data Model, Denormalization and Data Duplication, Schema Design Considerations, Data Consistency and Eventual Consistency, Key Design Patterns in NoSQL Databases, Aggregates and Embedded Documents, Indexing Strategies for NoSQL Databases, Partitioning and Data Distribution, Handling Complex Relationships, Data Modeling for Scalability, Data Integrity and Validation			
6	<b>Integrating with Node</b>	6	5	L1, L2, L3, L4, L6
	Introduction to MongoDB and Node.js Integration: Installing and Configuring the MongoDB Node.js Driver, Connecting to MongoDB from a Node.js Application, CRUD Operations with the MongoDB Node.js Driver, Querying and Filtering Data, Aggregation Framework, Handling Relationships and References in MongoDB, Error Handling and Exception Management in Integration, Authentication and Authorization			
<b>Total Hours</b>		<b>30</b>	<b>15</b>	

### Text /Reference Books:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	Web Development with MongoDB and Node.js	Jason Krol	Packt Publishing	First Edition	2014
2	MongoDB: The Definitive Guide	Kristina Chodorow, Michael Dirolf	O'Reilly	Second Edition	2010
3	Express in Action: Writing, building, and testing Node.js applications	Evan Hahn	Manning	First Edition	2016
4	JSON at Work: Practical Data Integration for the Web	Tom Marrs	O'Reilly	First Edition	2017

### Online References:

Sr. No.	Website Name	URL	Modules Covered
1	<a href="https://www.simplilearn.com">https://www.simplilearn.com</a>	<a href="https://www.simplilearn.com/tutorials/nodejs-tutorial/nodejs-mongodb">https://www.simplilearn.com/tutorials/nodejs-tutorial/nodejs-mongodb</a>	M1, M2, M6
2	<a href="https://www.tutorialspoint.com/">https://www.tutorialspoint.com/</a>	<a href="https://www.tutorialspoint.com/json/">https://www.tutorialspoint.com/json/</a>	M3
3	<a href="https://www.udemy.com">https://www.udemy.com</a>	<a href="https://www.udemy.com/course/backend-web-development-with-nodejs-mongo-and-express/">https://www.udemy.com/course/backend-web-development-with-nodejs-mongo-and-express/</a>	M1-M6

**T.E. Semester –V**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**  
**TCET Autonomy scheme with effect from 2024-25**

BE ( Information Technology )						T.E.(SEM : V)	
Course Name : Project Based Learning (Full Stack Development 1- Projects)						Course Code : HME-ITPBL501	
Teaching scheme (Holistic Student Development - HSD) (Conducted in the beginning of Semester during first 3 Weeks)					Examination Scheme (Formative/ Summative)		
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation		
Hours					Presentation (15)	Report (10)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	AC	AC	25
-	-	2	2	1	15	10	
AC- Activity Evaluation							
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).							
Prerequisite: Computer Fundamentals & knowledge of Programming Languages RBT : Revised Bloom’s Taxonomy							

**Course Objectives:** This course is intended to develop projects thereby identifying & analyzing the basic real time problems and study existing solutions and prepare literature survey. To apply the basic computing & mathematics fundamentals to solve problems and to apply fundamental concepts of Programming such as C/C++ and Java to solve basic real time problems.

**Course Outcomes:** Upon completion of the course student will be able to:

S N	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Identify & analyze the basic real time problems and prepare literature survey.	L1,L2,L3
2	Identify & apply appropriate technologies & programming constructs to solve problems.	L1,L2,L3
3	Present & Document the results obtained.	L1,L2,L3,L4

**Suggested Project Topics:**

As per the requirement and Market needs suggested by In-Solution Global (ISG)

**T.E. Semester –V**

**Choice-Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2023)**

**Proposed Syllabus under Autonomy Scheme based on Design Thinking and Project Management**

BE ( Information Technology )					T.E.(SEM : V)			
Course Name: Project Based Learning					Course Code: HME –PBL501			
Contact Hours Per Week: 02					Credits: 01			
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)			
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation			
Hours Per Week					Theory (25)	Presentations (25)	Reports (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA -	(AC)	(AC)	25
-	-	2	2	1	-	15	10	
IA-In Semester Assessment -Paper Duration -1.5 Hours. ESC- End Semester Exam- Duration - 3 Hours. AC: Activity The weightage of marks for continuous evaluation of Term work: Formative (40%), Timely completion of practical ( 40%), and Attendance / Learning Attitude (20%).								
Prerequisite: TV 2035 Challenges								

**Course Objectives:**

To provide students with the mindset, skills, and tools necessary to lead successful projects, drive innovation, and solve complex problems in a variety of contexts.

**Course Outcomes:**

<b>SN</b>	<b>Course Outcome</b>	<b>Cognitive level attainment as per revised Bloom Taxonomy</b>
1.	Students will be able to understand and apply the principles of design thinking, including empathy, ideation, prototyping, and iteration, to solve complex problems effectively.	L1, L2, L3
2.	Students will be able to demonstrate proficiency in project management methodologies, including project planning, scheduling, budgeting, risk management, and stakeholder communication.	L1, L2, L3
3.	Students will be able to integrate design thinking and project management approaches to plan, execute, and implement projects that address real-world challenges.	L1, L2, L3, L4, L5
4.	Students will be able to communicate their ideas, project plans, and findings effectively through written, verbal, and visual means, both within their teams and to external.	
5.	Prepared to participate in PAN India competition with innovative technical (Software /Hardware based) Product meeting the needs of users along with value addition.	L1, L2, L3, L4, L5, L6

### Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive level attainment as per revised Bloom Taxonomy
1	<b>INSPIRATION: Explore</b>	5	L1, L2, L3
	Strategic Priorities, Activity System, Stakeholder Mapping, Opportunity Framing		
2	<b>RESEARCH: Empathize and IDEATION: Experiment and Engage</b>	5	L1, L2, L3
	EMPATHISE: METHODS & TOOLS: Secondary research, Observation, interview, Empathy map, Pain points and needs, Persona Development, Correlate Secondary research, Mapping of idea, Mind maps and Affinity maps. TRIZ principles for solution, Testing.		
3	<b>IMPLEMENTATION: Evolve</b>	2	L1, L2, L3, L4
	Strategic requirements and Activity system.		
4	<b>Introduction to 7 Cs for Project Success</b>	4	L1, L2, L3
	Introduction to 7Cs for Project success: Communication, Commitment, Cash, Control, Cooperation, Culture, Coaching		
5	<b>Project Planning</b>	4	L1, L2, L3
	Conception & Initiation, to design project charter, Project Definition & Project Planning: To revisit the prototype design and identify Constraints, include a risk management plan, Human resources requirements, Project schedule and key milestones, Budget/cost estimates for final Product design. Overall project performance monitoring NOISE estimation: five qualitative parameters: Needs, Opportunities, Improvements, Strengths, and Exceptions		
6	<b>Implementation, Presentation and Report</b>	10	L1, L2, L3
	I. Presentation will be an amalgamation of five modules, Case study, Brainstorming understanding, Survey and Prototype		
	II. Report writing in format. <b>Evaluation by faculty as per format</b> Based on Prototype, Presentation and report written by students		
	<b>Total Hours (15 hrs. conduct in class in 15-week semester +Self learning 15 hours)</b>	<b>30</b>	

### Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	NASA's Journey to Project Management Excellence	Edward J. Hoffman and Matt Kohut	National Aeronautics and Space Administration,	E Book	2012
2	97 Things Every Project Manager Should Know: Collective Wisdom from the Experts	Barbee Davis	O'Reilly Media, Inc.	E book	2009
3	The Practical Guide to Project Management	Cristine Peterson	Bookboon	E book	2013
4	Launch: Using Design Thinking to Boost Creativity and Bring Out the Maker in Every Student	John Spencer and A.J. Juliani	Dave Burgess Consulting,	E book	2016

			Inc.		
5	Design Thinking in the Classroom: Easy-to-Use Teaching Tools to Foster Creativity, Encourage Innovation, and Unleash Potential in Every Student" by David Lee and Mark D. Churchill	David Lee and Mark D. Churchill	Corwin	E book	2015