



Manav Rachna University

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

Scheme & Syllabus

B.Tech (2018-22)



MANAV RACHNA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE&TECHNOLOGY
SYLLABUS & SCHEME

Apart from the courses that have been picked from B.Tech CSE the specialization courses for Digital Transformation Engineering are as follows:

CSU03- Semester-I

SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CHH144	CHEMISTRY-I	NIL	NA	CH	HARD	CORE	3	1	2	0	6	5
ECH103B-T/P	Basics Of Electrical & Electronics	NIL	NA	EC	HARD	CORE	3	1	2	0	6	5
CSH101B-T&P	PROGRAMMING FOR PROBLEM SOLVING USING C	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
CSH105B-T&P	DIGITAL PRODUCT ENGINEERING AND DESIGN THINKING	NIL	NA	CS	Hard	Core	3	1	2	0	6	5
MEW102B	ENGINEERING GRAPHICS & DRAWING	NIL	NA	ME	WORKSHOP	ALLIED CORE	0	0	3	0	3	1.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							12	4	11	0	27	21.5

DETAILED SYLLABUS
CSU03- Semester-I

Course Title/Code	Digital product Strategy/Engineering & Design Thinking (CSH105B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Course Outcomes: Students will be able to

CO1: Understand Digital transformation and its need

CO2: Understand and design Business Model Canvas

CO3: Understand Product management: roles & responsibilities

CO4: Understand Product Development Methodologies

CO5: Understand digital innovation

CO6: Understand Lean startups and its concepts

CO7: Understand User Experience

CO8: Understand Product Marketing

Section-A

Introduction to Digital Transformation - Why DT (Economic growth, Dependence on Digital, Global connectedness), What is DT (Principles and Pillars of Digital Transformation), Pragmatic view of Business Models & Changes needed, Business Model Generation (Business Model Canvas) Value Propositions.

Product Management & Service Mindset - Introduction to Product Management (What, Why), Building Digital Products & Services (Product Management role), Product Lifecycle.

Section-B

Product Development methodology - Systems Thinking, Value Chain, Capability Optimization, Business Integration Methods, Lean Thinking, Agile. Digital Innovation - Innovation methods and techniques, Design Thinking Phases,

Section-C

Design Thinking - Divergence, Emergence, Convergence, Difference Between Design Thinking, Lean Startup, and Agile, Challenges of Design Thinking, Empathize, Define, Ideate, Prototype, Test, What is a Design Sprint?, Design Sprint Process - Map, Sketch, Decide, Prototype, Test, Design Thinking vs Design Sprint.

Lean Startup - Minimum viable product, Continuous deployment, Split testing, Actionable metrics, Pivot, Innovation accounting, Build-Measure-Learn.

Section-D

Introduction to User Experience Design (Service Design) - Overview of UI and UX, User Experience Design, Requirement Gathering, Designing Alternatives, Prototyping, Evaluation, Performance. Product Marketing - Digital Marketing Framework & Strategy, Paid Social & Advertising, Content Marketing, Customer Engagement & Retention, Analytics, Data & Reporting.

SEMESTER - 2												
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
PHH101 B-T&P	QUANTAM MECHANICS FOR ENGINEER	NIL	NA	PY	HARD	CORE	3	1	2	0	6	5
CSH106 B-T&P	AGILE SOFTWARE DEVELOPMENT	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
HLS101 B/HLS10 2B	BUSINESS ENGLISH/ COMMUNICATIVE ENGLISH	NIL	NA	HM	SOFT	CORE	2	0	2	0	4	3
CSW208 B	PROGRAMMING FOR PROBLEM SOLVING USING PYTHON	NIL	NA	CS	Workshop	CORE	0	0	3	0	3	1.5
MAH101 B-T & P	CALCULUS & LINEAR ALGEBRA	NIL	NA	MH	HARD	CORE	3	1	2	0	6	5
CHH137	ENVIRONMENTAL STUDIES	NIL	NA	CH	SOFT	AUDIT	2	0	0	2	4	0
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							13	3	1	2	29	19.5

CSO104 B	Post 2nd Sem Summer Training (Mandatory) (Project Management)	2
----------	---	---

Course Title/Code	Agile Software Development (CSH106 B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Traditional Software Development Methodologies: Classic waterfall method, Gated waterfall method; Problem/issues with traditional approach: Conflict between developers and operations, Issues with traditional development and operations

Section-B

Introduction and history of Agile, Agile development, Agile Manifesto and the four values, Introduction and history of Lean, Lean principles.

Section-C

Introduction to Agile methodologies: Extreme Programming (XP), Feature-driven Development (FDD), Adaptive System Development (ASD), Dynamic Systems Development Method (DSDM), Lean Software Development (LSD), Kanban, Crystal clear, Scrum

Scrum Model and the concepts: Introduction, Scrum Theory, Scrum Values, Scrum Roles, Scrum Events, Scrum Artifacts, and Benefits of Scrum.

Extreme Programming and the concepts: Introduction, XP Values, XP Rules, XP Roles, XP Activities, Different Categories of XP Practices.

Section-D

Agile Estimation and Planning: Agile Planning and its Need, The Agile Planning Onion, Levels of Agile Planning, Conditions of Satisfaction, Estimating the Size in Story Points and Ideal Days, Agile Estimating Techniques, Implementing Agile on Industry Projects, Soft Skills in Agile.

Course Title/ Code	Programming for Problem Solving using Python (CSW208B)
Course Type:	Domain Core (Department)
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objective	The course is designed to provide Basic knowledge of Python . Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%

	TOTAL	100%
--	--------------	-------------

Course Outcome:

CO1: Acquiring the basic knowledge of Python using IDE environment.

CO2: Implementation of Programming construct of Python.

CO3: Concept of Collections and their implementation in Python.

CO4: Various operations on collections using Python.

CO5: Implementation of object oriented programming concept in Python.

CO6: File operations in python

Section-A

Introduction: Introducing the Python language, Understanding the Python shell, writing a simple program, Development environment setup, Configuring – Eclipse, interpreter, Introducing the Eclipse working environment, Concept of module and packages,

Basic Operators – Arithmetic, Relational, Assignment, Logical, Membership and Identity operators, Variables and Data Types, Understanding Mutable and Immutable types, Working with various type – None, Boolean(True/False), Numeric(int, float, long), Sequence(String, List & Tuple), Mapping(Dictionary) Understanding the concept of header & suites in the language construct, Conditionals and inline syntax, Multiple assignments in variables, Working with data type conversion, Working with Loops – While & For Effects of break, continue, pass & else statement in various construct.

Section-B

Implementing custom functions, Variable scope – Global vs. Local, Dealing with various function arguments – default, named and variable length arguments, Understanding the concept of pass by value and pass by reference, Returning multiple values from a function, Anonymous & Recursive function,

Understanding Strings in Python & different type of its delimiter, Working with special string operators & formatted strings, Exploring some useful built in string methods, Working with Date & Time,

Section-C

Understanding File Operations, Working with the File Object for reading & writing, Object oriented programming in Python, Understanding Classes & Objects, and Exploring different components of a Class , **Class** inheritance & Method

overriding, Working with multiple Inheritance, Understanding the Abstraction mechanism in Python, Built-in Class attributes, Exception handling,

Section-D

Python DB Interaction. Python Demonstration: Reading and Writing CSV files, The Series Data Structure, Querying a Series, The Data Frame Data Structure, Data Frame Indexing and Loading, Querying a Data Frame, Indexing Data frames, Missing Values.

DETAILED SYLLABUS

Course Title	MATHEMATICS I (CALCULUS AND LINEAR ALGEBRA)
Course Code	MAH101B-T, MAH101B-P
Course Type	Core (Allied)
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Course Objective	<p>The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.</p>

COURSE OUTCOME :

Students would be able to

CO1 solve problems on application of differential calculus like radius of curvature ,evolutes , maximum/minimum , Taylor

series & Maclaurin series

CO2 apply the concepts of definite integrals to evaluate volume and surface area of revolution.

CO3 solve definite integrals using Beta & Gamma functions.

CO4 compute rank and inverse of a matrix.

CO5 solve system of linear equations using Cramer's Rule, Gauss elimination and Gauss Jordan method.

CO6 define a Vector Space and check for linear dependence of vectors

CO7 find basis and dimension of vector space

CO8 identify Linear transformations (maps) and find range, kernel, rank, nullity, Inverse of a linear transformation, composition of linear maps, Matrix associated with a linear map

CO9 find Eigen values, Eigenvectors and Eigen bases of matrix, diagonalize a matrix and define Inner product spaces

CO10 apply Gram-Schmidt orthogonalization process to find orthonormal basis for the given space

CO11 solve & analyze the Mathematical problems related to calculus & linear algebra using OCTAVE software.

SECTION – A

Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

SECTION – B

Matrices: Matrices, vectors, addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

SECTION – C

Vector spaces - 1: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

SECTION – D

Vector spaces-2: Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, Eigen bases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

SEMESTER - 3

SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
MAH202B-T & P	PROBABILITY & STATISTICS	NIL	NA	MH	HARD	CORE	3	1	2	0	6	5
CSH103B-T&P	DATA STRUCTURES & ALGORITHMS	NIL	NA	CS	HARD	DOMAIN CORE	3	1	2	0	6	5
CSH202B-T&P	DATABASE MANAGEMENT SYSTEM	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
CSH210B-T&P	SOFTWARE CRAFTSMANSHIP	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
EDS 288/EDS 289/EDS 235	APP. PHILOSOPHY/APP. PSYCHOLOGY/ APP. SOCIOLOGY	NIL	NA	ED	SOFT	ELECTIVE	1	0	2	0	3	2
FLS201B/FLS202B/FLS203B	FOREIGN LANGUAGE	NIL	NA	FL	AUDIT	ELECTIVE	1	0	0	0	1	0
CDO202	CDC	NIL	NA	CDC	OUTCOME	CORE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							14	4	1	0	29	22.5

Course Title/Code	Software Craftsmanship - TDD/SOLID (CSH210B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Course Outcomes: Students will be able to

CO1: Preliminary study. Define craftsmanship: Mastery of the paradigm

CO2: Identify the fundamental characteristics of good design

CO3: Explain the SOLID design principles

CO4: Discuss horizontal and vertical formatting

CO5: Describe the basic test-driven development

CO6: Define code smells: Symptoms of poorly designed code

CO7: Learn how to Keep your stuff organized

CO8: Know about common frameworks and code architectures

CO9: Understand about choosing a programming strategy

CO10: Defining your goals in becoming a craftsman

Section-A

What is software craftsmanship and why matters? Clean Coding Principles.

Section-B

Coding guidelines, Code Refactoring.

Section-C

Code Formatting, SOLID principles

Section-D

Unit testing, TDD

SEMESTER - 4

SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
---------------	--------------	---------------	--------------------------------	-----------------------	--------------------------------------	-----------------------------	---	---	---	---	-------------------------------	----------------

					NTCC/ Audit)						K	
CSH205B-T&P	COMPUTER NETWORKS	NIL	NA	CS	HARD	CORE	3	0	2	0	5	4
CSH206B-T&P	OPERATING SYSTEMS	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
CSH201B-T&P	OOPS USING JAVA	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
CSH211B-T&P	MODERN WEB AND MOBILE FRAMEWORKS	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
FLS204/FLS205/FLS206	FOREIGN LANGUAGE	NIL	NA	FL	AUDIT	ELECTIVE	1	0	0	0	1	0
LWH324	INDIAN CONSTITUTION	NIL	NA	ED	SOFT	AUDIT	1	0	2	0	3	0
MC7	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	NIL	NA	ED	AUDIT	ELECTIVE	1	0	2	0	3	0
CDO202	CDC	NIL	NA	CDC	OUTCOME	CORE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							15	3	3	0	31	19.5
CSO209B	SUMMER TRAINING POST 4TH SEMESTER										2	

Course Title/Code	Modern Web and Mobile frameworks (CSH211B-T&P)
Course Type:	Domain Core

Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Introduction to HTML5, CSS3, Introduction to modern JavaScript, History of frontend architectures – Direct DOM manipulation, MVC, MV-VM, Reactive.

Section-B

Backend JavaScript architecture - Node.js, REST API, GraphQL, HTTP/2.

Section-C

Vue.js, Introduction to Mobile Development, Native vs Hybrid vs Cross platform Native

Section-D

Progressive Apps, Working with gestures and touch events, Wearables

SEMESTER - 5

SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH321B-T&P	DEVOPS and TEST AUTOMATION	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
CSH402B-T&P	THEORY OF AUTOMATA & COMPILER DESIGN	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
ECH308B-T/P	DIGITAL ELECTRONICS & MICROCONTROLLER	NIL	NA	EC	HARD	CORE	3	1	2	0	6	5
CSW308B	ADVANCED JAVA	OOPs using JAVA	NA	CS	WORKSHOP	CORE	0	0	3	0	3	1.5
CHS234/ECS306B /CSS325B- T&P	ENVIRONMENTAL ETHICS & SUSTAINABLE DEVELOPMENT/ GREEN COMPUTING/ E-WASTE MANAGEMENT	NIL	NA	CH/EC	SOFT	ELECTIVE	1	0	2	0	3	2
MCS368B	ENTREPRENEURSHIP	NIL	NA	MC	SOFT	ELECTIVE	1	0	2	0	3	2
CSS309B/CSS326B/CSS327B/CSS328B	RESEARCH PAPER WRITING-I (Copyright/Patent/Startup/Project Work)	NIL	NA	CS	SOFT	CORE	0	0	2	0	2	0
CDO305	PROFESSIONAL COMPETANCY ENHANCEMENT-III	NIL	NA	CDC	OUTCOME	CORE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							11	3	6	0	30	21

Course Title/Code	Automation - DevOps, Test Automation (CSH321B-T&P)
--------------------------	---

Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Course Outcomes:

1. Understand DevOps as a practice, methodology and process for fast collaboration, integration and communication between Development and Operations team.
2. Master Continuous Integration, Continuous Deployment, Continuous Delivery, Configuration Management and Continuous Monitoring.
3. Become an expert on technologies such as GIT. Maven, Chef, Puppet & more.
4. Automate and increase the speed of productivity with reliability.
5. Understanding Selenium tool to perform testing.
6. Writing test suits for applications.
7. Construct and test simple programs.
8. Understanding the use of bug tracking and testing tool Bugzilla, Jira.

Section-A

DevOps Overview, Linux Foundation, Source control

Section-B

Continuous Integration, Configuration Management, REST API, GraphQL, HTTP/2.

Section-C

Application Containerization, DevOps Tools, Monitoring Tools

Section-D

Introduction to Test Automation, Approaches to testing, designing test cases

Course Title/Code	ENTREPRENEURSHIP (MCS368B)
Course Type:	Allied Elective
Course Nature:	Soft
L-T-P-O Structure	1-0-2-0

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Students would be able to

CO1: Understand Effectuation Principles and Entrepreneurial styles

CO2: Understand and apply design thinking

CO3: Understand Business models and value proposition

CO4: Understand lean designing

CO5: Understand various cost and revenues involved in setting up a business

CO6: Understand marketing and sales

CO7: Understand different aspects of planning

Section A

Lesson 1: Self-Discovery: Finding Your Flow, What is Effectuation?, Five Principles of Effectuation, Take Stock of Your Means, Identify the Effectuation Principle Used, Case Study, Entrepreneurial Styles Introduction, Identify Your Entrepreneurial Style.

Lesson 2: Opportunity Discovery: Identify Problems worth Solving, Say Hello to Design Thinking, What is Design Thinking, Design Thinking Values, Design Thinking Process, Design Thinking Case Studies, Brainstorming, Identify the "Why" behind successful companies, Present the Problem You Love, Problem Identified and Solution.

Section B

Lesson 3: Customer and Solution: Customer Vs. Consumer, Market Types, Segmentation and Targeting, Identify Your Customer Segments, Jobs, Pains, and Gains, Identify Your Early Adopters, Craft Your Value Proposition,

Lesson 4: Business Model: Introduction to Business Models, the Lean Approach, Identify the Problem, Solution, and Customer Segments of Existing Companies, The Tesla Case, Sketch the Lean Canvas, Lean Canvas Example: Airbnb, Facebook, Starbucks, Identify Your Riskiest Assumptions, Tips to Prioritize Your Risks and Assumptions

Lesson 5: Validation: Video: Blue Ocean Strategy, example, Plot the Strategy Canvas, Four Action Framework, Build a Solution Demo and Conduct Solution, MVP-How to Build a Startup, Difference between Solution Demo and MVP, Identify an MVP and build it, Build MVP and Conduct MVP Interviews, Compile your result from MVP Interviews, Present Your MVP.

Section C

Lesson 6: Money: Video: Cost Structure, Estimate Your Costs, Revenue Streams, Types of Revenue, Identify Your Secondary Revenue Streams, Pricing, Estimate Your Revenue and Price, Check the Profitability of Your Business Idea, Bootstrapping; Sources and Uses of Funds, Identify Sources and Uses of Funds, Case Studies on Bootstrap Finance.

Lesson 7: Team: Video: Adopting Shared Leadership, Shared Leadership & Team Building, Identifying Co-founders and Hiring a Team, Identify Job Roles for Hiring, Pitching to Potential Employees, Explore Slack, Collaborate Using Slack.

Section D

Lesson 8: Marketing and Sales: Create Your Positioning Statement, What Is Branding?, Create Your Brand Strategy, Introduction to Channels, Selecting Your Channels, Create Your Company Profile, Why Customers Won't Buy? – Introduction, Psychological Biases, Switching Costs, Customer Acquisition, Make Your Sales Plan and Sales Pitch, Make a Sale, One-to-One Selling - Process and Concept.

Lesson 9: Support: Introduction to Project Management, Getting Started With Trello, Explore Trello and Add Your Members to Trello, Trello and Slack Integration, Create a Project Plan for the Next Three Months Using Trello, Creating a Project Plan for the Next Three Months Using Trello, Business Structures and Legal Entities, Types of Organizations and Setting Up, Different Legal Entities – A Comparative Note, Why Compliance?, Compliance Checklist, List of Required Registrations, Interviewing Entrepreneurs and Business Owners.

SEMESTER - 6

SUBJECT CODES	SUBJECT NAME	PRE - REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop / NTC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH322B-T&P	MODERN ARCHITECTURE PATTERNS	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
CSH314B-T&P	Machine Learning	NIL	NA	CS	HARD	CORE	3	0	2	0	5	4
LWS321/LWS323	CYBER LAW/LAW OF PATENTS	NIL	NA	LW	SOFT	ELECTIVE	1	0	2	0	3	2
CSW407B	USER EXPERIENCE	NIL	NA	CS	WORKSHOP	CORE	0	0	3	0	3	1.5
ECW204B/MEW314B / MEW315B / MEW316B /CSW317B	ELECTRONIC DESIGN WORKSHOP/ Manufacturing Workshop/ 3-D Software/ CNC / AGILE TECHNOLOGIES	NIL	NA	EC/ME/CS	WORKSHOP	ELECTIVE	0	0	3	0	3	1.5
ECW310B/MEH439/MEW318B/MEW319B/CSW318B	SENSORS & IOT/ Basic of Robotics/ 3 D Printing/ SAP/ R PROGRAMMING	NIL	NA	EC/ME/CS	WORKSHOP	ELECTIVE	0	0	3	0	3	1.5
EDH422	BIOLOGY	NIL	NA	ED	SOFT	CORE	2	0	2	0	4	3

CSS319B/CSS329B/CSS330B/CSS331B	RESEARCH PAPER WRITING - II (Copyright/Patent/Startup/Project Work)	NIL	NA	CS	SOF T	CORE	0	0	2	0	2	0
CDO306	PROFESSIONAL COMPETANCY ENHANCEMENT-IV	NIL	NA	CDC	OUT COME	COE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							9	1	0	0	30	19
CSS320B	SUMMER TRAINING POST 6TH SEMESTER											3

Course Title/Code	Modern Architecture Patterns (CSH324B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Client Server, API, Source control, Event Driven

Section-B

Reactive, Microservices.

Section-C

Serverless, Peer-to-Peer, Streaming

Section-D

Map Reduce, Blockchain

SEMESTER - 7

SUBJECT CODES	SUBJECT NAME	PRE-REQUIRE SITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH414B-T&P	Virtualization - Containers/Cloud	NIL	NA	CS	HARD	CORE	3	1	2	0	5	5
CSH415B-T&P	Internet of Things	NIL	NA	CS	HARD	CORE	3	1	2	0	6	5
ECH403B/ ECH401B-T/P/ MEH401B/ MEH402B/ MEH403B	INTERFACING ANDROID WITH EMBEDDED SYSTEMS/ ROBOTICS IN AUTOMATION/ Non Conventional Energy Sources/ Heating, Ventilation and Air Conditioning (HVAC)/ Operation Research by Optimising Technique	NIL	NA	EC/ME/CS	HARD	ELECTIVE	3	1	2	0	6	5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							9	3	6	0	17	15

Course Title/Code	Virtualization - Containers/Cloud (CSH414B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

COURSE OUTCOMES:

CO1 : Containerize applications and services.

CO2 : A set of tools/frameworks that will help students understand/analyze the applications.

CO3 : Strong understanding of Containers and Microservices to architect applications.

CO4 : Become conversant with DevOps on Cloud. Truly understand the power of cloud by working on multiple managed services.

CO5 : Become proficient with AWS Cloud.

Section-A

What is Virtualization? (Basic theory and concept behind having a virtualized platform), Types of Virtualization (Server, Desktop, etc)

Section-B

Hypervisors (can additionally include types of hypervisors as well), Concept of Cloud Computing (Motivation behind cloud computing).

Section-C

Cloud Delivery Models (SaaS, PaaS, IaaS), Cloud Deployment Models (Public, Private, Hybrid), Major Cloud Vendors (AWS, GCP, Azure)

Section-D

Cloud Services offered (we can choose a vendor like AWS and list down some of the commonly used services), Cloud Architecture and Design (pick up a problem statement and layout a high level cloud architecture the same)

Course Title/Code	Internet of Things (CSH415B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

What is IOT, how is it used in the real world, existing solution (Alexa, Google Home)? Blueprint of IOT Application (how data is transmitted across network)

Section-B

Bluetooth, NFC, Infrared, Wifi, other communication channels.

Section-C

Basic electronics (circuits, capacitors)

Section-D

SEMESTER - 8

SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
MCS232/ MCS231	INTRODUCTION TO FINANCE BASICS OF ECONOMICS	NIL	NA	MC	SOFT	ELECTIVE	1	0	2	0	3	2
CSH413B-T&P	PROJECT	NIL	NA	CS	NTCC	CORE	320 TO 360 HOURS				8	
CSH305B-T&P	NEURAL NETWORKS & FUZZY LOGIC	NIL	NA	CS	HARD	ELECTIVE	3	0	2	0	5	4
CSH324B-T&P	NATURAL LANGUAGE PROCESSING	NIL	NA	CS								
CSH416B-T&P	COMPUTER VISION & DATA VISUALIZATION	NIL	NA	CS								
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							4	0	4	0	8	14