



Annasaheb Dange College of Engineering and Technology, Ashta

(An Empowered Autonomous Institute affiliated to Shivaji University, Kolhapur)

Department of Computer Science and Engineering

[Internet of Things and Cyber Security including Blockchain Technology]

(NAAC A++ Grade Accredited Institute, ISO 9001: 2015 Certified)

(Courses for Multiple Entry-Multiple Exits, Multidisciplinary and Specialized Minors, Honors and Research)

According to this curricular framework of the B. Tech Curriculum Structure in accordance with NEP2020, a complete set of courses for different learners to opt for : 1-Year UG Certificate, 2 Year UG Diploma in respective Major Programme and 3 Year B.Sc degree.

A. Courses for Minors

Totally 170 credits required to earn an undergraduate engineering degree which includes Multidisciplinary Minor in Internet of Things and Embedded Systems of 14 Credits.

Sr.No	Course Code	Course Name	L	T	P	Sem	Credits	Total Credits
1.	IICIC212	Introduction to Internet of Things	2			IV	2	14
2.	IICIC304	Embedded Systems for IOT	3			V	3	
3.	IICIC313	Smart Sensors and Actuators	3			VI	3	
4.	IICIC405	IoT with Arduino, ESP and Raspberry Pi	3			VII	3	
5.	IICIC416	Minor Project			6	VIII	3	

B. Courses for Double Minor (Specialization Minor)*

An additional 18 credits required to earn under Honors in Cyber Security to get eligible for Under Graduate engineering degree with Honors and Multidisciplinary Minor .

Sr.No	Course Name	Sem	Platform	Credits	Total Credits
1.	A Strategic Approach to Cybersecurity	IV	Coursera	3	18
2.	Introduction to Cybersecurity Tools & Cyber Attacks	V		3	
3.	Data Privacy Fundamentals	VI		3	
4.	Software Security for Web Applications	VII		3	
5.	Cybersecurity Breach Response: A Case Studies Report	VIII	IBM	6	

Head of Department

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(Courses for Multiple Entry-Multiple Exits, Multidisciplinary and Specialized Minors, Honors and Research)

C. Courses for Honours *

An additional 18 credits required to earn under Honors in Cloud Architect to get eligible for Under Graduate Engineering degree with Honors and Multidisciplinary Minor .

Sr.No	Course Name	Sem	Platform	Credits	Total Credits
1.	Cloud Computing	IV	NPTEL	3	18
2.	AWS Cloud Fundamentals (AWS Cloud Practitioner)	V	AWS	3	
3.	Microsoft Azure Cloud Fundamentals AZ 900	VI	Microsoft Azure	3	
4.	AWS Cloud Architect	VII	AWS	3	
5.	Project Work	VIII	-	6	

D. Courses for Honors with Research

An additional 18 credits required to earn under Honors with Research to get eligible for Under Graduate Engineering degree with Honors with Research and Multidisciplinary Minor .

Sr.No	Course Name	Sem	Credits	Total Credits
1.	Research Methodology	VI	4	18
2.	Dissertation	VII and VIII	14	

E. Compulsory Courses for Multiple Entry-Multiple Exits *

Sr.No	Course Name
1.	Certified Network Engineer - CCNA Course (1-Year UG Certificate)
2.	Certified IoT Analyst - T-ITeS Sector Skill Council (NLDC) (2 Year UG Diploma)
3.	Certified Software Developer-Product Development - T-ITeS Sector Skill Council (NLDC) (3 Year B.Sc degree)

Note: * indicates Detailed documents for these courses are attached herewith.

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Annasaheb Dange College of Engineering and Technology, Ashta
(An Autonomous Institute)

Department of Computer Science & Engineering
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B. Tech Program with One Major and One Minor (170 Credits)

Course Category	I	II	III	IV	V	VI	VII	VIII	Total
Basic Sciences	4	9							13
Engineering Science	10	3							13
Program Core	3	7	16	11	11	9	7		64
Program Elective					3	4	4	3	14
Minor				2	3	3	3	3	14
Open Elective					3	3	2		8
Vocational and Skill Enhancement Courses			3	3				2	8
Humanities and Social Sciences	3	1	3	4	1		2		14
Experiential Learning Courses				1	1	2	4	10	18
Co-curricular Courses			1	1	1	1			4
Total	20	20	23	22	23	22	22	18	170


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Annasaheb Dange College of Engineering and Technology, Ashta
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Teaching and Evaluation Scheme

F. Y. B. Tech Semester I

F. Y. B. Tech Semester I																			
Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL					GRAND TOTAL	
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total	Min		
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min				
11CBS101	Applied Mathematics - I	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	100	
11CES102	Basic Electrical Engineering	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100	
11CES103	Analog Electronics	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	100	
11CES104	Engineering Graphics	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	100	
11CHS105	Professional Communication Skills	-	-	4	2	-	-	-	-	-	-	-	50	-	-	50	20	50	
11CPC106	Problem Solving Using C	3	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100	
11CES107	Engineering Graphics Laboratory	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50	
11CES108	Design Thinking Laboratory	1	-	2	2	-	-	-	-	-	-	-	50	-	-	50	20	50	
11CHS109	Value Added Course - I	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50	
		14	1	12	20														700
	Total Contact Hours	27																	

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Teaching and Evaluation Scheme

F. Y. B. Tech Semester II																		
Course Code	Course Name	Teaching Scheme				THEORY						PRACTICAL				GRAND TOTAL		
						ISE		MSE+ ESE			Total	Min	ISE	ESE			Total	Min
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
1ICBS110	Applied Mathematics - II	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICBS111	Engineering Physics and Chemistry	4	-	-	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICES112	Digital Electronics	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC113	Computer Networks	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC114	Object Oriented Programming	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICBS115	Engineering Physics and Chemistry Laboratory	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICES116	Digital Electronics Laboratory	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICPC117	Computer Networks Laboratory	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICHS118	Value Added Course - II	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		14	1	10	20													700
	Total Contact Hours	25																

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Annasaheb Dange College of Engineering and Technology, Ashta
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Teaching and Evaluation Scheme

S. Y. B. Tech Semester III																		
Course Code	Course Name	Teaching Scheme				THEORY						PRACTICAL				GRAND TOTAL		
						ISE		MSE+ ESE			Total	Min	ISE	ESE			Total	Min
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
1ICPC201	Discrete Mathematics and Theory of Computation	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC202	Data Structures	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	100	40	200
1ICPC203	Database Management System	3	-	2	4	40	16	30	30	24	100	40	50	-	-	50	20	150
1ICPC204	Operating System	3	-	2	4	40	16	30	30	24	100	40	50	-	-	50	20	150
1ICHS205	Psychology	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICHS206	Constitution of India	1	-	-	1	25	10	-	-	-	25	10	-	-	-	-	-	25
1ICVS207	Java Programming Laboratory	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICCC208	Aptitude and Reasoning Part – I	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		17	1	10	23													825
	Total Contact Hours	28																


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Teaching and Evaluation Scheme

S. Y. B. Tech Semester IV																		
Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL					GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min								
1ICPC209	Fundamentals of Block Chain	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC210	Information Theory for Cyber Security	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	100	40	200
1ICPC211	Introduction to Internet of Things	3	-	2	4	40	16	30	30	24	100	40	50	-	-	50	20	150
1ICIC212	Minor Course - I	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICH213	Universal Human Values	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICVS214	Python Programming Laboratory	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICH215	Environmental Studies	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICEL216	Innovation / Prototype	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICCC217	Aptitude and Reasoning Part- II	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		17	0	10	22													850
	Total Contact Hours	27																


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Minor Course - I					
Course Code	Course Name	L	T	P	Credits
11CIC212	Introduction to Internet of Things	2	-	-	2


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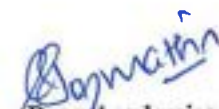
Department of Computer Science & Engineering
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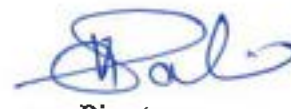
Teaching and Evaluation Scheme

T. Y. B. Tech Semester V																		
Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL				GRAND TOTAL	
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total		Min
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
1ICOE3**	Open Elective - I	3	-	-	3	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICPC301	Design and Analysis of Algorithms	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC302	Microcontrollers	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	100	40	200
1ICPC303	Smart Contracts and Solidity	3	-	2	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICIC304	Minor Course - II	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICH305	Entrepreneurship	-	-	2	1	-	-	-	-	-	-	-	25	-	-	25	10	25
1ICPE3**	Professional Elective - I	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICEL309	Industrial Training/ Internship	-	-	-	1	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICCC310	Aptitude and Reasoning Part- III	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		17	0	10	23													775
	Total Contact Hours	27																

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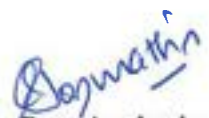
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Minor Course - II					
Course Code	Course Name	L	T	P	Credits
1ICIC304	Embedded System for IoT	3	-	-	3

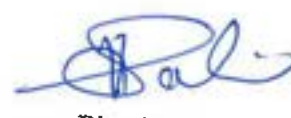
Professional Elective - I					
Course Code	Course Name	L	T	P	Credits
1ICPE306	Embedded Systems for IOT	2	-	2	3
1ICPE307	Steganography and Digital Watermarking	2	-	2	3
1ICPE308	Blockchain Platforms and Use cases	2	-	2	3



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Teaching and Evaluation Scheme

T. Y. B. Tech Semester VI																		
Course Code	Course Name	Teaching Scheme				THEORY						PRACTICAL					GRAND TOTAL	
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total		Min
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
1ICOE3**	Open Elective - II	3	-	-	3	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICPC311	Compiler Design	2	-		2	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC312	Data Encryption	3	-	2	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICIC313	Minor Course - III	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPE3**	Professional Elective - II	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	100	40	200
1ICPC317	SDLC Laboratory	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICEL318	Mini Project	-	-	4	2	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICCC319	Aptitude and Reasoning Part- IV	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		16	0	12	22													750
	Total Contact Hours	28																

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Department of Computer Science & Engineering
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Minor Course - III					
Course Code	Course Name	L	T	P	Credits
1ICIC313	Smart Sensors and Actuators	3	-	-	3

Professional Elective - II					
Course Code	Course Name	L	T	P	Credits
1ICPE314	Ubiquitous Sensing, Computing and Communication	3	-	2	4
1ICPE315	Security Assessment and Risk Analysis	3	-	2	4
1ICPE316	Blockchain Security and Performance	3	-	2	4


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ANNASAHB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY, ASHTA

(An Autonomous Institute with NAAC A++ Grade)

Department of Computer Science & Engineering
(Internet of Things and Cyber security including Block Chain Technology)

Teaching and Evaluation Scheme

Final Year B. Tech Semester VII

Final Year B. Tech Semester VII																		
Course Code	Course Name	Teaching Scheme				THEORY						PRACTICAL				GRAND TOTAL		
						ISE		MSE+ ESE			Total	Min	ISE	ESE			Total	Min
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
2ILOE451	Open Elective-III	2	-	-	2	50	20	-	-	-	-	-	-	-	-	-	-	50
1ICPE4**	Professional Elective-III	3	-	2	4	40	16	30	30	24	100	40	50	-	-	50	20	150
1ICPC404	Distributed and Cloud Computing	2	-	2	3	40	16	30	30	24	100	40	50	-	-	50	20	150
1ICIC405	Minor Course-IV	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC406	Machine Learning	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	50	20	200
1ICH407	Project Management and Finance	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICEL408	Project	-	-	8	4	-	-	-	-	-	-	-	50	50*	20	100	40	100
		15	0	14	22													850
	Total Contact Hours	29																

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Member Secretary-BoS

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Chairman - BoS

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Member Secretary - AC

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Chairman - AC





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Department of Computer Science & Engineering
(Internet of Things and Cyber security including Block Chain Technology)

Open Elective- III					
Course Code	Course Name	L	T	P	Credits
2ILOE451	Introduction to Indian Knowledge System	2	-	-	2

Professional Elective-III					
Course Code	Course Name	L	T	P	Credits
1ICPE401	IoT with Arduino, ESP and Raspberry Pi	3	-	2	4
1ICPE402	Database Security and Access Control	3	-	2	4
1ICPE403	Blockchain and FinTech	3	-	2	4

Minor Course-IV					
Course Code	Course Name	L	T	P	Credits
1ICIC405	IoT with Arduino, ESP and Raspberry Pi	3	-	-	3

Madhusri

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Member Secretary - AC

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Department of Computer Science & Engineering
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Teaching and Evaluation Scheme

Final Year B. Tech Semester VIII

Final Year B. Tech Semester VIII																		
Course Code	Course Name	Teaching Scheme:				THEORY							PRACTICAL					GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
11CPE4**	Professional Elective - IV	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
11CVS4**	VSEC Elective Laboratory	1	-	2	2	-	-	-	-	-	-	-	50	50*	20	100	40	100
11CIC417	Minor Project	-	-	-	3	-	-	-	-	-	-	-	50	-	-	50	20	50
11CEL418	Internship	-	-	-	10	-	-	-	-	-	-	-	200	-	-	200	80	200
		4	0	2	18													450
	Total Contact Hours	6 + Internship																

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Member Secretary - AC

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Professional Elective-IV					
Course Code	Course Name	L	T	P	Credits
IICPE409	Industrial IoT	3	-	-	3
IICPE410	Cyber Crimes and Digital Forensics	3	-	-	3
IICPE411	Blockchain Revolution Specialization	3	-	-	3

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Member Secretary - AC

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Vocational and Skill Course Elective					
Course Code	Course Name	L	T	P	Credits
IICVS412	Data Analytics with R	1	-	2	2
IICVS413	Robotic Process Automation with Power Automate	1	-	2	2
IICVS414	Ethical Hacking Essentials	1	-	2	2
IICVS415	Web Technology	1	-	2	2
IICVS416	Augmented Reality and Virtual Reality	1	-	2	2
IICVS417	Software Quality Assurance	1	-	2	2
IICVS418	Android Programming	1	-	2	2
IICVS419	UI/ UX Design	1	-	2	2

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Bormathin

Member Secretary - AC

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Minor in Internet of Things					
Course Code	Course Name	L	T	P	Credits
1ICIC212	Introduction to Internet of Things	2	-	-	2
1ICIC304	Embedded Systems for IOT	3	-	-	3
1ICIC313	Smart Sensors and Actuators	3	-	-	3
1ICIC405	IoT with Arduino, ESP and Raspberry Pi	3	-	-	3
1ICIC416	Minor Project	-	-	3	3
				Total	14

Specialization Minor in Cyber Security				
Course Name	L	T	P	Credits
A Strategic Approach to Cybersecurity	-	-	-	2
Introduction to Cybersecurity Tools & Cyber Attacks	-	-	-	3
Data Privacy Fundamentals	-	-	-	3
Software Security for Web Applications	-	-	-	3
Cybersecurity Capstone: Breach Response Case Studies	-	-	-	3
	Total			14


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Honors in Cloud Computing				
Course Name	L	T	P	Credits
Cloud Computing	-	-	-	3
AWS Cloud Fundamentals	-	-	-	3
Microsoft Azure Cloud Fundamentals	-	-	-	3
AWS Cloud Architect	-	-	-	3
Project Work	-	-	-	6
Total				18

Honors with Research				
Course Name	L	T	P	Credits
Research Methodology	-	-	-	4
Dissertation	-	-	-	14
Total				18


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Course Details:

Class	B. Tech, Sem - VII
Course Code and Course Title	11CPE401- Professional Elective – III: IoT with Arduino, ESP and Raspberry Pi
Prerequisite/s	11CPC211 – Introduction to Internet of Things
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits	4
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30
Evaluation Scheme (Practical): ISE	50

Course Outcomes (COs):

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

11CPE401_1	Understand the IoT architecture, sensors, actuators, communication protocols and their roles in building IoT systems. (K2)
11CPE401_2	Explain the features and programming basics of Arduino, ESP8266, ESP32 and Raspberry Pi for IoT applications. (K2)
11CPE401_3	Compare cloud platforms like AWS IoT, Azure IoT Hub and Google IoT Core for IoT applications. (K4)
11CPE401_4	Analyze the role of IoT in smart homes, smart agriculture, industrial IOT, and healthcare using real-world case studies. (K4)
11CPE401_5	Design IoT based systems that utilize different types of sensors and actuators for real world applications. (K6)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Fundamentals of IoT: Basics of IoT: Definition, IoT Architecture. Sensor features, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT	6
Unit 2	IoT Communication Protocols: Overview of Communication Protocols: MQTT, HTTP, Bluetooth, Zigbee, and LoRa Data Transmission and Device-to-Device Communication in IoT Basics of Wi-Fi, Ethernet, and Cellular Communication for IoT , Security Challenges in IoT Communication	7

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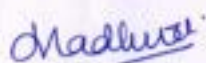
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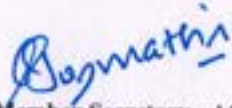
Unit 3	Introduction to IoT Platforms: Arduino Overview: Hardware, IDE, and Programming Basics ESP8266 and ESP32: Features, GPIO Programming, and Wi-Fi Connectivity Raspberry Pi: Setup, GPIO Basics, and Python Programming Comparison of Arduino, ESP, and Raspberry Pi for IoT Applications	7
Unit 4	Interfacing Sensors and Actuators: Interfacing Temperature, Humidity, and Light Sensors with Arduino Controlling Actuators: Motors, Relays, and LEDs with Arduino and ESP32 IoT Application Development: Data Collection, Actuation, and Control Real-Time Data Logging using IoT Platforms like ThingSpeak	6
Unit 5	IoT Cloud and Data Analytics: Introduction to Cloud Platforms for IoT: AWS IoT, Azure IoT Hub and Google IoT Core. Data Storage, Visualization, and Analysis on Cloud Platforms, Integration of IoT Devices with Cloud, Introduction to Edge Computing and IoT Data Security	7
Unit 6	IoT Applications and Case Studies: Practical Applications of IoT: Smart Homes, Smart Agriculture, Industrial IoT, and Healthcare. Case Studies: Predictive Maintenance, Traffic Management Systems, and Environmental Monitoring.	6

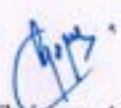
Experiment List

Exp. No.	Title of Experiment
1.	To interface temperature sensor with Arduino Uno to measure and display temperature readings.
2.	To calculate distance of an object using ultrasonic sensor with Arduino Uno and display readings on LCD.
3.	To implement object detection using IR sensor and Node MCU.
4.	To control speed of DC motor using L298N motor driver and Arduino Uno.
5.	To control an LED from a webserver using ESP8266.
6.	Setting up and configuring Raspberry Pi including operating system installation, GPIO pin exploration and basic setup for IoT applications.
7.	To develop a program to blink an LED using Raspberry Pi.


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8.	To interface an ultrasonic sensor with Raspberry Pi to measure object distance and display the readings.
9.	To upload sensor data to Thing Speak cloud platform using Node MCU.
10.	To upload sensor data to the cloud using Raspberry Pi and visualizing the data using online dashboards.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Internet of Things with Arduino, ESP8266, and Raspberry Pi	Rajesh Singh, Anita Gehlot, and Lovi Raj Gupta	CRC Press (Taylor & Francis Group)	1st Edition	2019
2	Internet of Things: A Hands-On Approach	Arshdeep Bahga and Vijay Madisetti	Universities Press	1st Edition	2015
3	Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux	Derek Molloy	Wiley	1st Edition	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Internet of Things (IoT): Systems and Applications	Jamil Y. Khan and Mehmet R. Yuce	CRC Press	1st Edition	2019
2	IoT: From Research and Innovation to Market Deployment	Ovidiu Vermesan and Peter Friess	River Publishers	1st Edition	2014

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Useful Online Resources::		
Sr. No	Link	QR
1	https://www.coursera.org/courses?query=raspberry%20pi	
2	https://surl.li/vmiatt	
3	https://www.youtube.com/watch?v=VGNVFWheeI4	

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Course Details:

Class	B. Tech, Sem - VII
Course Code and Course Title	IICPE402- Professional Elective – III: Database Security and Access Control
Prerequisite/s	IICPC203- Database Management System
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits	4
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30
Evaluation Scheme (Practical): ISE	50

Course Outcomes (COs):

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

IICPE402_1	Explain the purpose, policies, models, and mechanisms of access control, including DAC, MAC, and RBAC. (K2)
IICPE402_2	Elaborate security models such as Biba's Integrity Model, Clark-Wilson Model, and Domain Type Enforcement in enterprise systems. (K3)
IICPE402_3	Evaluate the capabilities and limitations of access control mechanisms such as ACLs, capability lists, and various types of RBAC, and compare their applicability. (K4)
IICPE402_4	Assess the strengths and weaknesses of various access control models and to analyze their behavior. (K4)
IICPE402_5	Evaluate smart card security principles, including data transmission, user authentication, and security mechanisms, to identify vulnerabilities and implement secure access control solutions. (K5)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Introduction to database Access Control: Introduction: Introduction to Access Control, Purpose and fundamentals of access control, brief history, Policies of Access Control, Models of Access Control, and Mechanisms, Discretionary Access Control (DAC), Non-Discretionary Access Control, Mandatory Access Control (MAC).	8

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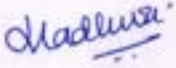
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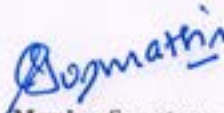
Unit 2	Capabilities and Limitations of Access Control Mechanisms: Access Control List (ACL) and Limitations, Capability List and Limitations. RBAC's, Various types of RBAC's, Limitations of RBAC's, Limitations of Mandatory Access Control (MAC).	6
Unit 3	Models: Models: Biba's integrity model, Clark-Wilson model, Domain type enforcement model, mapping the enterprise view to the system view, Role hierarchies-inheritance schemes, hierarchy structures and inheritance forms, using SoD in real system Temporal Constraints in RBAC, MAC AND DAC.	6
Unit 4	Smartcard Security: Smart Card based Information Security, Smart card operating system fundamentals, design and implantation principles, memory organization, smart card files, file management, atomic operation. Case Study on Smart Access Control.	6
Unit 5	Smartcard data transmission: Smart card data transmission ATR, PPS Security techniques- user identification, smart card security, quality assurance and testing. Smart card life cycle-5 phases, smart card terminals.	7
Unit 6	Database Security: Recent trends in Database security and access control mechanisms. Case study of Role-Based Access Control (RBAC) systems. Recent Trends related to data security management, vulnerabilities in different DBMS.	6

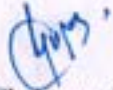
Experiment List

Exp. No.	Title of Experiment
1.	Implementation of Discretionary Access Control (DAC) system using SQL commands. (Grant & Revoke)
2.	Develop a Mandatory Access Control (MAC) prototype using security levels for database objects.
3.	Create and evaluate an Access Control List (ACL) for a database.
4.	Implement a Role-Based Access Control (RBAC) system in a database and test different RBAC types.
5.	Simulate Biba's integrity model using database constraints.


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Useful Online Resources:		
Sr. No	Link	QR
1	https://online.stanford.edu/courses/soe-ydatabases0005-databases-relational-databases-and-sql	
2	https://eric.ed.gov/?id=EJ895859	
3	https://www.cs.uct.ac.za/mit_notes/database/pdfs/chp12.pdf?utm_source=chatgpt.com	

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Unit 3	Cryptocurrencies and Tokenization in Fintech Cryptocurrency Fundamentals: Bitcoin, Ethereum, and altcoins Tokenization of Assets: Real estate, commodities, stocks, and fractional ownership Stablecoins: USDT, DAI, and their role in maintaining price stability, Initial Coin Offerings (ICO) & Security Token Offerings (STO)	6
Unit 4	Decentralized Finance (DeFi) Introduction to DeFi: Goals, principles, and evolution Decentralized Exchanges (DEXs): Uniswap, PancakeSwap, liquidity pools DeFi Lending and Borrowing: Platforms like Aave, Compound Risks & Challenges in DeFi: Smart contract vulnerabilities, scalability, liquidity, and regulation	7
Unit 5	Blockchain & Payment Systems Blockchain's Role in Payment Solutions: Enhancing speed, transparency, and reducing fees Blockchain-based Payment Systems: Ripple, Stellar, and their applications Tokenization of Payment Systems: Digital wallets, mobile payments, cryptocurrencies	6
Unit 6	Security in Blockchain & Fintech Regulatory and Privacy Issues in Blockchain and Fintech: GDPR, KYC, AML Blockchain Auditing and Risk Management: Tools for auditing smart contracts and blockchain systems	6

Experiment List

Exp. No.	Title of Experiment
1.	Simulate a Basic Blockchain Structure with Blocks, Chains, and Nodes
2.	Develop a Simple Smart Contract on Ethereum Using Solidity for a Basic Financial Application
3.	Implement and Compare Proof of Work (PoW) and Proof of Stake (PoS) Consensus Algorithms
4.	Simulate the Tokenization of a Real-World Asset (e.g., Real Estate or Stocks) Using ERC-20 Tokens

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5.	Build a Basic Simulation of a Decentralized Exchange (DEX) like Uniswap
6.	Create a Prototype of a Blockchain-Based Payment System Using Ripple or Stellar
7.	Perform a Security Audit of a Smart Contract Using Tools like Mythril or Remix IDE
8.	Implement a Basic DeFi Lending Protocol Using a Testnet
9.	Design an Experiment to Explore Blockchain Auditing Tools and Simulate Risk Assessment Scenarios (GDPR, AML Compliance)
10.	Generate Hash Values Using SHA-256 and Understand the Role of Hash Functions in Blockchain Security.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mastering Bitcoin: Unlocking Digital Cryptocurrencies	Andreas M. Antonopoulos	O'Reilly Media	2 nd	2017
2	Blockchain Basics: A Non-Technical Introduction in 25 Steps	Daniel Drescher	Apress	1 st	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies is Changing the World	Don Tapscott & Alex Tapscott	Penguin	1 st	2016
2	Blockchain Applications: A Hands-On Approach	Arshdeep Bahga & Vijay Madisetti	VPT	1 st	2017

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3	The Basics of Bitcoins and Blockchains	Antony Lewis	CreateSpace Independent	1 st	2018
4	Blockchain and the Law: The Rule of Code	Primavera De Filippi & Aaron Wright	Harvard University Press	1 st	2018

Useful Online Resources:		
Sr. No	Link	QR
1	https://onlinecourses.nptel.ac.in/noc22_cs44/preview	
2	https://www.youtube.com/results?search_query=Introduction+to+Blockchain+and+FinTech	
3	https://www.youtube.com/results?search_query=Introduction+to+Blockchain+and+FinTech	

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Course Details:

Class	B. Tech, Sem - VII
Course Code and Course Title	11CPC404- Distributed and Cloud Computing
Prerequisite/s	11CPC113-Computer Networks, 11CPC204-Operating System
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30
Evaluation Scheme (Practical): ISE	50

Course Outcomes (COs):

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

11CPC404_1	Explain the fundamental concepts and paradigms of Distributed and Cloud Computing, including their architecture, types, and goals. (K2)
11CPC404_2	Analyze various synchronization techniques, cloud deployment models, virtualization mechanisms, and security challenges in cloud environments. (K3)
11CPC404_3	Apply programming techniques for distributed systems, including remote procedure calls, clock synchronization, and mutual exclusion. (K4)
11CPC404_4	Evaluate different cloud services, including public and private cloud implementations, and analyze case studies of major cloud service providers. (K4)
11CPC404_5	Assess data security challenges in cloud computing, including identity management, access control, disaster recovery, and virtual machine security. (K5)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Distributed system paradigms: Definition, goals, architecture, Types of distributed system, Architectural styles, and system architectures.	4
Unit 2	Processes, Communication & Synchronization: Remote procedure calls, synchronization, clock synchronization, logical clock, mutual exclusion, election algorithms.	4
Unit 3	Cloud Computing Basics: Cloud computing fundamentals, the role of networks in Cloud computing, Essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multitenancy, Cloud cube model, Cloud economics	5

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	and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines.	
Unit 4	Virtualization: Introduction & Benefits, Implementation levels of Virtualization, Virtualization at OS level, Virtualization structure, Virtualization Mechanism, Open-source Virtualization Technology, Xen Virtualization Architecture, Binary translation with full Virtualization, paravirtualization, Virtualization of CPU, memory and I/O devices	4
Unit 5	Exploring cloud services: Cloud services Overview, advantages, examples. Case study of different cloud service providers.	4
Unit 6	Data security in cloud: Security Overview, Cloud Security Challenges and Risks, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security. Identity and Presence, Identity Management and Access Control, Disaster Recovery in Clouds	5

Experiment List

Exp. No.	Title of Experiment
01	Program based on Remote procedure call using RMI
02	Program based on clock synchronization.
03	Program based on Mutual Exclusion
04	Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
05	Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
06	Configuration of Private Cloud (Openstack/Eucalyptus)
07	Case study on Amazon EC2 to learn about Amazon EC2 and to start web service on it.
08	Case study on Microsoft azure for building, deploying and managing applications and services through a global network of Microsoft-managed data-centers

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09	Design and develop custom Application using Sales force Cloud
10	Install Google App Engine. Create hello world app and other simple web applications using python/java.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Distributed Systems- Principles & paradigms	Andrew S Tanenbaum	Pearson	2 nd	2015
2	Cloud Computing Bible	Barrie Sosinsky	Wiley	1 st	2011
3	Cloud Computing Black Book	Kailash Jayaswal Dr.Deven Shah	Dreamtech Press	1 st	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Distributed Systems - Concepts & Design	George Koulouris, Jean Dollimore, TimKindberg	Pearson Education		2005
2	Cloud Computing Principles and Paradigms	RajkumarBuyya James Broberg. Andrzej Goscinski	Wiley		2013

Useful Online Resources:

Sr. No	Link	QR
1	https://www.oreilly.com/library/view/distributed-and-cloud/9780123858801	
2	https://www.amazon.in/Distributed-Cloud-Computing-Parallel-Processing-ebook/dp/B00GNBLGE4	
3.	https://www.udemy.com/course/fundamentals-of-cloud-computing-by-cloudthat/	

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Course Details:

Class	B. Tech, Sem - VII
Course Code and Course Title	11CIC405- Minor Course – IV: IoT with Arduino, ESP and Raspberry Pi
Prerequisite/s	11CIC304 – Embedded System for IoT
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme (Theory): ISE/MSE/ESE	40/30/30

Course Outcomes (COs):

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

11CIC405_1	Understand the IoT architecture, sensors, actuators, communication protocols and their roles in building IoT systems. (K2)
11CIC405_2	Explain the features and programming basics of Arduino, ESP8266, ESP32 and Raspberry Pi for IoT applications. (K2)
11CIC405_3	Compare cloud platforms like AWS IoT, Azure IoT Hub and Google IoT Core for IoT applications. (K4)
11CIC405_4	Analyze the role of IoT in smart homes, smart agriculture, industrial IOT, and healthcare using real-world case studies. (K4)
11CIC405_5	Design IoT based systems that utilize different types of sensors and actuators for real world applications. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Fundamentals of IoT and Platforms: Basics of IoT: Definition, Architecture, and Applications. IoT Architecture: Perception, Network, and Application Layers. Sensors and Actuators: Types, Working Principles, and Applications.: MQTT, HTTP, Bluetooth, Zigbee, LoRa	6
Unit 2	IoT Communication Protocols: Overview of Communication Protocols: MQTT, HTTP, Bluetooth, Zigbee, and LoRa Data Transmission and Device-to-Device Communication in IoT Basics of Wi-Fi, Ethernet, and Cellular Communication for IoT Security Challenges in IoT Communication	7

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Unit 3	Introduction to IoT Platforms: Arduino Overview: Hardware, IDE, and Programming Basics ESP8266 and ESP32: Features, GPIO Programming, and Wi-Fi Connectivity Raspberry Pi: Setup, GPIO Basics, and Python Programming Comparison of Arduino, ESP, and Raspberry Pi for IoT Applications	7
Unit 4	Interfacing Sensors and Actuators: Interfacing Temperature, Humidity, and Light Sensors with Arduino Controlling Actuators: Motors, Relays, and LEDs with Arduino and ESP32 IoT Application Development: Data Collection, Actuation, and Control Real-Time Data Logging using IoT Platforms like ThingSpeak	6
Unit 5	IoT Cloud and Data Analytics: Introduction to Cloud Platforms for IoT: AWS IoT, Azure IoT Hub, and Google IoT Core Data Storage, Visualization, and Analysis on Cloud Platforms Integration of IoT Devices with Cloud: Example Projects Introduction to Edge Computing and IoT Data Security	7
Unit 6	IoT Applications and Case Studies: Practical Applications of IoT: Smart Homes, Smart Agriculture, Industrial IoT, and Healthcare. Case Studies: Predictive Maintenance, Traffic Management Systems, and Environmental Monitoring. Future Trends in IoT and Industry 4.0	6

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Internet of Things with Arduino, ESP8266, and Raspberry Pi	Rajesh Singh, Anita Gehlot, and Lovi Raj Gupta	CRC Press (Taylor & Francis Group)	1st Edition	2019
2	Internet of Things: A Hands-On Approach	Arshdeep Bahga and Vijay Madisetti	Universities Press	1st Edition	2015
3	Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux	Derek Molloy	Wiley	1st Edition	2016

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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Internet of Things (IoT): Systems and Applications	Jamil Y. Khan and Mehmet R. Yuce	CRC Press	1st Edition	2019
2	IoT: From Research and Innovation to Market Deployment	Ovidiu Vermesan and Peter Friess	River Publishers	1st Edition	2014

Useful Online Resources:		
Sr. No	Link	QR
1	https://www.coursera.org/courses?query=raspberry%20pi	
2	https://surl.li/vmiatt	
3	https://www.youtube.com/watch?v=VGNVFWheel4	

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Course Details:

Class	B. Tech, Sem - VII
Course Code and Course Title	11CPC406- Machine Learning
Prerequisite/s	11CVS214 - Python Programming Laboratory
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits:	4
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30
Evaluation Scheme (Practical): ISE/ESE	50/50

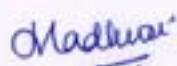
Course Outcomes (COs):

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

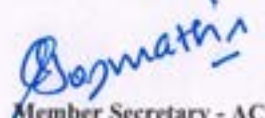
11CPC406_1	Explain the fundamental concepts of Machine Learning along with its architectural design, development processes and lifecycle stages. (K2)
11CPC406_2	Analyze effectively predictive real-world problems with respect to single and multivariate regression techniques. (K4)
11CPC406_3	Analyze the classification techniques such as binary, multiclass and probabilistic for classification problems. (K4)
11CPC406_4	Develop the ability to uncover the hidden patterns and groupings in data using different clustering techniques. (K4)
11CPC406_5	Acquire the foundational understanding of neural networks and back propagation algorithm. (K5)

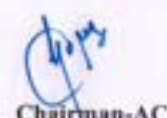
Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to Machine Learning: Definition, Terminology, Types of learning, Machine Learning Problem categories, Machine learning architecture, process, Lifecycle, Performance measures, tools and framework, data visualization.	5
Unit 2	Regression: Simple regression – hypothesis, cost function, parameter learning with gradient descent, learning rate, Gradient Descent for linear regression, examples, simple regression in matrix form. Multivariate Linear Regression – Multiple features, hypothesis functions, Gradient Descent for multiple variables, Feature scaling, polynomial regression	7


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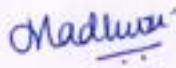

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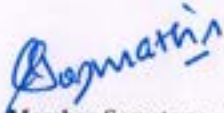
Unit 3	Classification: Logistic regression & Naïve Bayes: Logistic Regression – Definition, Hypothesis representation, decision boundary, cost function, Gradient Descent for Logistic Regression. Multiclass Classification, Regularization, Over fitting & Under fitting, Conditional probability and Naïve Bayes Classifier. Instance-based classifier – K- Nearest Neighbor Classifier, Bayesian Network, Hidden Markov Model.	8
Unit 4	Classification- Decision trees and Support Vector Machine: Decision trees: definition, terminology, the need, advantages, and limitations. Constructing and understanding Decision trees, common problems with Decision trees, Decision tree algorithms, random forest. Support Vector Machine: What is SVM, Kernel Trick, Cost Function, and Decision Trees vs. Support Vector Machine	7
Unit 5	Unsupervised learning: Clustering, K Means clustering, Hierarchical clustering, DBScan Clustering, Association Rule mining.	5
Unit 6	Neural Networks: Neural Networks- Neuron representation and model, Hypothesis for neuron, cost function, solution of a problem using single neuron. Gradient descent for a neuron. Neural network, Multiclass classification with neural network. Learning in neural network-back propagation algorithm	7

Experiment List

Exp. No.	Title of Experiment
01	Implementation of Simple Linear Regression
02	Implementation of Multiple Linear Regression
03	Implementation of Logistic Regression
04	Implementation of Multi-Class Classification
05	Implementation of Decision Tree Algorithm
06	Implementation of Random Forest Algorithm
07	Implementation of K-Means Clustering


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08	Implementation of Association Rule Mining
09	Implementation of Neural Networks
10	Implementation of Back-propagation Algorithm of Neural Network

Text Books:

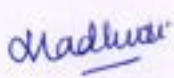
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Machine Learning with Python- an approach to applied ML	Abhishek Vijayvargiya	BPB Publications	1 st	2018
2	Machine Learning	Tom M. Mitchell	McGraw Hill Education	1 st	1997

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Machine Learning for dummies	John Paul Muller	Wiley Publication	1 st	2016
2	Introduction to Machine Learning	Ethem Alpaydin	PHI	2 nd	2013

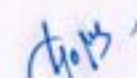
Useful Online Resources:

Sr. No	Link	QR
1	https://onlinecourses.nptel.ac.in/noc22_cs97/preview	
2	https://developers.google.com/machine-learning/crash-course	
3	https://www.youtube.com/watch?v=JxgmHe2NycY	


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Course Details:

Class	B. Tech, Sem - VII
Course Code and Course Title	11CHS407- Project Management and Finance
Prerequisite/s	11CPC317-SDLC Laboratory
Teaching Scheme: Lecture/Tutorial/Practical	2/0/0
Credits:	2
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

Course Outcomes (COs):

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

11CHS407_1	Apply project management principles to initiate, plan, execute, monitor, and control projects. (K3)
11CHS407_2	Apply financial principles to project budgeting, cash flow management, and investment appraisal. (K3)
11CHS407_3	Analyze project feasibility considering technical, economic, and financial aspects. (K4)
11CHS407_4	Estimate project costs, schedule tasks, and allocate resources effectively. (K4)
11CHS407_5	Identify project risks using appropriate techniques. (K5)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Project Fundamentals Definition and characteristics of a project, Project life cycle and its phases, Project management methodologies (e.g., Agile, Waterfall, Scrum), Stakeholder analysis and management, Introduction to Project Management Professional (PMP) framework	4
Unit 2	Project Planning & Scheduling Work Breakdown Structure (WBS) development, Activity definition and sequencing, Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT), Resource allocation and leveling, Project scheduling tools (e.g., Gantt charts, MS Project)	4

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Unit 3	Project Cost & Risk Management Cost estimation techniques (e.g., Parametric, Analogous, Bottom-up), Cost budgeting and control, Earned Value Management (EVM), Cost-benefit analysis and return on investment (ROI), Risk identification and assessment, Qualitative and quantitative risk analysis technique, Risk response planning (mitigation, avoidance, transference, acceptance), Contingency planning and reserves	5
Unit 4	Project Execution and Control Activity Planning, Team Building and Management, Stakeholder Engagement, Project Monitoring & Control Performance Measurement, Change Management, Issue Resolution, Quality Management : Quality Planning, Quality Assurance, Continuous Improvement, Project Challenges and Solutions	4
Unit 5	Project Communication & Finance Communication planning and channels, Stakeholder communication strategies, Report writing and presentations, Conflict resolution and negotiation, Time value of money concepts, Capital budgeting techniques (e.g., NPV, IRR, Payback period), Sources of project finance (e.g., loans, equity, grants), Financial statement analysis for project evaluation	4
Unit 6	Project Closure & Review Project completion and handover, Project closure procedures, Post-project evaluation and lessons learned Project audits and reviews, Professional ethics and responsibilities in project management	5

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	A Guide to the Project Management Body of Knowledge	Global Standard	Project Management Institute (PMI)	7th	2021
2	Project Management: The Managerial Process	Erik W. Larson & Clifford F. Gray	McGraw Hill	6th	2017
3	Project Finance: In Theory and Practice	Stefano Gatt	Academic Press	-	2007

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Advanced Project Portfolio Management and the PMO	Gerald I.Kendall, Steven C.Rollins	J. Ross Publishing	1 st	2003
2	Fundamental of Financial Management	SKGupta, RKSharma	OSR Publishers Odisha	1 st	2022

Useful Online Resources:

Sr. No	Link	QR
1	https://www.oreilly.com/library/view/financing-and-managing	
2	https://www.youtube.com/watch?v=uWPIsaYpY7U&t=0s	
3	https://www.edx.org/learn/project-management	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICPE409- Professional Elective – IV : Industrial IoT
Prerequisite/s	IICPC210 - Information Theory for Cyber Security IICPC211 – Introduction to Internet of Things
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

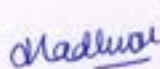
Course Outcomes (COs):

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

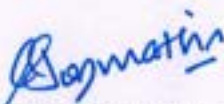
IICPE409_1	Explain the fundamentals of sensing, actuation and communication protocols used in Industrial IoT systems. (K2) .
IICPE409_2	Apply cybersecurity principles to secure Industrial IoT systems in real-time industrial environments. (K3) .
IICPE409_3	Analyze middleware patterns and IIoT platforms to assess their role in smart factory applications. (K4)
IICPE409_4	Develop IIoT applications using big data, ML, SDN and cloud platforms for industrial optimization. (K6) .
IICPE409_5	Design IIoT solutions for applications in healthcare, energy, manufacturing, security, and UAV-based operations. (K6) .

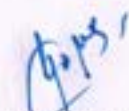
Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Fundamentals of Sensing, Actuation, and Communication Protocols: Overview of sensors: types, characteristics, and applications. Actuators: working principles and industrial use cases. Communication Protocols: CoAP and NFC, 5G Networking, industrial Ethernet, and IIoT-specific networking.	6
Unit 2	Industrial IIoT Architectures and Cloud Computing: IIoT business models: value creation and innovation strategies, Reference architecture for IIoT: Fog, Edge, and Cloud computing, Sensing and processing layers: real-time data acquisition and analytics,	7


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Unit 3	Big Data Analytics and Software Defined Networks in IIoT: Big data analytics for predictive maintenance and operational efficiency, Machine learning and AI applications in IIoT , Software-defined networking: principles and industrial use cases , Cloud platforms for IIoT: AWS IoT Core, Microsoft Azure IoT Hub.	7
Unit 4	Cybersecurity Fundamentals in industrial settings: Industrial process control: SCADA and PLC integration with IoT, Risk assessment and mitigation strategies for industrial IoT systems, Industrial sensing and actuation technologies: advances and limitations.	6
Unit 5	Middleware Software Patterns and IIOT Platforms: Publish/Subscribe Pattern: MQTT, XMPP, AMQP, DDS- Middleware Architecture- SigFox- LoRaWAN Augmented reality- Real-World Smart Factories	6
Unit 6	Application Domains of Industrial IoT Healthcare: remote monitoring and IoT-enabled diagnostics, Energy management in power plants and smart grids, Advanced assembly lines and quality control, Facility management and security systems using AR/VR, Specialized domains: UAVs in agriculture and oil industries.	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Industry 4.0 The Industrial Internet of Things	Gilchrist, Alasdair	Apress	1st	2017
2	The Internet of Things in the Industrial Sector: Security and Device connectivity, smart environments and Industry 4.0	Zaigham Mahmood	Springer	1st	2019
3	Industrial Internet of Things: Cyber manufacturing System.	Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat	Springer	1st	2017

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Industrial IoT Challenges, Design Principles, Applications, and Security	Ismail Butun	Springer	1st	2020
2	The Fourth Industrial Revolution	Klaus Schwab	Currency.	1st	2017
3	Internet of Things - From Research and Innovation to Market Deployment	Ovidiu Vermesan and Peter Friess	River Publishers	1st	2014

Useful Online Resources:

Sr. No	Link	QR
1	https://online.umich.edu/courses/industrial-internet-of-things/	
2	https://onlinecourses.nptel.ac.in/noc21_cs20/preview	
3	https://www.apress.com/gp/book/9781484220467	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICPE410- Professional Elective – IV: Cyber Crimes and Digital Forensics
Prerequisite/s	IICPC210: Information Theory for Cyber Security.
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

Course Outcomes (COs):

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

IICPE410_1	Explain the typologies of cybercrime and the role of federal, state, and international agencies in investigating and enforcing cyber laws effectively. (K2)
IICPE410_2	Describe various forms of malware, hacker activities, and the legal frameworks used to investigate and prosecute cyber-attacks. (K2)
IICPE410_3	Apply appropriate investigative procedures and tools for identifying digital evidence, preserving data integrity, and reporting findings in cybercrime cases. (K3)
IICPE410_4	Demonstrate an understanding of cyberbullying, cyberterrorism, and cyberwarfare, and apply regulatory and legislative measures to mitigate their impact. (K3)
IICPE410_5	Analyze legal and policy-related challenges in digital forensics and evaluate future enforcement strategies in combating evolving cyber threats globally. (K4)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Technology, Cybercrime and Law Enforcement Technology as a Landscape for Crime, A Typology of Cybercrime, Offices in Investigating Cybercrime, State Agencies' Roles in Investigating Cybercrime, Federal Law Enforcement and Cybercrime, Civil Investigation and Application of Digital Evidence, International Enforcement Challenges	7

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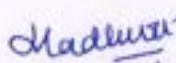
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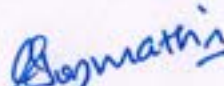
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Unit 2	Computer Hackers and Computer Attacks The Contemporary Hacker Subculture, Legal Frameworks to Prosecute Hacking, Enforcing and Investigating Hacker Activity. The Basics of Malware, Viruses, Trojans, and Worms, Blended Threats and Ancillary Tools, Hackers and Malware Writers, Legal Challenges in Dealing with Malware, Coordination and Management in Addressing Malware	6
Unit 3	Digital Piracy, IPR and Online Fraud The Theft of Corporate IP Relative to Pirated Content, Counterfeiting, E-Commerce, and Intellectual Property Theft, The Subculture of Piracy, The Evolution of Legislation to Deal with Intellectual, Property Theft, The Law Enforcement and Industry Response, Fraud and Computer-Mediated Communications, Email-Based Scams, Phishing Emails, Data Breaches and Identity Crimes, Identity Theft and Fraud Laws, Investigating and Regulating Fraud Globally.	7
Unit 4	Cyber Bullying, Cyber Terror and Cyber Warfare Differentiating Online Harassment and Stalking, Rates of Harassment and Stalking, Reporting Online Bullying, Harassment, and Stalking,, Regulating Cyberbullying, Regulating Online Harassment and Stalking, Enforcing Cyber-Violence Laws and Norms, Legislating Extremism and Cyberterror, Investigating and Securing Cyberspace from the Threat of Terror, Role of Nation-State Actors in Cyber Attack, Offensive and defensive cyber operations, Securing cyberspace from the threat of cyberwar	7
Unit 5	Evolution of Digital Forensics and Examination of Evidences From Computer Forensics to Digital Forensics, Stages of Digital Forensic Investigation, The Role of Digital Evidence, Types of Hardware, Peripherals, and Electronic Evidence, Evidence Integrity, Data Preservation , Digital Forensic Imaging Tools, Uncovering Digital Evidence, Data Analysis, Reporting of Findings	6
Unit 6	Legal Challenges in Digital Forensics and Future of Cybercrime Constitutional Issues in Digital Investigations, Admissibility of Evidence in Court, Admissibility of Digital Forensics as Expert Testimony, How Technicways Will Shift with New Technologies, Social Movements, Technology, and Social Change, Need for New Cyber Criminological Theories, Shifting Enforcement Strategies in the Age of the Internet, Considering the Future of Forensics, The Challenge to Policy-Makers Globally	6


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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Cybercrime and Digital Forensics: An Introduction	Thomas J. Holt, Adam M. Bossler, Kathryn C. Seigfried-Spellar	Routledge (Taylor & Francis Group)	3rd	2022
2	Digital Forensics and Cyber Crime: Principles and Practice	R.C. Joshi and Emilee Rautenbach	Wiley	1st	2016
3	Cyberlaw: The Law of the Internet and Information Technology	Brian Craig	Pearson Education	2nd	2021

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Investigating Cybercrime: An Introduction to the Digital Investigation Process	Brent E. Turvey, Stan Crowder	Elsevier / Academic Press	1st	2017
2	Cyber Warfare and Cyber Terrorism	Lech J. Janczewski, Andrew M. Colarik	IGI Global	1st	2008
3	Guide to Computer Forensics and Investigations	Bill Nelson, Amelia Phillips, Christopher Steuart	Cengage Learning	6th	2018

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Useful Online Resources:		
Sr. No	Link	QR
1	https://www.open.edu/openlearn/science-maths-technology/digital-forensics/content-section-0	
2	https://www.mygreatlearning.com/academy/learn-for-free/courses/cyber-forensics	
3	https://alison.com/course/diploma-in-forensic-investigation	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICPE411- Professional Elective – IV : Blockchain Revolution Specialization
Prerequisite/s	IICPE316-Blockchain Security and Performance IICPE403-Blockchain and FinTech
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

Course Outcomes (COs):

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

IICPE411_1	Explain the foundational concepts and mechanics of blockchain systems, including trust models, consensus algorithms, and cryptographic techniques. (K2)
IICPE411_2	Demonstrate the application of blockchain principles by designing basic smart contracts and identifying real-world opportunities for asset tokenization. (K3)
IICPE411_3	Analyze the layered architecture of blockchain technology stacks and assess how each layer influences governance models and system implementation. (K4)
IICPE411_4	Evaluate the transformative impact of blockchain across various sectors, particularly in financial services and emerging business models. (K5)
IICPE411_5	Design a blockchain-based solution to address specific organizational or industry problems, incorporating strategic, technical, and governance consider. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to Blockchain Technologies: Limitations of the Internet in business and economic activities, Trust models in pre-blockchain and post-blockchain environments, Terminology: miner, hash, nonce, proof-of-work, public key cryptography, Steps in a blockchain transaction lifecycle, Seven design principles of blockchain technology, Ten implementation challenges in blockchain adoption	6
Unit 2	Transacting on the Blockchain: Types of crypto assets: cryptocurrencies, tokens, stablecoins, NFTs, etc., Asset	7

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	tokenization concepts and applications ,Smart contracts: definition, structure, use cases ,Distributed identity systems and self-sovereign identity, Core functions of the financial services industry,Disruption of financial services through blockchain integration.	
Unit 3	Blockchain and Business: Transformation of business structures and functions through blockchain, Blockchain-enabled business models: platform cooperatives, DAOs, etc. ,Intellectual property management using blockchain ,Blockchain technology stack: infrastructure, protocol, services, applications,Governance and operational implications of each layer in the stack	7
Unit 4	Blockchain Opportunity Analysis: Idea generation and opportunity mapping in industry-specific blockchain applications ,Value proposition development for blockchain-based solutions ,Business model planning and feasibility assessment ,Operational adjustments and organizational change requirements for adoption	7
Unit 5	Implementation Challenges and Strategic Adoption: Legal, regulatory, and compliance issues in blockchain deployment ,Technical challenges: scalability, latency, energy consumption, privacy ,Risk management strategies and mitigation planning ,Change management and organizational transformation frameworks ,Pilot projects, testing strategies, and scalable adoption models	6
Unit 6	Case Study and Industry Application: Case study on blockchain implementation in supply chain, healthcare, or real estate, Process transparency and fraud prevention through blockchain, Integration of IoT devices with blockchain for real-time tracking and data security, Strategic insights and lessons from case implementation	6

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Blockchain Basics: A Non-Technical Introduction in 25 Steps	Daniel Drescher	Apress	1st Edition	2017
2	Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies is Changing the World	Don Tapscott and Alex Tapscott	Portfolio	1st Edition	2018

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3	Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications	Imran Bashir	Packt Publishing	3rd Edition	3rd Edition
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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Blockchain Applications: A Hands-On Approach	Arshdeep Bahga and Vijay Madisetti	VPT	1st Edition	2017
2	Blockchain and the Law: The Rule of Code	Primavera De Filippi and Aaron Wright	Harvard University Press	1st Edition	2018
3	Token Economy: How the Web3 Reinvents the Internet	Shermin Voshmgir	Token Kitchen	2nd Edition	2020

Useful Online Resources:

Sr. No	Link	QR
1	https://onlinecourses.nptel.ac.in/noc19_cs63/preview	
2	https://www.youtube.com/watch?v=PI8OlkkwRpe	
3	https://www.coursera.org/specializations/blockchain-revolution-enterprise	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS412- Data Analytics with R
Prerequisite/s	IICPC404 – Machine Learning, IICVS214 - Python Programming Laboratory
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

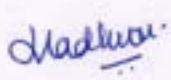
Course Outcomes (COs):

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

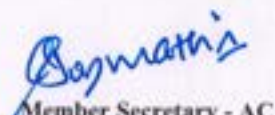
IICVS412_1	Understand the fundamentals of Data Analytics and the types, nature, and characteristics of data along with its real-world applications. (K2)
IICVS412_2	Develop basic R programming skills to perform data manipulation using data structures like vectors, arrays, matrices, and functions. (K3)
IICVS412_3	Apply descriptive statistical methods and summary techniques for data analysis and understanding of data distributions. (K3)
IICVS412_4	Perform data import/export, cleaning, wrangling, and create effective visualizations using base R and ggplot2 for data interpretation. (K4)
IICVS412_5	Design predictive models using linear and logistic regression in R and interpret the results; design interactive dashboards using Power BI. (K6)

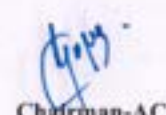
Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to Data Analytics: Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics	2
Unit 2	Introduction to R Programming: Fundamentals of R: Installation, Set-up, set working directory, packages and libraries, Operators, data types, vector creation and manipulation, Factors, array, matrix, functions and R packages	2
Unit 3	Data Visualization: Reading and writing data into R using CSV files, XML files, JSON files etc. Data handling and cleaning and data wrangling Basic Plotting types:	3


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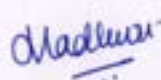

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	Barchart, Pie Chart, Histogram, Density Plot, Box Plot, Plot customization: Adding legend, adding color in plots, adding axis labels and chart title, overlay plots in R, Introduction to ggplot2 and advanced visualization techniques	
Unit 4	Descriptive Statistics: Mean, Median and Mode, Measures of Central Tendency, Measures of Variability - Skewness and Kurtosis, Summary functions, describe functions	2
Unit 5	Predictive Analysis: Regression models, Classification models, linear regression: lm(), logistic regression: glm(), Survival analysis (Titanic Dataset)	2
Unit 6	Reports and Dashboard Design (Power BI): Exploring Power BI Desktop: Layout and Features, BI Components, Linking Up with Various Data Sources, Implementing Data Visualization Standards, Creative Visual Exploration	2

Experiment List

Exp. No.	Title of Experiment
01	Explore and classify various types of datasets with their characteristics and applications in different domains
02	Install R and RStudio and create vectors, matrices, arrays and factors and perform basic arithmetic operations and logical comparisons of R objects
03	Develop user-defined functions in R to perform data transformation operations (Use built-in packages for mathematical functions)
04	Implement a program to read data from a CSV file and clean it using R (Handle missing values, remove duplicates and rename columns etc.)
05	Implement and plot visualizations such as bar charts, pie charts, histograms, density plots and box plots, etc.)
06	Implement layered plots using ggplot2 to create aesthetics and themes
07	Implement descriptive statistics (mean, median, mode, standard deviation, skewness and kurtosis) on a real-world dataset using R
08	Implement a program to apply linear regression (lm()) to predict a continuous variable and interpret regression coefficients and plot regression lines


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09	Implement a program to perform logistic regression (glm()) to classify binary outcomes (Titanic dataset to perform survival analysis)
10	Create a dashboard to connect Power BI to an external dataset to clean and transform the data and create interactive dashboards with filters, slicers and visual charts

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Applied Statistics and Probability for Engineers	Montgomery, Douglas C., George C. Runger	John Wiley & Sons	1 st	2010
2	Beginning R - The Statistical Programming Language	Mark Gardener	John Wiley & Sons	1 st	2012
3	R Programming An approach to Data Analytics	G. Grolemond	MJP Publisher	1 st	2021

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	R Programming: Simply in Depth	Singh, Ajit	Amazon Digital Services LLC - KDP	–	2020
2	R: Data Analysis and Visualization	Fischetti, Tony	Packt Publishing	–	2016
3	Mastering Microsoft Power BI	Greg Deckler, Bret Powell	Packt Publishing	1 st	2022

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Useful Online Resources:		
Sr. No	Link	QR
1	https://cran.r-project.org/doc/contrib/Owen-TheRGuide.pdf	
2	https://smac-group.github.io/ds/	
3	https://www.datacamp.com/tutorial/tutorial-power-bi-for-beginners	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS413- Robotic Process Automation with Power Automate
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

Course Outcomes (COs):

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

IICVS413_1	Understand the fundamentals of Robotic Process Automation (RPA), identify key RPA roles and the RPA life cycle. (K2)
IICVS413_2	Apply variable manipulation techniques in Power Automate Desktop by creating desktop flows to set variables and other operations. (K3)
IICVS413_3	Analyze the list manipulation and conditional logic techniques in Power Automate Desktop with list related operations. (K4)
IICVS413_4	Create Excel automation workflows in Power Automate Desktop by designing flows to launch Excel, read and write data to worksheets. (K6)
IICVS413_5	Design a power automate desktop flow to extract data from PDF file. (K5)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to RPA, Major RPA Roles and Responsibilities, RPA Life Cycle, what is Microsoft Power Automate, How to Sign-up and sign-in for Power Automate, Hardware and Software Requirements, How to Download and Install Power Automate Desktop, Power Automate Desktop application, Microsoft Power Automate Versus Microsoft Power Automate Desktop, Create Desktop flow.	2
Unit 2	Variable Actions: How to Set Variable, Truncate Number, Get Random Numbers, Increase Variable, Decrease Variable, Desktop Flow for Set variable, Truncate & Get Rand Numbers, Inc & Dec Variable, Create New List, Add Item to List, Remove Item from List, Clear List,	2

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Unit 3	Work with Remove Duplicate items from List, Reverse List, Shuffle List, Work with Merge Lists, Subtract Lists, Find Common List items. Conditional Actions: Learn Conditional Actions (Theoretical), work with Conditional Actions (Practical Use case)	2
Unit 4	Conditional Actions (If and Else) Excel Automation: Launch Excel, Read from Excel. Close Excel, write to Excel Worksheet.	2
Unit 5	Add New Worksheet. Set Active Excel Worksheet. Work with Get First free Column / Row from Excel Worksheet action. work with "Get first free row on column from Excel Worksheet"	2
Unit 6	PDF Automation: Introduction of PDF Automation, Extract Images from PDF Extract Text from PDF, Extract PDF pages to new PDF, Merge PDF Files Extract Tables from PDF	3

Experiment List

Exp. No.	Title of Experiment
01	Implement Desktop Flow for Setting Variable, Truncating Number & Generating Random Number.
02	Design a power automate desktop flow to create a new list, add item to list and remove item from list.
03	Design a flow to eliminate duplicate entries from a list, reverse list, merge list and subtract the list.
04	Design and apply conditional logic in an automated flow.
05	Design a power automate desktop flow to launch excel sheet then read the data from and write the data to excel sheet.
06	Implement a power automate desktop flow for excel automation, get first free column and first free row from Excel Worksheet.
07	Implement a power automate desktop flow to extract images from pdf file.
08	Desktop Flow for Browser / Web Automation for Employee Onboarding process.
09	Desktop Flow for Excel Automation for Employee Onboarding process
10	Data Extraction from NSF. with Extract Data from web page action

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microsoft Power Automate: Learning Robotic Process Automation	Aaron Guilmette	Packt Publishing	Second Edition	2022
2	Learning Robotic Process Automation	Alok Mani Tripathi	Packt Publishing	First Edition	2018

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Pro Microsoft Power Platform: Solution Building for the Citizen Developer	Mitchell Pearson	Apress	First Edition	2020
2	The Robotic Process Automation Handbook	Tom Taulli	Apress	Second Edition	2020

Useful Online Resources:

Sr. No	Link	QR
1	https://learn.microsoft.com/en-us/training/paths/work-automation-flow/	
2	https://www.udemy.com/courses/search/?src=ukw&q=RPA+with+Power+automate+beginner	
3	https://learn.microsoft.com/en-us/training/paths/work-automation-flow/	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS414- Ethical Hacking Essentials
Prerequisite/s	IICPC113- Computer Networks IICPC210-Information theory for Cyber Security IICPE315-Security Assessment & Risk Analysis
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

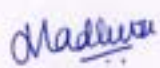
Course Outcomes (COs):

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

IICVS414_1	Understand the scope of ethical hacking, types of hackers, and relevant cyber laws to analyze the legal and ethical dimensions of penetration testing. (K2)
IICVS414_2	Apply various reconnaissance and foot printing techniques to gather intelligence on target systems. (K3)
IICVS414_3	Analyze network scanning results and enumerate systems for vulnerability identification. (K4)
IICVS414_4	Evaluate system security by simulating attacks on both Windows and Linux environments. (K5)
IICVS414_5	Create a comprehensive penetration testing report by executing attacks using professional tools. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to Ethical Hacking: - Definition and Scope of Ethical Hacking, Types of Hackers: White Hat, Black Hat, Grey Hat, Ethical Hacking Process and Phases Legal and Ethical Issues, Cyber Laws (India and Global), Setting up a Virtual Penetration Testing Lab.	2
Unit 2	Foot printing and Reconnaissance: -Foot printing Techniques: Passive and Active, Information Gathering using WHOIS, DNS Interrogation, Social Engineering and Email Foot printing, Google Hacking Techniques, Tools: Maltego, Recon ng, Shodan	2


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Unit 3	Scanning and Enumeration:- Network Scanning Concepts ,Port Scanning: TCP, SYN, ACK Scans, OS Fingerprinting, Banner Grabbing, Network Mapping and Topology Discovery Tools: Nmap, Zenmap, Angry IP Scanner	2
Unit 4	System Hacking and Malware Threats:- Password Cracking Techniques: Dictionary, Brute Force, Privilege Escalation on Windows and Linux, Malware Types: Keyloggers, Trojans, Rootkits, Ransomware, Spyware and Adware Behavior, Techniques to Hide and Detect Malware	2
Unit 5	Web Application and Wireless Hacking:- OWASP Top 10 Vulnerabilities Overview, SQL Injection, Cross-Site Scripting (XSS), File Inclusion, Wireless Standards: WEP, WPA, WPA2, Wireless Attacks: Evil Twin, De authentication, Tools: Burp Suite, Aircrack-ng, Wireshark	2
Unit 6	Network Attacks and Penetration Testing:- Man-in-the-Middle (MITM), ARP Spoofing, DNS Poisoning, Sniffing and Session Hijacking Denial of Service (DoS) and Distributed Dos, IDS/IPS and Firewall Evasion Techniques Introduction to Penetration Testing Reports and Methodology	3

Experiment List

Exp. No.	Title of Experiment
01	Configure a Virtual Penetration Testing Lab using Kali Linux and Metasploitable.
02	Demonstrate Passive and Active Footprinting Techniques using WHOIS, DNS Lookup tools.
03	Execute Information Gathering process using Recon-ng, Shodan, and Google Hacking Techniques.
04	Perform Network and Port Scanning using tools such as Nmap, Zenmap, and Angry IP Scanner.
05	Analyze Operating System Fingerprinting and Banner Grabbing for Target Discovery in Network.
06	Implement Password Cracking Techniques using Dictionary and Brute Force Attacks with Hydra and John the Ripper.
07	Demonstrate Privilege Escalation Techniques on Windows and Linux Systems.
08	Test Web Application Vulnerabilities such as SQL Injection and Cross-Site Scripting using Burp Suite.

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09	Conduct Wireless Network Attacks: Evil Twin Setup and Deauthentication using Aircracking
10	Simulate Network Attacks like ARP Spoofing, DNS Poisoning, and MITM using Wireshark and Ettercap.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data and Computer Communications --	W. Stallings.	Pearson	10th	2013
2	Data Communications and Networking	Behrouz A. Forouzan	McGraw-Hill Education	5th	2012
3	Ethical Hacking and Countermeasures: Attack Phases	EC-Council	Cengage Learning	2nd	2016
4	Cybersecurity Essentials	Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short	Wiley	1st	2018
5	The Basics of Hacking and Penetration Testing	Patrick Enebreton	Syngress (Elsevier)	2nd	2013

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Hacking: The Art of Exploitation	Jon Erickson	No Starch Press	2nd	2008

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2	Penetration Testing: A Hands-On Introduction to Hacking	Georgia Weidman	No Starch Press	1st	2014
3	Kali Linux Revealed: Mastering the Penetration Testing Distribution	Raphael Hertzog, Jim O'Gorman, Mati Aharoni	Offensive Security	1st	2017

Useful Online Resources:

Sr. No	Link	QR
1	https://archive.nptel.ac.in/courses/106/105/106105217/	
2	https://portswigger.net/web-security	
3	https://www.netacad.com/courses/ethical-hacker?courseLang=en-US	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS415 – Web Technology
Prerequisite/s	IICPC203-Database Management system Java Programming
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

Course Outcomes (COs):

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

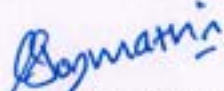
IICVS415_1	Understand and interpret standard web technologies. (K2)
IICVS415_2	Implement interactive client and server-side web applications. (K3)
IICVS415_3	Use web application data with databases. (K3)
IICVS415_4	Build real world applications using client side and server-side scripting languages. (K6)
IICVS415_5	Develop web application for given problem statement using NodeJS and mongoDB. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 Web Essentials: Clients, Servers and Communication, The Internet, World wide web, HTTP Request Message ,HTTP Response Message , Web Clients , Web Servers , HTML5 -Tables ,Lists, Image, HTML5 control elements – Drag and Drop, Audio, Video controls - CSS3 – Inline, embedded and external style sheets, Rule cascading, Inheritance – Backgrounds, Border Images,Colors,Shadows,Text,Transformations–Transitions,Animations. Bootstrap Framework	3
Unit 2	PHP Basic Syntax - Defining variable and constant, PHP Data types - Operator and Expression, Operator Precedence - Decisions and Loop - Functions &	2


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	Recursion, String Processing and Regular Expressions, Form Processing - Working with file and Directories - Cookies	
Unit 3	MongoDB Overview, CRUD operation, Basic operations, aggregations, Indexing, Replication and sharding	2
Unit 4	Bootstrap and Javascript Introduction to Client Side scripting - JavaScript - Control statements - Functions - Arrays - Objects - Events - Dynamic HTML with Java Script - AJAX: Ajax Client Server Architecture - XML Http Request Object - Call Back Methods, Fundamentals of JQuery and Bootstrap	2
Unit 5	ReactJS Introduction, syntax, Components, props and states, styling component, react component lifecycle, react routing and forms, deploying react app to web	2
Unit 6	NodeJS Introduction, setup Dev environment, Modules, Node package manager, creating web server, file system, Express JS, Web application components	2

Experiment List

Exp. No.	Title of Experiment
01	Program Based on newly introduced elements of HTML5
02	Program Based on Typography and background properties of CSS3, Animation effect by using transition effect
03	Program Based on Javascript operators, functions and objects
04	Program Based on JQuery selectors and JQuery events
05	Program to demonstrate concept of DTD and its types
06	Program Based on XSLT stylesheet to convert XML to HTML
07	Program to implement PHP Variables and arrays
08	Design web form and validate it using regular expressions
09	Program to manage session in PHP
10	Design web page to perform CRUD operation

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Web Development with Node and Express:Leveraging the JavaScript Stack	Brown, Ethan	O'Reilly Publication	3rd	2004
2	Mastering Web Application Development with Angular JS	Kozlowski, Pawel	Packt Publishing Ltd	1 st	2013
3	Fullstack React: The Complete Guide to React JS and Friends	Anthony, Accomazzo, Murray Nathaniel, Lerner Ari	Fullstack.io	1 st	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	The World of Scripting Languages	David William Barron	Wiley Publications	1 st	2000
2	Node.js, MongoDB, and AngularJS Web Development	Robin Nixon	O'Reilly	3rd	2014
3	Learning responsive web design: A beginners guide	Dayley B	Addison-Wesley Professional	1 st	2014

Useful Online Resources:

Sr. No	Link	QR
1	https://www.coursera.org/specializations/javascript-programming-with-react-node-mongodb	
2	https://www.youtube.com/watch?v=nu_pCVPKzTk	
3	https://www.w3schools.com/	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS416 – Augmented Reality and Virtual Reality
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

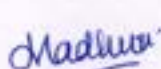
Course Outcomes (COs):

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

IICVS416_1	Describe how AR-VR systems work and list the applications of AR-VR. (K2)
IICVS416_2	Demonstrate hardware and software components used in augmented reality and virtual reality to perform experiments by identifying specific requirements of application. (K2)
IICVS416_3	Use unity game engine and ARCore framework to perform specific experiments using augmented reality and virtual reality. (K3)
IICVS416_4	Design augmented reality applications to solve given problem using unity game engine and vuforia software. (K5)
IICVS416_5	Design and Build a virtual reality applications to solve given problem using unity game engine, vuforia software and virtual reality boxes. (K5)

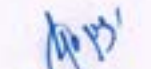
Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Understanding Augmented & Virtual Reality (AR-VR) Overview of AR and VR: History, evolution, and significance. key differences. Devices & Platforms: VR headsets (Oculus, HTC Vive). AR devices (HoloLens, mobile AR). Hardware Components: Sensors, displays, controllers, haptics, motion tracking. Software Platforms: Unity3D, Unreal Engine, WebXR, ARKit, ARCore.	2
Unit 2	Fundamentals of the Unity Game Engine Unity Basic Concepts, Installation of Unity, Overview of the Unity Game Engine: Editor Camera Controls, Creating Geometry, Setting Up The Scene Camera	2


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Unit 3	Unity Game Engine Objects and Components Import External Objects, Game Objects, Scene graph, Components, Assets, Shading and Materials, Importing & Using Textures, Lighting, Scripting in Unity, Fundamental Classes: MonoBehaviour, GameObject, Transform.	2
Unit 4	AR Development: AR Platforms: Introduction to ARCore, ARKit, Marker-based vs. Markerless AR: Concepts and implementation. Object Tracking & Detection: Understanding object recognition. Building an AR Application: Creating an interactive mobile AR experience.	2
Unit 5	VR Development: VR World Building: Scene creation, object placement, and navigation in VR Interaction in VR: Physics, gravity, & movement within a virtual environment Building VR Application: End-to-end development of a basic VR application.	2
Unit 6	Industry applications & Future Trends in AR and VR Applications of AR/VR: Gaming, education, healthcare, engineering, real estate, entertainment etc. Next-Gen AR/VR Devices: Wearables, contact lenses, and future HMDs Artificial Intelligence in AR/VR: AI-driven interaction and world-building Augmenting Reality with IoT: Integrating AR/VR with IoT devices and smart environments.	3

Experiment List

Exp. No.	Title of Experiment
01	Introduction to AR VR Laboratory
02	Installation of Unity Game Engine
03	Installation of AR Foundation framework in Unity game engine.
04	Implementation of a Marker based augmented reality application.
05	Implementation of Marker less augmented reality application
06	Creation of VR world using Unity Game Engine
07	Building a VR game using Unity Game Engine and VR Box.
08	Testing VR game using Unity Game Engine and VR Box.
09	Building a VR game using Unity Game Engine and VR Box.

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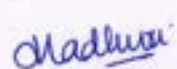
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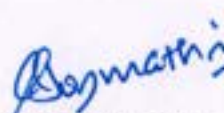
10	Testing VR game using Unity Game Engine and VR Box.
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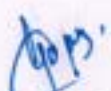
Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Augmented Reality: Principles and Practice	Dieter Schmalstieg, Tobias Hollerer	Addison-Wesley	First Edition	2016
2	The VR Book: Human-Centered Design for Virtual Reality (ACM Books)	Jason Jerald	Morgan & Claypool	Illustrated edition	2015
3	Understanding Augmented Reality, Concepts and Applications	Alan B. Craig	Morgan Kaufmann	Illustrated edition	2013.

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Hands-On Augmented Reality Development with Meta Spark Studio	Afshar, Jaleh	Berkeley, CA : Apress	First edition	2023
2	Advances in augmented reality and virtual reality	Jitendra Kumar Verma, Sudip Paul,	Springer	First edition	2022
3	Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR	Steve Aukstakalnis	Addison-Wesley	First edition	2016


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Useful Online Resources:		
Sr. No	Link	QR
1	https://nptel.ac.in/courses/121106013	
2	http://cambum.net/course-2.htm	
3	https://www.youtube.com/watch?v=zLMgdYI82IE	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS417 – Software Quality Assurance
Prerequisite/s	IICPC317- SDLC
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

Course Outcomes (COs):

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

IICVS417_1	Explain the fundamental concepts of software testing, including the Software Development Life Cycle (SDLC) and Software Testing Life Cycle (STLC). (K2)
IICVS417_2	Design effective test cases and test plans using appropriate test design techniques. (K3)
IICVS417_3	Differentiate between various types of testing techniques and applicability in real-world scenarios. (K4)
IICVS417_4	Utilize testing tools and methods to execute test cases, identify software bugs, and report them. (K3)
IICVS417_5	Compare manual and automated testing methodologies, and formulate strategies for test automation to ensure efficient test execution and closure. (K4)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction: Software Testing, Importance of testing, Roles and Responsibilities, Testing Principles, Attributes of Good Test, V-Model, Agile development method, Test Case Generation, SDLC Vs STLC, Software Testing Life Cycle	2
Unit 2	Types of Testing: Testing Strategies: Unit Testing, Integration Testing, System Testing, Smoke, Regression Testing, Acceptance Testing. CleanRoom Software Engineering. Functional/Non-Functional Testing. Testing Tools, Categorization of testing methods: Manual Testing, Automation Testing and Automated Testing Vs. Manual Testing	2

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Unit 3	Software Testing Methodologies: Validation & Verification, White/Glass Box Testing, Black Box Testing, Grey Box Testing, Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage Testing, Loop Coverage Testing, Boundary Value Analysis, Equivalence Class Partition, State Based Testing, Cause Effective Graph, Decision Table, Use Case Testing, Exploratory testing and Testing Metrics, Testing GUI	3
Unit 4	Software Testing Life Cycle: Requirements Analysis/Design, Traceability Matrix, Test Planning, Objective, Scope of Testing, Schedule, Approach, Roles & Responsibilities, Assumptions, Risks & Mitigations, Entry & Exit Criteria, Test Automation, Deliverables.	2
Unit 5	Test Cases Design and Management: Write Test cases, Review Test cases, Test Cases Template, Types of Test Cases, Difference between Test Scenarios and Test Cases. Test Environment setup, Understand the SRS, Hardware and Software requirements, Test Data.	2
Unit 6	Test Execution and Defect Management: Execute test cases, Error/Defect Detecting and Reporting, DRE (Defect Removal Efficiency), Object, Types of Bugs, Art of Debugging, Debugging Approaches, Reporting the Bugs, Severity and priority, Test Closure, Criteria for test closure, Test summary report.	2

Experiment List

Exp. No.	Title of Experiment
01	Prepare requirement document for a mini project / application
02	Design mockups or wireframes to understand the requirements in a better way
03	Understand agile scrum process, roles and its phases
04	Create a Test Plan to carry out the testing activities
05	Create user, epic, stories etc. for agile process using JIRA and JAMA / Zephyr
06	Write test case and get it reviewed by your team(peer-review) and update the TCs as per review comments
07	Create test run, add TCs to the test run and execute the test cases also mark them as pass or fail accordingly

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08	Log a defect and make the defect to go through possible states and close the bug with proper test evidences and comments
09	Demonstrate automation testing by using an automation tool UFT/Selenium
10	Demonstrate Non-functional / Performance testing using Load Runner

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Software Testing: Principles and Practices	Srinivasan Desikan	Pearson Education	2nd Edition	2015
2	Software Testing and Quality Assurance: Theory and Practice	Kshirasagar Naik and Priyadarshi Tripathy	Wiley India Pvt. Ltd	1st Edition	2008

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Software engineering- A practitioner's Approach, McGraw-Hill International Editions	Roger S.Pressman	McGraw-Hill Education	8th Edition	2014
2	Software Engineering, Pearson education Asia	Ian Sommerville	Pearson	10th Edition	2015
3	Software Testing Techniques	Boris Beizer	Dreamtech Press	2nd edition	1990

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Useful Online Resources:		
Sr. No	Link	QR
1	https://www.atlassian.com/continuous-delivery/software-testing	
2	http://www.softwaretestinghelp.com	
3	https://www.youtube.com/@testrobrcr/playlists	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS418- Android Programming
Prerequisite/s	Java Programming
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

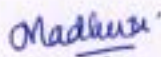
Course Outcomes (COs):

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

IICVS418_1	Understand the Android architecture, components and tools to set up and configure the mobile app development environment. (K2)
IICVS418_2	Design and develop interactive user interfaces using layouts, widgets, menus and dialogs to enhance user experience. (K3)
IICVS418_3	Implement intent-based navigation, activity lifecycle handling and fragments for modular application design. (K4)
IICVS418_4	Analyze and apply background services, broadcast receivers and notifications for responsive Android apps. (K4)
IICVS418_5	Create robust mobile applications integrating SQLite databases, content providers and multimedia features such as audio, video and camera usage. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to Mobile Application Development: Review to Java concepts & OOPS concepts, History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture, Android components including activities, View and View group, Services, Content Providers, Broadcast receivers, Intents, Parcels, Instance State	2
Unit 2	User Interface Application: Application context, Intents: Explicit Intents, Returning results from activities, Implicit intents, Intent filter and intent resolution and applications of implicit intents, Activity Life Cycle, Activity stack, Application's priority and its process's states, fragments and its life cycle	2


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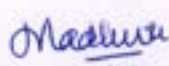

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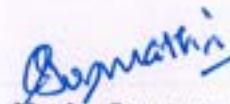
Unit 3	User Interface Design: Layouts, Optimizing layout hierarchies, Form widgets, Text fields, Button Control, Toggle buttons, Spinners, Images, Menu, Dialog	2
Unit 4	Broadcast receivers, Notifications and Services: Broadcast sender, receiver, broadcasting events with intents, listening for broadcast receivers, broadcasting ordered intents, broadcasting sticky intents, pending intents, creating notifications, setting and customizing the notification tray UI, Create - start - stop services, Binding services to activities	3
Unit 5	Database and Content Provider: SQLite, Content values and Cursors, Creating SQLite databases, Querying a database, Adding, Updating and removing rows, Creating Content Providers, Implement content providers queries and its usage	2
Unit 6	Android Multimedia: Drawing and working with Animation, Playing Audio and Video, recording Audio and Video, using Camera to take and process pictures	2

Experiment List

Exp. No.	Title of Experiment
01	Develop a basic Android Application displaying a Welcome message using Java and Android Studio
02	Create an Application demonstrating explicit and implicit intents for Activity navigation and System Interactions
03	Design a User Interface using various layouts and widgets including text fields, buttons, spinners and menus
04	Implement fragments to create a multi-pane layout and demonstrate fragment lifecycle management
05	Develop an application with custom broadcast receiver to handle system events like Battery Change or Airplane Mode
06	Create and Design Notifications in an application using pending intents and Notification Manager
07	Build an Android app with bound services for real-time data exchange between activity and service
08	Create a Student management App with SQLite database to perform insert, update, delete and query operations
09	Develop and use a custom content provider to share structured data across applications
10	Implement multimedia features by capturing images using Camera and playing Audio/Video files


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Android Programming: The Big Nerd Ranch Guide	Brian and Bill Phillips	Addison-Wesley	1 st	2013
2	Head First Android Development	Griffiths, Dawn and David Griffiths	Wrox Publication	1 st	2015
3	Professional Android 4 Application Development	Reto Meier	John Wiley & Sons	1 st	2012

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mobile Applications Development	Afreen C. Firza	Book Rivers	1 st	2021
2	Beginning Android 4 Application Development	Wei-Meng Lee	Wrox Press	1 st	2012
3	Android Design Patterns, Interaction Design Solutions for Developers	Greg Nudelman	John Wiley & Sons	1 st	2013

Useful Online Resources:		
Sr. No	Link	QR
1	https://developer.android.com/get-started/overview	
2	https://www.youtube.com/user/androiddevelopers	
3	https://onlinecourses.swayam2.ac.in/nou21_ge41/preview	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICVS419 - UI/ UX Design
Prerequisite/s	Design Thinking
Teaching Scheme: Lecture/Tutorial/Practical	1/0/2
Credits:	2
Evaluation Scheme (Practical): ISE/ESE	50/50

Course Outcomes (COs):

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

IICVS419_1	Apply the principles of Design Thinking to empathize with users, define problems, and ideate user-centric solutions for real-world applications. (K3)
IICVS419_2	Analyze and interpret user requirements through qualitative and quantitative research techniques using industry-standard tools like FigJam. (K4)
IICVS419_3	Evaluate and enhance the usability of digital products through structured usability testing and feedback analysis to support iterative design improvements. (K5)
IICVS419_4	Design intuitive and aesthetically appealing user interfaces by incorporating visual design principles, user journey mapping, and storyboarding. (K6)
IICVS419_5	Develop interactive and functional UI/UX prototypes using modern design tools such as Figma, applying concepts like gamification, animations, and component reuse. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Design Thinking Fundamentals: Introduction to Design Thinking - Concept, Purpose, 5 stages of Design Thinking - Emphasize, Define, ideate, Prototype, Test Introduction to User Interface/ User Experience (UI/UX): Definition of Design with respect to digital media, User interface, User experience, Difference between UI and UX, History of UX, need of UI and UX	2

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Unit 2	User Requirements and its Analysis: Introduction to Research and analysis tools such as FigJam, User requirements - Definition, Types of user research, Qualitative research, Quantitative research, Tools to collect user requirements - personal observation, interviews, questionnaire, User/Expert reviews	2
Unit 3	User Interface Design: Storyboarding, user journey mapping, Gestalt principles of design - Aesthetics in UI design - using light, color and contrast effectively in UI design, Introduction to any freeware design tools such as Figma, Visual Communication Design - Effective visual communication for graphical user interface	2
Unit 4	User Experience Design Tool: Introduction to User Experience design, UX design open source tool such as Figma, features - Navigation, interactions, buttons, creating library, gamification, micor-animation, creating visual identity of the project - design system, design theme	3
Unit 5	Prototyping & Testing: Introduction to Wireframing - purpose of wireframing, types - low fidelity, medium fidelity, high fidelity, basics of sketching - creating low fidelity wireframes, medium fidelity and high fidelity in Figma	2
Unit 6	Usability Testing and Evaluation: Definition, Goals, Importance in UX design lifecycle, types of usability testing: Moderated vs Unmoderated, remote vs in-person, formative vs summative, task success rate, error rate, time-on-task, user satisfaction (SUS - System usability Scale) identifying pain points, presenting findings	2

Experiment List

Exp. No.	Title of Experiment
01	Identify and define user needs by creating empathy maps and problem statements using design thinking techniques
02	Generate and organize innovation ideas using Ideation techniques in FigJam for a real-world problem
03	Develop User Personas and Map their journeys to understand and enhance user interactions
04	Design user interface screens by applying Gestalt principle to improve visual clarity and intuitiveness

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05	Enhance UI aesthetics by applying effective use of color, contrast and typography in screen design
06	Build and simulate interactive user interface prototypes in Figma with navigation and button actions
07	Create Low, Medium and High-Fidelity wireframes to visually communicate design intentions
08	Construct a consistent UI design system by creating a reusable component library in Figma
09	Conduct usability testing and analyze user feedback to improve interface functionality and satisfaction
10	Execute a complete UI/UX design project by applying design thinking stages from problem identification to prototyping

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	The Elements of User Experience: User-Centered Design for the Web and Beyond	Jesse James Garrett	New Rider Publishing		
2	Design Thinking: The Handbook	Falk Uebernickel, Li Jiang, Walter Brenner, Britta Pukall, Therese Naef	World Scientific Publishing		
3	Designing and Prototyping Interfaces with Figma	Fabio Staiano	Packt Publishing		

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Design Thinking for Beginners	Kilian Langenfeld	Personal Growth Hackers		

Useful Online Resources:

Sr. No	Link	QR
1	https://aim.gov.in/pdf/Design_Thinking.pdf	
2	https://youtu.be/-wzNTPXVlyM?si=zET5z3GpIPl-cAry	
3	https://www.figma.com/resource-library/design-basics/	

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Course Details:

Class	B. Tech, Sem - VIII
Course Code and Course Title	IICEL418 - Internship
Prerequisite/s	IICEL309, Industrial Training/ Internship
Teaching Scheme: Lecture/Tutorial/Practical	0/0/0
Credits:	10
Evaluation Scheme (Practical): ISE	200

Course Outcomes (COs):

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

IICEL418 _1	Utilize engineering concepts to engage in real-world projects within a professional environment. (K3)
IICEL418 _2	Operate industry-specific tools, software, and equipment efficiently. (K3)
IICEL418 _3	Exhibit strong teamwork skills by working alongside industry professionals, peers, and mentors to successfully meet project goals, ensuring compliance with industry regulations and standards. (K3)
IICEL418 _4	Analyze challenges encountered in industrial processes, proposing innovative and effective solutions. (K4)
IICEL418 _5	Create comprehensive reports, including case studies, and deliver impactful presentations that effectively convey insights and outcomes from projects and learning experiences. (K6)

Internship Requirements:

Ø All students are required to complete an internship at a research organization, university, or industry to gain practical exposure through meaningful projects that align with their academic learning. This internship must be approved by the Head of the Institution and has a duration of a minimum of 12 weeks and a maximum of 24 weeks, as specified in the curriculum.

Ø The tables below represent the outline of the internship guidelines and student responsibilities: For detailed guidelines and procedures, refer to the Institute Internship Policy Document.

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Internship Guidelines:

1. Request Letter	Obtain a request letter from the institute, signed by the Institute Director, addressed to the HR manager or relevant authority.
2. Confirmation Letter	Submit the confirmation letter from the industry or organization to the Internship Coordinator and Department Office.
3. Mentorship	- A faculty member will act as a mentor for a group of students to monitor, evaluate, and guide their internship activities. - The mentor will visit the internship location at least once or twice during the internship period and provide feedback to the Internship Coordinator.
4. Progress Reports	Submit progress reports every two weeks to the mentor, along with a final report to the Internship Coordinator.
5. Evaluation	The mentor and an assessment panel will evaluate student performance post-internship, submitting an evaluation report to the Department Office.
6. Internship Certificate	Obtain and submit an Internship Certificate from the organization to the Internship Coordinator.
7. Presentation and Term Work	Deliver a presentation on internship work as part of term assessments; submit an internship diary and report for evaluation.

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Student Responsibilities

Category	Responsibilities
Professionalism	Adherence to workplace rules, ethical conduct, professional communication
Engineering Skills	Apply engineering fundamentals, use tools and software, conduct experiments, solve problems
Industry Knowledge	Learn industry standards, observe practices, understand project management
Professional Development	Improve communication, teamwork, problem-solving, time management, build network, enhance employability
Learning & Growth	Seek learning opportunities, apply classroom knowledge, maintain a journal, gain insights into career paths

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