ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY
ASHTA
(An Autonomous Institute with NAAC A++ Grade)
Department of Computer Science and Engineering
(Internet of Things and Cyber Security Including Blockchain Technology)

Annasaheb Dange College of Engineering and Technology, Ashta

An Autonomous Institute

Curriculum Structure

B. Tech. Computer Science and Engineering

(Internet of Things and Cyber Security including Blockchain Technology)

SEMESTER V

Academic Year 2023-24
(Updated)

Teaching and Evaluation Scheme

ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY
ASHTA
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Department of Computer Science and Engineering
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Teaching and Evaluation Scheme
T.Y.B. Tech: Semester-V

Course Code	Course	Teaching Scheme				Evaluation Scheme				
						Scheme	Theory (Marks)		Practical (Marks)	
		L	T	P	Credits		Max.	Min. for Passing	Max.	Min. for Passing
0ICOE3**	Open Elective-I	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPC303	Design and Analysis of Algorithms	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPC304	Information Theory for Cyber Security	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPC305	Block Chain Technology	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICHS306	Entrepreneurship	--	--	2	1	ISE I	25	10	--	--
						ISE II	25	10	--	--
0ICPC351	Design and Analysis of Algorithms Laboratory	--	--	2	1	ISE	--	--	25	10
						ESE	--	POE	50	20
0ICPE3**	Professional Elective-II Laboratory	2	--	2	3	ISE	--	--	25	10
						ESE	--	POE	50	20
0ICPC355	Block Chain Technology Laboratory	--	--	2	1	ISE	--	--	25	10
						ESE	--	POE	50	20
0ICPC356	Programming Laboratory-II	2	--	2	3	ISE	--	--	50	20
0ICPR357	Industrial Training/Internship	--	--	--	1	ESE	--	PR	50	20
VAC-5	Value Added Course-5	2	--	--	--	Audit				
Total		**18**	**0**	**10**	**22**	**Total**	**450**		**325**	
Total Contact Hours/Week: 28 hrs.						**Total=450+325=775**				

Course Category	**HS**	**BS**	**ES**	**PC**	**PE**	**OE**	**PR**
Credits	01	00	01	14	03	03	00
Cumulative Sum	07	17	22	43	06	03	01

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TY - IoT - ST - 01/04

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0ICOE3**- Open Elective-I		0ICPE3**- Professional Elective-II Laboratory	
0ICOE301	Ethical Hacking and Tools	0ICPE352	Data Analytics
0ICOE302	Smart Sensors and Actuators	0ICPE353	IOT Platforms and System Design
		0ICPE354	Multimedia and Social Media Security

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Curriculum Structure

B. Tech. Computer Science and Engineering

(Internet of Things and Cyber Security including

Blockchain Technology)

SEMESTER VI

Academic Year 2023-24

ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY
ASHTA
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Department of Computer Science and Engineering
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Teaching and Evaluation Scheme
T.Y.B. Tech: Semester-VI

Course Code	Course	Teaching Scheme				Evaluation Scheme				
						Scheme	Theory (Marks)		Practical (Marks)	
		L	T	P	Credits		Max.	Min. for Passing	Max.	Min. for Passing
0ICOE3**	Open Elective-II	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPC309	Data Encryption, Steganography and Digital Watermarking	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPC310	Embedded System for IoT	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPC311	Software Engineering	3	1	--	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICPE3**	Professional Elective-III	3	--	--	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50	20	--	--
0ICHS315	Universal Human Values-2	2	--	--	2	ISE I	25	10	--	--
						ISE-II	25	10	--	--
0ICPC358	Data Encryption, Steganography and Digital Watermarking Laboratory	--	--	2	1	ISE	--	--	25	10
						ESE	--	POE	50	20
0ICPE3**	Professional Elective-III Laboratory	--	--	2	1	ISE	--	--	50	20
0ICPC362	Embedded System for IoT Laboratory	--	--	2	1	ISE	--	--	25	10
						ESE	--	POE	50	20
0ICPR363	Minor Project	--	--	2	1	ISE	--	--	25	10
						ESE	--	PR	50	20
VAC-6	Value Added Course-6	2	--	--	--	Audit				
Total		**19**	**1**	**08**	**22**	**Total**	**550**		**275**	
Total Contact Hours/Week: 28 hrs.						**Total=550+275=825**				

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	02	00	00	12	04	03	01
Cumulative Sum	09	17	22	55	10	06	02

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0ICOE3**- Open Elective-II	
0ICOE307	Introduction to Blockchain
0ICOE308	Cyber Crimes and Security

0ICPE3**- Professional Elective-III	
0ICPE312	Wireless Sensor Networks
0ICPE313	Database Security
0ICPE314	Smart Contracts and Solidity

0ICPE3**- Professional Elective-III Laboratory	
0ICPE359	Wireless Sensor Networks Laboratory
0ICPE360	Database Security Laboratory
0ICPE361	Smart Contracts and Solidity Laboratory

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Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	0ICOE301- **Ethical Hacking and Tools**
Prerequisite/s	0ICPC108 - Computer Networks 0ICPC203 - Operating System
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme : ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0ICOE301_1	**Express** knowledge on basics of computer based vulnerabilities
0ICOE301_2	**Gain** understanding on different foot printing, reconnaissance and scanning methods.
0ICOE301_3	**Gain** knowledge on hacking options available in Web and wireless applications.
0ICOE301_4	**Demonstrate** the enumeration and vulnerability analysis methods.
0ICOE301_5	**Use** tools to perform ethical hacking to expose the vulnerabilities.

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Introduction** Introduction to ethical hacking. Fundamentals of computer networking. TCP/IP protocol stack. IP addressing and routing. TCP and UDP. IP subnets. Routing protocols. IP version 6.	6
Unit 2	**Basic Tools** Installation of attacker and victim system. Information gathering using advanced google search, archive.org, netcraft, whois, host, dig, dnsenum and NMAP tool.	7

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Unit 3	**Vulnerability Analysis and System Hacking** Vulnerability scanning using NMAP and Nessus. Creating a secure hacking environment. System Hacking: password cracking, privilege escalation, application execution. Malware and Virus. ARP spoofing and MAC attack.	8
Unit 4	**Cryptography and Stegenography** Introduction to cryptography, private-key encryption, public-key encryption, Cryptographic hash functions, digital signature and certificate, applications. Steganography, biometric authentication, network-based attacks, DNS and Email security.	6
Unit 5	**Cyber Attacks** Packet sniffing using wireshark and burpsuite, password attack using burp suite. Social engineering attacks and Denial of service attacks. Elements of hardware security: side-channel attacks, physical inclinable functions, hardware trojans.	7
Unit 6	**Hacking and Countermeasures** Different types of attacks using Metasploit framework: password cracking, privilege escalation, remote code execution, etc.Attack on web servers: password attack, SQL injection, cross site scripting. Case studies: various attack scenarios and their remedies.	8

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Introduction to Computer Networks and Cybersecurity	C-H. Wu and J. D. Irwin	CRC Press	-	2015
2	Cryptography and Network Security: Principles and Practice	W. R. Stallings	Pearson	7th	2018
3	The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws,	Dafydd Stuttard and Marcus Pinto.	--	--	2011

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	The Basics of Hacking and Penetration Testing	Patrick Engebretson,	SYNGRESS, Elsevier	--	2013
2	TCP/IP Protocol Suite	B. A. Forouzan	Mc Graw Hill	4th	2010
3	UNIX Network Programming	W Richard Steven	Pearson Education	3rd	2004

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T4- IoT - 03/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	0ICOE302- **Smart Sensors and Actuators**
Prerequisite/s	0ICESI 04 - Analog Electronics 0ICES106 - Digital Electronics
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme : ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0ICOE302_1	**Identify** different types sensors, actuators, Microsensors and Microactuators to solve a problem using Sensor fundamentals and its characteristics. (K2)
0ICOE302_2	**Use** Microsensors and Microactuators to solve the problems in different scenarios using Arduino IDE. (K2)
0ICOE302_3	**Design** a solution for a given problem using sensors and ESP32 with Arduino IDE. (K3)
0ICOE302_4	**Design** sensor system for real world applications using Raspberry Pi. (K4)
0ICOE302_5	**Connect** sensors and actuators with ESP32 to solve a problem using pin description of ESP32 microcontroller. (K5)

Course Contents:		
Unit No.	**Unit Name**	**Contact Hours**
Unit 1	**Sensor fundamentals and Characteristics** Introduction, Basic principles of sensor, sensor classification, Understanding various sensors, sensor selection and characteristics: Range, resolution, sensitivity, error, precision, repeatability, linearity and accuracy, impedance response time and backlash, Performance measures of sensors.	6
Unit 2	**Types of sensors and their applications** Temperature sensor, Proximity sensor, Infrared sensor, Ultrasonic sensor, Light sensor, Smoke and Gas sensor, Alcohol sensor, Humidity sensor,	7

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	automobile sensor, home appliance sensors. Real time application of sensors, Technologies related to sensors: Metal detector, Global Positioning system, Blood Glucose monitoring, Photoelectric sensor.	
Unit 3	**Actuators** Definition, types and selection of Actuators, Working principle of actuators, sensor calibration, Linear actuators, Rotary actuators, Logical and continuous actuators, Pneumatic actuator, Hydraulic actuators- control valves, Electrical actuating system: solid state switched, solenoids, electric motors- principle of operation and its application, DC motors, AC motors, Synchronous motors , Stepper motors. Introduction to controllers, Types of controllers: Proportional, Proportional-Integral(PI), Proportional-Derivative(PD), Proportional – Integral-Derivative (PID)	8
Unit 4	**Micro Sensors and Micro Actuators** Micro Sensors: Principles and examples, Force and pressure micro sensors, position and speed micro sensors, acceleration micro sensors, chemical sensors, biosensors, temperature micro sensors and flow micro sensors. Micro Actuators: Actuation principle, shape memory effects-one way, two way and pseudo elasticity. Types of micro actuators- Electrostatic, Magnetic, Fluidic, Inverse piezo effect, other principles.	8
Unit 5	**Introduction to ESP32 and Raspberry Pi** Overview of ESP32 and its features, Block diagram of ESP32, Specifications, Layout, Pin description for ESP32, Understanding concepts of Arduino, Setting up an ESP32 with Arduino IDE, Introduction to Raspberry Pi.	7
Unit 6	**Case Studies** Sensors and actuators in Smart cities, Agriculture, Health Care, Activity Monitoring, Weather monitoring system, Forest fire detection, Smart sensors in Artificial Intelligence and Automation.	6

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Sensors and Actuators in Mechatronics, Design and Applications	Andrzej M. Pawlak	CRC Press, Taylor & Francis group	1st	2007

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2	Hand Book of Modern Sensors: Physics, Designs and Application	Jacob Fraden	Springer	5th	2016
3	Sensors and Transducers	Patranabis.D	Wheeler publisher	4th	1994

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mechatronic systems, Sensors and Actuators Fundamentals and Modelling	Robert H. Bishop	Taylor & Francis Group	1st	2006
2	Micro actuators Electrical, Magnetic, thermal, optical, mechanical, chemical and smart structures	Massood Tabib and Azar	Kluwer academic publishers, Springer	1st	1997
3	Microsystem Technology and Microbotics	Sergej Fatikow and Ulrich Rembold	Springer	1st	1997
4	ESP32 web server with Arduino IDE, step –by-step project guide	Rui Santos and Sara Santos	-	-	-

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TY- IoT-06/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPC303-Design and Analysis of Algorithms**
Prerequisite/s	0ICPC202 - Data Structures
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	3
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC303_1	**Explain** different design methods of algorithm (K2).
0ICPC303_2	**Explain** complexity of different algorithm designs (K2)
0ICPC303_3	**Apply** effectively and work in a team for laboratory activities (K3)
0ICPC303_4	**Apply** rules to provide the solution for designing algorithms (K3)
0ICPC303_5	**Analyze** professional and ethical principles during laboratory (K4)

Course Contents

Unit-1	**Divide and Conquer Method:** Reecurrence Equations and their solution, Randomized Algorithms, The general method Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Selection, Convex Hull	6
Unit-2	**The Greedy Method:** The general method, Knapsak problem, Job sequencing with deadlines, minimum-Cost spanning trees-Prim's and Kruskal's, Optimal storage on tapes, Graph coloring problem, Single source shortest path	8
Unit-3	**Dynamic Programming:** The general method, Multistage graphs, All pair shortest paths, Optimal binary search tree, 0/1 knapsack, Reliability design, Traveling Sales person problem.	7

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Unit-4	**Basic Traversal and Search Techniques:** Techniques for Graphs, AND/OR Graphs, Connected components and Spanning Trees, Biconnected components and Depth first search.	7
Unit-5	**Backtracking and Infeasibility:** **Backtracking** The general method, 8-queen problem, sum of subsets, Hamiltonian Cycle, Graph Coloring. **Infeasibility:** P and NP-classes, NP-hard Problems	8
Unit-6	Parallel Computational methods: PRAM, MESH, HYPERCUBE- Fundamental Algorithms	6

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamental of Computer Algorithms	Ellis Horowitz, Satraj Sahani, SaguthevarRajasejaran	Universities Press	2	2008
02	Introduction to Algorithms	Thomas Cormen, Charles Leiserson, Ronald RIvest, Clifford Stein	PHI	3	2009
03	Algorithms in a Nutshell	G T Heineman, G Pollice, S Selkow	O'Reilly	1	2008
04	Fundamental of Algorithms	G. Brassard, P. Brately	Pearson Education	1	2015

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Design and Analysis of Algorithms	Aho, Hopferaft and Ullman	Pearson Education	1	2000
02	Algorithms	Kenneth Berman, Jerome Paul	CENAGE Learning	1	2010

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
03	Algorithms	Robert S., Kevin W	Person Education	4	2014
04	Introduction to Design and Analysis of Algorithms	AnanyLevitin		1	2008

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TY-IoT- 09/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPC304 –Information Theory for Cyber Security**
Prerequisite/s	0ICPC108 - Computer Networks
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits	3
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC304_1	**Understand** the principles and applications of information theory (K2)
0ICPC304_2	**Describe** information security measures. (K2)
0ICPC304_3	**Illustrate** different secrecy metrics and security techniques. (K3)
0ICPC304_4	**Apply** coding schemes and error correcting codes. (K3)
0ICPC304_5	**Compare** different secrecy metrics and security techniques. (K4)

Course Contents:		
Unit 1	Shannon's foundation of Information theory, Random variables, Probability distribution factors, Uncertainty/entropy information measures, Leakage, Quantifying Leakage and Partitions, Lower bounds on key size: secrecy, authentication and secret sharing. provable security, computationally-secure, symmetric cipher	**8**
Unit 2	Secrecy, Authentication, Secret sharing, Optimistic results on perfect secrecy, Secret key agreement, Unconditional Security, Quantum Cryptography, Randomized Ciphers, Types of codes: block codes, Hamming and Lee metrics, description of linear block codes, parity check Codes, cyclic code, Masking techniques	**7**
Unit 3	Information-theoretic security and cryptography, basic introduction to Diffie-Hellman,AES, and side-channel attacks	**6**

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Unit 4	Secrecy metrics: strong, weak, semantic security, partial secrecy, Secure source coding:rate-distortion theory for secrecy systems, side information at receivers, Differential privacy, Distributed channel synthesis	7
Unit 5	Digital and network forensics, Public Key Infrastructure, Lightweight cryptography, Elliptic Curve Cryptography and applications.	7
Unit 6	**Case Study:** Secure software development infrastructure, Health care and forensic analysis, SOC-as-a-platform (SOCaaP), Cyber Security Threat Hunting.	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Information Theory and Coding,	Muralidhar Kulkarni, K S Shivaprakasha,	John Wiley & Sons	-	2015
02	Communication Systems: Analog and digital	Singh and Sapre	Tata McGraw Hill	2nd	2009
03	Fundamentals in information theory and coding	Monica Borda	Springer	-	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Information Theory, Coding and Cryptography.	R Bose	Tata McGraw Hill	2nd	2002
02	Multi-media System Design,	Prabhat K Andleigh and Kiran Thakrar.	Pearson education	1st	2015

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Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPC305- Blockchain Technology**
Prerequisite/s	0ICPC202 - Data Structure
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0ICPC305_1	**Explain** the basic concepts of Blockchain Technology (K1)
0ICPC305_2	**Use** Bitcoin and Ethereum protocol – to lay down the foundation for developing distributed applications and smart contracts (K2)
0ICPC305_3	**Apply** immutable distributed ledger and trust model for real time applications (K3)
0ICPC305_4	**Evaluate** the different types of consensus algorithms (K5)
0ICPC305_5	**Build** and deploy block chain application for on premise and cloud based architecture (K6)

Course Contents:		
Unit No.	**Unit Name**	**Contact Hours**
Unit 1	**Introduction:** Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.	7

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Unit 2	**Understanding Block chain with Crypto currency:** Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.	8
Unit 3	**Working with Consensus in Bitcoin:** Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.	8
Unit 4	**Understanding Block chain for Enterprises** **Permissioned Block chain:** Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain-Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.	8
Unit 5	**Understanding Block chain for Enterprises** **Enterprise application of Block chain:** Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain	6
Unit 6	**Block chain application development:** Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda	5

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	Imran Bashir	Packt Publishing	-	2017

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2	Essentials of Bitcoin and Blockchain	Kiran kalyan Kulkarni	Packt Publishing.	-	-
3	Blockchain: Ultimate guide to understanding Blockchain, bitcoin, cryptocurrencies, smart contracts and the future of money	Mark Gates	Create Space Independent Publishing Platform		

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Blockchain for Dummies	Tiana Laurence	John Wiley & Sons.	2nd	2019
2	Blockchain: Blueprint for a New Economy	Melanie Swan	Shroff Publisher O'Reilly Publisher Media	1st	2015
3	Mastering Bitcoin: Programming the Open Blockchain	Andreas Antonopoulos.	-	-	-
4	Block Chain & Crypto Currencies	Anshul Kaushik	Khanna Publishing House	-	-

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TY- IoT- 14/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	0CCHS506- **Entrepreneurship**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme: ISE-I / ISE-II	25/25

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0CCHS506_1	**Understanding** of the scope of an entrepreneur (K2).
0CCHS506_2	**Explain** areas of development, financial assistance by the institutions (K4)
0CCHS506_3	**Apply** To Learn methods of taxation and tax benefits,etc (K3)
0CCHS506_4	**Develop** systematic process to select and screen a business idea (K5)
0CCHS506_5	**Design** strategies for successful implementation of ideas (K5)

Course Contents

Unit-1	ENTREPRENEURSHIP Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.	2
Unit-2	MOTIVATION Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives	2
Unit-3	BUSINESS Small Enterprises – Definition, Classification – Characteristics, Ownership Structures –Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies	3

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Unit-4	FINANCING AND ACCOUNTING Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Income Tax, Excise Duty – Sales Tax.	3
Unit-5	V SUPPORT TO ENTREPRENEURS Sickness in small Business – Concept, Magnitude, causes and consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.	2
Unit-6	Parallel Computational methods: PRAM, MESH, HYPERCUBE- Fundamental Algorithms	2

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	"Entrepreneurial Development"	S.S.Khanka	S.Chand & Co. Ltd. Ram Nagar NewDelhi	2	1999.
2	Enterprenuership – Theory, process and practices	Kuratko & Hodgetts	Thomson learning	6	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Entrepreneurship	Hisrich R D and Peters M P	Tata McGraw-Hill	5	2012
2	Enterprenuership theory at cross roads: paradigms and praxis	Mathew J Manimala	Dream tech	2	2006
3	Entrepreneurship and innovation	Rabindra N. Kanungo	Sage Publications	--	1998

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TY- IoT- 16/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPC351 Design and Analysis of Algorithms Laboratory**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme: ISE / ESE	25/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC351_1	**Understand** the different design methods of algorithm (K2)
0ICPC351_2	**Apply** important algorithmic design paradigms and methods of analysis
0ICPC351_3	**Analyze** Time and Space complexity of different algorithm designs (K4)
0ICPC351_4	**Differentiate** the different backtracking methods (K5)
0ICPC351_5	**Develop** a real time application using dynamic programming concepts (K6)

Expt No.	Experiment List
1	Programs based on finding the maximum and minimum using iterative version and divide & conquer method. Compare the time complexity of both
2	Program based on convex Hull
3	Program based on general method of Greedy method
4	Program based on Greedy method
5	Program based on minimum-cost spanning trees
6	Program based on general method of Greedy Dynamic Programming.
7	Program based on Dynamic Programming.

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8	Program based on general method of backtracking.
9	Program based on backtracking.
10	Program based on AND/OR graph
11	Using OpenMP, implement a paralyzed Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Let Us C	Yashwant Kanetkar	BPB	3	2011
2	Fundamentals of compuer algorithms	Ellis Horowitz, Satraj Sahni and Rajasekaran	Universities Press	2	2008
3	Data Structure-A Pseudocode Approach with C	Richard F, Glberg and Behrouz A, Forouzon	PWS Publishing Company	2	2004
4	Introduction to algorithm	Thomas Cormen, Charles Leiserson, Ronald RIvest, Clifford Stein	PHI	3	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein	PHI	3rd Edition	2010
2	Design and Analysis of Algorithms	S. Sridhar	Oxford (Higher Education)	Higher Education	2009

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TY- IoT- 18/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPE352- Professional Elective Laboratory – II (Data Analytics)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	3
Evaluation Scheme: ISE / ESE	25/ 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE352_1	**Explain** how data is collected, managed and stored for data science.(K1)
0ICPE352_2	**Understand** the key concepts in data science, including their real-world applications.(K2)
0ICPE352_3	**Apply** data visualization concepts for a complex Data Sets. (K3)
0ICPE352_4	**Analyze** the different key concepts in data science, including the toolkit used by data scientists.(K4)
0ICPE352_5	**Implement** data collection and management scripts using MongoDB. (K5)

Course Content:

Unit No.	Unit Name	Contact Hours
Unit 1	**Introduction** Introduction to Data Science, Different Sectors using Data science, Purpose and Components of Python in Data Science.	4
Unit 2	**Data Analysis Types** Data Analytics Process, Knowledge Check, Exploratory Data Analysis (EDA), EDAQuantitative technique, EDA- Graphical Technique, Data Analytics Conclusion and Predictions.	4
Unit 3	**Feature Selection**	6

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	Feature Generation and Feature Selection (Extracting Meaning from Data)- Motivating application: user (customer) retention- Feature Generation (brainstorming, role of domain expertise, and place for imagination)- Feature Selection algorithms.	
Unit 4	**Data Visualization** Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects- Exercise: create your own visualization of a complex dataset.	4
Unit 5	**Applications** Applications of Data Science, Data Science and Ethical Issues- Discussions on privacy, security, ethics- A look back at Data Science- Next-generation data scientists.	4
Unit 6	**Case Study** Web Analytics-Basics ,URLS-Cookies, Search Analytics –Internal search ,SEO and PPC Healthcare Analytics –Advanced Data Analytics for health care, computer assisted medical image analysis system, Mobile Imaging and analytics for biomedical data	6

Exp. No.	Experiment List
1	Write a program to handle missing data by imputation or removal
2	Write a program to identify correlations between variables.
3	Perform t-tests to compare sample means.
4	Conduct an experiment to perform chi-squared tests for categorical data analysis.
5	Perform linear regression to model relationships between variables
6	Implement logistic regression for binary classification.
7	Visualize clusters with scatter plots and dendrogram.
8	Implement k-means clustering to group similar data points
9	Impalement Principal Component Analysis (PCA) for feature reduction
10	Perform text preprocessing (tokenization, stemming, stop-word removal).
11	Write a program to detect anomalies in data using techniques like Isolation Forests or Autoencoders.

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Handbook of Data Visualization	Chun-houh Chen, Wolfgang Härdle, Antony Unwin	Springer	-	
2	Visualizing Data	Ben Fry Beijing	O'Reilly Media	-	
3	Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython	McKinney W.	O'Reilly Media	2nd edition	2017
4	Doing Data Science: Straight Talk from the Frontline	O'Neil, C., & Schutt, R	O'Reilly Media	-	2013

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
	Data Analysis Using Regression and Multilevel/ Hierarchical Models	Gelman, Andrew, and Jennifer Hill	UK: Cambridge University Press	1st edition	2006

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TY-IoT-21/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPE353- Professional Elective Laboratory – II (IOT Platforms and System Design)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	3
Evaluation Scheme: ISE / ESE	25/ 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE353_1	**Explain** the fundamentals principles of IoT system design. (K2)
0ICPE353_2	**Apply** edge computing concepts to design an IoT solution for real-time data processing.(K3)
0ICPE353_3	**Analyze** various prototypes and provide IoT solutions using hardware and software components. (K4)
0ICPE353_4	**Compare** and contrast different IoT platforms and select the most suitable one for specific IoT applications. (K5)
0ICPE353_5	**Develop** a complete IoT solution that addresses a specific problem or use case.(K6)

Course Content:

Unit No.	Unit Name	Contact Hours
Unit 1	**Introduction to IoT Platforms** Understanding the Internet of Things (IoT) and its significance, Overview of IoT platforms and their role in IoT applications, Types of IoT platforms: cloud-based, edge-based, and hybrid, Examples of popular IoT platforms in the industry	5
Unit 2	**IoT Platforms** Understanding IoT platforms, Comparison of popular IoT platforms (e.g., AWS IoT, Azure IoT, Google Cloud IoT),Selecting the right IoT platform for a project.	4

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Unit 3	**IoT Data Management** Data collection and processing in IoT systems, Big data and analytics for IoT, Edge computing and data processing at the edge	4
Unit 4	**IoT System Design** Overview of IoT system design principles, Importance of system design in IoT, Design principles for IoT systems, Components of an IoT system (sensors, actuators, gateways, cloud),Prototyping and testing IoT solutions	6
Unit 5	**IoT Security in System Design** Security threats and challenges in IoT, Secure device onboarding and authentication, Data encryption and secure communication	4
Unit 6	**IoT Applications and Case Studies** Real-world IoT applications across various industries (e.g., healthcare, smart cities, agriculture, Future trends and challenges in IoT	4

Exp. No.	Experiment List
1.	Understand the basics of Internet of Things: Sensors, Actuators, IoT architecture and Gateway
2.	Study of IoT Networking: Connectivity technologies, Protocols and Interoperability in IoT.
3.	Develop a program to blink LED using Arduino Board.
4.	Develop a program to ON and OFF bulb based on LDR using Arduino Board.
5.	Temperature and Humidity monitoring using Arduino Board
6.	Interfacing and programming of actuators.
7.	To detect occupancy of an area using PIR sensors
8.	Implement the weather station using Cloud
9.	Connect the temperature sensor to the Arduino, and send temperature data to the IoT platform at regular intervals.
10.	Implement Vehicle tracking using Global Positioning System (GPS).

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T4- DoT - 23/73

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Warren	Cisco Press	2017	1st
2	Designing IoT Devices	Adrian McEwen and Hakim Cassimally	O'Reilly Media	2018	1st
3	Internet of Things: Architecture, Design Principles And Applications	Rajkamal	McGraw Hill HigherEducation	-	-
4	Arduino for Dummies	John Nussey	Dummies Publishing	2018	2nd

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Internet of Things (IoT): A Hands-On Approach	Arshdeep Bahga and Vijay Madisetti:	Universities Press	1st	2015
2	IoT System Design: FromSensors to Cloud	Vlasios Tsiatsis, Stefan Avesand, Stamatis Karnouskos, David Boyle, and Stamatis Koubias	Academic Press	1st	2020
3	Designing for the Internet of Things	Juha Sääski and Pär J. Ågerfalk	Springer	1st	2017

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TY-IoT-24/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPE354- Professional Elective Laboratory – II (Multimedia and Social Media Security)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	3
Evaluation Scheme: ISE / ESE	25/ 50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0ICPE354_1	**Understand** the basic concepts of Multimedia and Social Media Security(K1)
0ICPE354_2	**Explain** the main properties and classifications of different digital watermarking systems (K2)
0ICPE354_3	**Develop** applications showcasing the implementation of digital watermarking techniques. (K3)
0ICPE354_4	**Assess** the vulnerabilities related to privacy and security in the context of social networking (K4)
0ICPE354_5	**Formulate** comprehensive strategies for enhancing privacy and security in social networking platforms (K5)

Course Content:

Unit No.	Unit Name	Contact Hours
Unit 1	Overview of Multimedia Systems, Secured Multimedia, Digital Rights Management Systems, Multimedia Content Security, Multimedia Encryption, Multimedia Authentication, Multimedia Forensics.	4
Unit 2	Overview of Digital Watermarking, Types of Digital Watermarking, KL Transform, Discrete Cosine Transform based Watermarking, Discrete Wavelet Transform based Watermarking, and Fractional Fourier Transform based Watermarking,	5
Unit 3	Reference Watermarking, Singular Value Decomposition in Watermarking: Introduction, Eigen values and Eigenvectors, Singular Value Decomposition, Singular Vectors in watermarking, principal	5

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	component in watermarking, Hybrid Watermarking, Problem with Hybrid Watermarking, Adaptive Watermarking.	
Unit 4	Voice over IP security: Internet Protocol (IP), User Datagram Protocol (UDP), Real-Time Transport Protocol (RTP), RTP Payload, Packet Analysis, Network Security Issues and Solutions privacy and security concerns (spam, phishing, fraud nodes, identity theft) on Online Social Media	6
Unit 5	Collecting data from Online Social Media. Trust, credibility, and reputations in social systems, Trust, credibility, and reputations in social systems	4
Unit 6	Online social Media and Policing, Information privacy disclosure, revelation and its effects in OSM and online social networks, Phishing in OSM & Identifying fraudulent entities in online social networks	4

Exp. No.	Experiment List
1.	Study of different wireless network components and features of any one of the Mobile Security Apps.
2.	Study of the features of firewall in providing network security and to set Firewall Security in windows.
3.	Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)
4.	Study of different types of vulnerabilities for hacking a websites / Web Applications.
5.	Analysis the Security Vulnerabilities of E-commerce services.
6.	Analysis the security vulnerabilities of E-Mail Application
7.	Implementing Web Data Extractor and Web site watcher.
8.	Firewalls, Packet Analyzers, Filtering methods.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Digital watermarking and steganography: fundamentals and techniques	Shih, F. Y	CRC press	--	2017

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2	Embedded Multimedia Security Systems,	Pande, Amit, Zambreno, Joseph	Springer	--	2013
3	Handbook of Multimedia Information Security: Techniques and Applications	Singh, Amit Kumar, Mohan, Anand	Springer	--	2019

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Digital watermarking and steganography.	Cox, I., Miller, M., Bloom, J., Fridrich, J., Kalker, T	Morgan kaufmann	5th	2007
2	Homomorphic Encryption and Applications, Springer, Security and Cryptology	Yi, Xun, Paulet, Russell, Bertino, Elisa	--	--	2014

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T4-EoT-27/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	0ICPC355- **Block Chain Technology Laboratory**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE / ESE	25/ 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC355_1	**Understand** the basic concepts of Blockchain Technology (K1)
0ICPC355_2	**Develop** distributed applications and smart contracts using Bitcoin and Ethereum protocol tools (K2)
0ICPC355_3	**Apply** immutable distributed ledger and trust model for building real time applications (K3)
0ICPC355_4	**Demonstrate** the different types of consensus algorithms (K5)
0ICPC355_5	**Develop** Blockchain applications with IoT, AI and Cyber Security use cases (K6)

Exp. No.	Experiment List
1.	Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on Cloud to run
2.	Create and deploy a block chain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chaincode, and perform invoke and query on your block chain network
3.	Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules
4.	Deploy an asset-transfer app using block chain. Learn app development within a

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	Hyperledger Fabric network
5.	Use block chain to track fitness club rewards Build a web app that uses Hyperledger Fabric to track and trace member rewards
6.	Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyperledger Fabric to invoke chaincode while storing results and data in the starter plan.
7.	Develop an IoT asset tracking app using Block chain. Use an IoT asset tracking device to improve a supply chain by using Block chain, IoT devices, and Node-RED
8.	Secure art using block chain digital certificates. Node.js-based auction application can help democratize the art market

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Block Chain: Blueprint for a New Economy	Melanie Swan	O'Reilly	-	2015
2	Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming	Josh Thompsons	Createspace Independent Pub	-	2017
3	Block Chain and Crypto Currencies	Anshul Kaushik	Khanna Publishing House	1st	2018

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Block Chain Basics	Daniel Drescher	Apress	1st	2017
2	Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained	Imran Bashir	Packt Publishing	2nd	2018

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Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPC356- Programming Laboratory-II**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	2/0/2
Credits	3
Evaluation Scheme: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC356_1	**Knowledge:** students are able to create python programming to solve real world problems by using IDLE. (K2)
0ICPC356_2	**Apply:** Implement OOPs concepts in python programming to solve various real world scenarios using Python IDE. (K3)
0ICPC356_3	**Apply:** Create an application with the support of graphics in Python. (K3)
0ICPC356_4	**Analyze:** the data using different in-built functions of Pandas by using IDE. (K4)
0ICPC356_5	**Design:** and develop micro projects to solve real world problems by using python programming. (K5)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Basics of Python** Introduction to Python - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Control Statement: if statement, if, elif else statement Repetitive Control Statement: While loop, for loop, The range statement Selection Control Statement: Break & continue, Else clause	4

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Unit 2	**Modular Programming:** Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes **Function:** What is function, Define a function, Pass arguments, Arguments with default values, Arbitrary arguments, Local and global variables, Return a value from function, Mathematical functions, Random number functions, Mathematical constants, Recursive functions	6
Unit 3	**Exception Handling, File Handling** Errors, Exception handling with try, handling multiple exceptions, writing your own cxcption **File Handling**: File handling modes, reading files, writing snd spending to files, Handling file exceptions, The with statement.	4
Unit 4	**Introduction To Numpy and scikit learn:** NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes. Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting. Introduction scikit learn libraries.	4
Unit 5	**Data Manipulation with Pandas:** Introduction to pandas Data Structures: Series, DataFrame, Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.	4
Unit 6	**Data Cleaning, Preparation and Visualization** Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas. **Plotting with pandas:** Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.	6

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Experiments List:	
1	Implement basic Python programs to demonstrate fundamental concepts by reading input from console.
2	Implement Python programs to demonstrate decision control and looping statements.
3	Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem
4.	Implement OOP concepts like Data hiding and Data Abstraction.
5.	Create user-defined functions with different types of function arguments
6.	Perform File manipulations operations- open, close, read, write, append and copy from one file to another.
7.	Handle Exceptions using Python Built-in Exceptions
8.	Implement various in built functions of NumPy library.
9.	Create Pandas Series and DataFrame from various inputs.
10.	Import any CSV file to Pandas DataFrame and perform the following: (a) Visualize the first and last 10 records (b) Get the shape, index and column details (c) Select/Delete the records(rows)/columns based on conditions. (d) Perform ranking and sorting operations. (e) Do required statistical operations on the given columns. (f) Find the count and uniqueness of the given categorical values. (g) Rename single/multiple columns.
11.	Import any CSV file to Pandas DataFrame and perform the following: (a) Handle missing data by detecting and dropping/ filling missing values. (b) Transform data using apply() and map() method. (c) Detect and filter outliers. (d) Perform Vectorized String operations on Pandas Series. (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

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TY - DoT - 33/73

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to computing and Problem Solving with Python	Jeeva Jose and SojanLal	Khanna Book Publishing Co. (P) Ltd	1	2016
02	Programming Python	Mark Lutz	O'reilly	2	2001
03	Introduction to Programming using Python"	Y. Daniel Liang	Pearson	--	2012
04	Python Data Science Handbook: Essential Tools for Working with Data	JakeVanderPlas	O'Reilly	--	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Core Python Programming	Wesley J. Chun	Prentice Hall	--	2006
2	Learning Python	Mark Lutz,	O'reilly	4th	2009

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TY - IoT - 34/73

ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY
ASHTA
(An Autonomous Institute with NAAC A++ Grade)
Department of Computer Science and Engineering
(Internet of Things and Cyber Security Including Blockchain Technology)

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	**0ICPR357- Industrial Training/Internship**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/0
Credits	1
Evaluation Scheme: ESE	50

Activity:
Students should undergo industrial/ Internship activity in the 4th semester vacation period The assessment will be carried out during the 5th semester

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T4 - IoT - 35/73

Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code & Course Title	**Value Added Course 5**
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme:	Audit

Course Outcomes (COs):

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

VAC_1	**Solve** problems based on Vedic Mathematics, Calendar, Average, Age
VAC_2	**Solve** problems based on Speed Time distance and equations
VAC_3	**Solve** problems based on Blood Relations, Directions, Time Rate Work, Pipes and Tanks, Percentage, Profit and Loss
VAC_4	**Solve** Problems based on Spot the Error and Jumbled Para

Course Contents:

Unit No	Unit Name	Contact Hours
Unit 1	Vedic Mathematics, Calendar national problem, agriculture, traffic, social perspective, disaster recovery, innovative center for cross multi	2
Unit 2	Average, Ages	2
Unit 3	Speed Time Distance, Equations	2
Unit 4	Blood Relations, Directions, Time Rate Work, Pipes and Tanks	3
Unit 5	Percentage, Profit and Loss	2
Unit 6	Spot the Error, Jumbled Para	2
	Self-Study Module	

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
3	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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TY - IoT - 37/73

ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY
ASHTA
(An Autonomous Institute with NAAC A++ Grade)
Department of Computer Science and Engineering
(Internet of Things and Cyber Security Including Blockchain Technology)

Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICOE307- **Introduction to Blockchain**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs):

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

0ICOE307_1	**Explain** the basic concepts of Blockchain Technology (K1)
0ICOE307_2	**Use** Bitcoin and Ethereum protocol – to lay down the foundation for developing distributed applications and smart contracts (K2)
0ICOE307_3	**Apply** immutable distributed ledger and trust model for real time applications (K3)
0ICOE307_4	**Illustrate** the essential components of a Blockchain platform (K4)
0ICOE307_5	**Evaluate** the different types of consensus algorithms (K5)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Introduction to DLT and Blockchain** Distributed Ledger Technologies (DLTs) Introduction, Types of Blockchains, Blockchain: Origin, Phases, Components, Block in a Blockchain: Structure of a Block, Block, Header Hash and Block Height, The Genesis Block, Linking Blocks in the Blockchain, Merkle Tree.	6
Unit 2	**Consensus and Mining** What is Bitcoin and the history of Bitcoin, Bitcoin Transactions, Bitcoin Concepts: keys, addresses and wallets, Bitcoin Transactions, validation of transactions, PoW consensus Bitcoin Network: Peer-to-Peer Network Architecture, Node Types and Roles, Incentive based Engineering, The Extended Bitcoin Network, Bitcoin Relay Networks, Network Discovery, Full Nodes, Exchanging "Inventory", Simplified Payment Verification (SPV) Nodes, SPV Nodes and Privacy, Transaction Pools, Blockchain Forks.	8

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Unit 3	**Permissionless Blockchain:Ethereum** Components, Architecture of Ethereum, Miner and mining node, Ethereum virtual machine, Ether, Gas, Transactions, Accounts, Patricia Merkle Tree, Swarm, Whisper and IPFS, Ethash, End to end transaction in Ethereum, Smart Contracts: Smart Contract programming using solidity, Metamask (Ethereum Wallet), Setting up development environment, Use cases of Smart Contract, Smart Contracts: Opportunities and Risk. Smart Contract Deployment: Introduction to Truffle, Use of Remix and test networks for deployment	7
Unit 4	**Permissioned Blockchain :Hyperledger Fabric** Introduction to Framework, Tools and Architecture of Hyperledger Fabric Blockchain. Components: Certificate Authority, Nodes, Chain codes, Channels, Consensus: Solo, Kafka, RAFT,Designing Hyperledger Blockchain.	8
Unit 5	**Crypto assets and Cryptocurrencies** ERC20 and ERC721 Tokens, comparison between ERC20 & ERC721, ICO, STO, Different Crypto currencies	6
Unit 6	**Blockchain Applications & case studies** Blockchain in IoT, AI , Cyber Security, Applications of Blockchain in various domains Education, Energy, Healthcare, realestate, logistics, supply chain	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mastering Bitcoin, PROGRAMMING THE OPEN BLOCKCHAIN	Andreas M. Antonopoulos	O'Reilly Media, Inc	2nd	2017
2	Mastering Ethereum, Building Smart Contract and Dapp	Andreas M. Antonopoulos Dr. Gavin Wood	O'Reilly Media, Inc	--	--
3	Blockchain Technology	Chandramouli Subramanian, Asha A George, Abhillash K. A and Meena Karthikeyen	Universities press	--	--

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4	Hyperledger Fabric In-Depth: Learn, Build and Deploy Blockchain Applications Using Hyperledger Fabric	Ashwani Kumar	BPB publications	--	--
5	Solidity Programming Essentials	Ritesh Modi,	Packet publication	--	--
6	Cryptoassets: The Innovative Investor's Guide to Bitcoin and Beyond	Chris Burniske & Jack Tatar	--	--	--

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mastering Blockchain	Imran Bashir	Packt Publishing	--	--
2	Mastering Bitcoin Unlocking Digital Cryptocurrencies,	Andreas M. Antonopoulos,	O'Reilly Media	--	--
3	Blockchain Technology: Concepts and Applications	Kumar Saurabh and Ashutosh Saxena	Wiley	--	--
4	Mastering Bitcoin Unlocking Digital Cryptocurrencies	Andreas M. Antonopoulos	O'Reilly Media	--	--

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICOE308- **Cyber Crimes and Security**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0ICOE308_1	**Understand** the knowledge to implement various security attacks. (K1)
0ICOE308_2	**Explore** the ideas in various ways to trace an attacker. (K2)
0ICOE308_3	**Enhance** the practical exposure to forensic tools. (K3)
0ICOE308_4	**Distinguish** the various forensics principles and methods (K4)
0ICOE308_5	**Design and develop** the enterprise level security system for computer networks. (K5)

Course Contents:		
Unit No.	**Unit Name**	**Contact Hours**
Unit 1	**Introduction to IT laws & Cyber Crimes** Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security	7
Unit 2	**Legal and Ethical Principles** Introduction to Forensics – The Investigative Process – Code of Ethics, Ethics of Investigations, Evidence Management – Collection, Transport, Storage, access control, disposition	6
Unit 3	**Forensic Science** Principles and Methods – Scientific approach to Forensics, Identification and Classification of Evidence, Location of Evidence, Recovering Data, Media File Forensic Steps, Forensic Analysis – Planning, Case Notes and Reports, Quality Control.	8
Unit 4	**Digital Forensics** Hardware Forensics – Hidden File and Anti- forensics - Network Forensics – Virtual Systems - Mobile Forensics Digital Watermarking Protocols: A Buyer-Seller Watermarking Protocol, an Efficient and Anonymous Buyer-	8

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	Seller Watermarking Protocol, Extensions of Watermarking Protocols, Protocols for Secure Computation	
Unit 5	**Application Forensics, Tools and Report Writing** Application Forensics, Email and Social Media Investigations, Cloud Forensics, Current Digital Forensic Tools, Report Writing for Investigations	6
Unit 6	**Security in Evolving Technology** Biometrics, Mobile Computing and Hardening on android and ios, IoT Security, Web server configuration and Security, Basic security for HTTP Applications and Services, Basic Security for Web services like SOAP,REST etc. Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Computer Forensics and Investigations	Bill Nelson, Christopher Steuart, Amelia Philips	Delmar Cengage Learning	5th	2015
2	Certified Cyber Forensics Professional Certification	Chuck Eastom	McGraw Hill	--	2017
3	Computer Forensics: Computer Crime Scene Investigation	John R.Vacca	Laxmi Publications	--	2015

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Computer Forensics and Cyber Crime: An Introduction	MarjieT.Britz	Prentice Hall	3rd	2013
2	Digital Forensics for Network, Internet, and Cloud Computing A forensic evidence guide for moving targets and data	Clint P Garrison	Syngress Publishing, Inc	--	2010

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TY-IoT-42/73

Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPC309- **Data Encryption, Steganography and Digital Watermarking**
Prerequisite/s	0ICPC304 – Information Theory for Cyber Security
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0ICPC309_1	**Explain** the various cryptography algorithms with different key distribution methods (K1)
0ICPC309_2	**Understand** the concept of information hiding (K2)
0ICPC309_3	**Survey** the current techniques of steganography and learn how to detect and extract hidden information (K3)
0ICPC309_4	**Implement** the different information hiding techniques (K4)
0ICPC309_5	**Demonstrate** the watermarking techniques through examples (K5)

Course Contents:		
Unit No.	**Unit Name**	**Contact Hours**
Unit 1	**Introduction** – Applications and Properties: Applications – Properties – Evaluating watermarking systems, Models of Watermarking: Communication based watermarking – Geometric models of watermarking – Modelling watermarks detection by correlation, Watermarking with side information: Informed embedding – informed coding – dirty paper codes,	7
Unit 2	**Properties of Watermarking and Steganography** Properties of Watermarking Systems, Embedding Effectiveness, Fidelity, Data Payload, Blindor Informed Detection, False Positive Rate, Robustness, Security, Cipher and Watermark Keys, Modification and Multiple Watermarks, Cost, Evaluating Watermarking Systems, The Notion of "Best", Benchmarking, Scope of Testing. **Properties of Steganographic and Steganalysis Systems:** Embedding , Steganographic Capacity, Embedding Capacity, Embedding	7

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	Efficiency, and Data Payload, Blind or Informed Extraction, Blind or Targeted Steganalysis, Statistical Undetectability, False Alarm Rate, Robustness, Security, StegoKey, Evaluating and Testing Steganographic Systems.	
Unit 3	**Models of Watermarking:** Notation, Communications, Components of Communications Systems, Classes of Transmission Channels, Secure Transmission, Communication-BasedModels of Watermarking, Basic Model, Watermarking as Communications with Side Information at the Transmitter, Watermarking as Multiplexed Communications, Geometric Models of Watermarking, Distributions and Regions in Media Space, Marking Spaces, Modeling Watermark Detection by Correlation, Linear Correlation, Normalized Correlation, Correlation Coefficient	7
Unit 4	**Steganography:** Steganographic Communication, The Channel, The Building Blocks, Notation and Terminology, Information-Theoretic Foundations of Steganography, Cachin's Definition of Steganographic Security, Practical Steganographic Methods, Statistics Preserving Steganography, Model-Based Steganography, Masking Embedding as Natural Processing, Minimizing the Embedding Impact, Matrix Embedding, Nonshared Selection Rule	8
Unit 5	**Steganalysis :** Steganalysis Scenarios, Detection, Forensic Steganalysis, The Influence of the Cover Work on Steganalysis, Some Significant Steganalysis Algorithms, LSB Embedding and the Histogram Attack, Sample Pairs Analysis, Blind Steganalysis of JPEG Images Using Calibration, Blind Steganalysis in the Spatial Domain	6
Unit 6	**Applications :** Applications of Watermarking, Broadcast Monitoring, Owner Identification,Proof of Ownership, Transaction Tracking, Content Authentication, Copy Control, Device Control, Legacy Enhancement. Applications of Steganography, Steganography for Dissidents, Steganography for Criminals	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Digital Watermarking: Principles and Practice	Ingemar Cox, Matthew Miller, Jeffrey Bloom, Mathew Miller	Morgan Kaufmann Series in Multimedia Information and Systems	--	2008

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2	Digital Watermarking and Steganography	Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, JessicaFridrich, and Ton Kalker	Morgan Kaufmann Publishers	2nd	2008
3	Digital Watermarking and Steganography: Fundamentals and Techniques	Frank Y. Shih	CRC Press, USA	--	2007

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Digital Watermarking and Steganography: Fundamentals and Techniques	Juergen Seitz	Pearson Education	--	2007
2	Digital Watermarking for Digital Media	Juergen Seitz	IGI Global	--	2005

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TY - IoT - 45/73

Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	**0ICPC310 - Embedded System for IoT**
Prerequisite/s	0ICPC207 - Microprocessor and Microcontroller
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	3
Evaluation Scheme: ISE-I /MSE/ISE-II/ ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC310_1	**Understand** basic components and building blocks of Internet of Things (K2)
0ICPC310_2	**Explain** the real time embedded system and its components (K2)
0ICPC310_3	**Apply** skills to conduct interfacing of embedded boards with components, actuators and sensors. (K3)
0ICPC310_4	**Analyze** the real-world signals and perform remote process monitoring utilizing the concept of IoT (K4)
0ICPC310_5	**Design** and implement IoT enabled embedded control strategy for a given application. (K5)

Course Contents

Unit No.	Unit Name	Contact Hours
Unit-1	**Introduction :** Purpose and requirement specification, IoT level specification, Functional view specification, Operational view specification, Device and component integration, Pillars of Embedded IoT and Physical Devices: The internet of devices.	7
Unit-2	**Design of Embedded Systems:** Common Sensors, Actuators, Embedded Processors, Memory Architectures, Software architecture.	6
Unit-3	**Inputs and Outputs:** Digital Inputs and Outputs, Digital Inputs, Digital Outputs, BusIn, BusOut, and BusInOut, Analog Inputs and Outputs, Analog Inputs, Analog Outputs, Pulse Width Modulation (PWM), Accelerometer and Magnetometer, SD Card	8

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Unit-4	**IoT Enabling Technologies:** Communications, RFID and NFC (Near-Field Communication), Bluetooth Low Energy (BLE), LiFi, 6LowPAN, ZigBee, Z-Wave, LoRa, Protocols, HTTP, WebSocket, MQTT, CoAP, XMPP, Node-RED, Platforms.	8
Unit-5	**Web of Things :** Web of Things versus Internet of Things, Two Pillars of the Web, Architecture Standardization for WoT, Platform Middleware for WoT.	6
Unit-6	**Cloud Offerings and IoT Case Studies:** Cloud of Things. IoT Physical Servers,Cloud Offerings and IoT Case Studies: Introduction to Cloud Storage Models, Communication API.	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Internet of Things	RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan	John Wiley and Sons	-	-
2	Embedded Software for the IoT	Klaus Elk	-	-	-
3	Designing Embedded Systems and the Internet of Things (IoT) with the ARM Mbed	Perry Xiao	-	-	-
4	Designing Connected Products	Elizabeth Gootman et. al	Shroff Publisher/O'Reilly	-	-

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Embedded Systems Architecture	Tammy Noergaard	Elsevier	1	2016
2	Embedded system Design using C8051	Han-Way Huang	CENAGE Learning	1	2019
3	Real-Time systems Theory and Practice	Rajib Mall	Person Education	2	2007
4	Industrial Internet of Things: Cybermanufacturing Systems	Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat	Springer,	1	2017

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPC311- **Software Engineering**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	3/1/0
Credits	4
Evaluation Scheme: ISE I/ MSE/ ISE II/ ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC311_1	**Identify** appropriate standards for a given process to maintain software reliability and quality using quality standards like ISO 9000, CMM etc. (K2)
0ICPC311_2	**Test** the functioning of a given program to check correctness of code using test cases. (K3)
0ICPC311_3	**Design** a solution to solve a given problem using software engineering models. (K4)
0ICPC311_4	**Develop** a software system design to solve a given problem using structured or function-oriented design methodology. (K4)
0ICPC311_5	**Build** software requirement specifications and project plan to solve a given problem through analyzing the problem statement. (K5)

Course Contents:

Unit No.	Unit Name	Contact Hrs
Unit 1	**Software Processes and Agile Methodology** Software Process, Software Development Process Models, Agile software development - Agile methods, Plan-driven and agile development, Extreme programming, Scaling agile methods	8
Unit 2	**Software Requirements Analysis and Specification** Software Requirement, Problem Analysis, Requirements Specification, Functional Specification with Use Cases, validation.	6

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Unit 3	**Planning a Software Project** Process Planning, Effort Estimation, Project Scheduling and Staffing, Software Configuration Management Plan, Quality Plan, Risk Analysis & Management.	7
Unit 4	**Function Oriented Design** Design Principles, Module-Level Concepts, Design Notation and Specification, Structured Design Methodology	7
Unit 5	**Coding and Testing** Programming Principles and Guidelines, Coding Process, Testing Fundamentals, Black-Box Testing, White-Box Testing.	7
Unit 6	**Software Reliability and Quality Management** Software Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI CMM	7

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	An integrated approach to S/W engineering	Pankaj Jalote	Narosa Publishers	3rd	2011
2	Fundamentals of Software Engineering	Rajib Mall	PHI	3rd	2009
3	Software Engineering	Jawadekar W.S.	TMGH	7th	2007

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Software Engineering	Ian Sommerville	Pearson	10th	2016
2	Software Engineering: Practitioner's Approach	Roger S. Pressman	McGraw Hill	7th	2010
3	Software Engineering principles and practices	RohitKhuran	Vikas Publishing House Pvt. ltd	2nd	2010

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	**0ICPE312- Professional Elective – III (Wireless Sensor Networks Laboratory)**
Prerequisite/s	0ICPC108 - Computer Networks
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	3
Evaluation Scheme: ISE-I /MSE/ISE-II/ ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE312_1	**Understand: The** architecture challenges and technologies for wireless networks. (K2)
0ICPE312_2	**Explain:** Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks (K3)
0ICPE312_3	**Apply:** the design principles of WSN architectures and operating systems for simulating environment situations. (K3)
0ICPE312_4	**Analysis: Technical** knowledge about how to build and deploying a WSN with various critical parameters (K4)
0ICPE312_5	**Demonstrate:** the concept of programming in the WSN environment. (K5)

Course Contents

Unit No.	Unit Name	Contact Hrs
Unit-1	**Introduction**: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.	8
Unit-2	**Adhoc/sensor networks:** Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.	7
Unit-3	**MAC Protocols :** Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.	6

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Unit-4	**Routing Protocols:** Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols.	7
Unit-5	**QoS and Energy Management :** Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.	6
Unit-6	**Sensor Network Platforms and Tools:** Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node -level software platforms, Node- level Simulators, State- centric programming.	8

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Protocols And Architectures for Wireless Sensor Networks	Holger Karl & Andreas Willig	John Wiley	2	2005
2	Wireless Sensor Networks An Information Processing Approach	Feng Zhao & Leonidas J.Guibas	Elsevier	3	2007
3	Fundamentals of Wireless Sensor Networks Theory and Practice	Waltenegus Dargie , Christian Poellabauer	John Wiley & Sons Publications	2	2011
4	AdHoc Wireless networks	C. Siva Ram Murthy, and B. S. Manoj,	Pearson Education	1	2008

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Wireless sensor networks	Feng Zhao and Leonides Guibas	Elsevier publication	1	2004
2	Jochen Schiller	Mobile Communications	Pearson Education	2	2003
3	Wireless Communications and Networks	William Stallings	Pearson Education	2	2004

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	**0ICPE313 - Professional Elective – III (Database Security)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	3
Evaluation Scheme: ISE-I /MSE/ISE-II/ ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE313_1	**Identify** security threats in database systems. (K2)
0ICPE313_2	**Avoid** unauthorized data observation and modification. (K3)
0ICPE313_3	**Ensure** data confidentiality and prove that the data integrity is preserved & only authorized user has access to the data. (K3)
0ICPE313_4	**Solve** Complex Problems in a Team of database works. (K3)
0ICPE313_5	**Design** and Implement secure database systems. (K4)

Course Contents

Unit No.	Unit Name	Contact Hrs
Unit-1	**Database Security** Introduction to database security – Security in Information Technology - importance of data – database review - identity theft – Levels of security -Human level: Corrupt/careless User, Network/User Interface, Database application program, Database system, Operating System, Physical level	8
Unit-2	**Authentication and Authorization** Passwords, Profiles, Privileges and Roles - Authentication – operating system authentication, database authentication, Network or third-party authentication, Database vector password policies - Authorization – User Account authorization, - Database/Application Security - Limitations of SQL Authorization – Access Control in Application Layer - Oracle Virtual Private Database – Privacy.	7
Unit-3	**Application Vulnerabilities** Application Vulnerabilities - Application Security - OWASP Top 10 Web Security Vulnerabilities – Un validated input, Broken access control, Broken account/session	6

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	management, Cross-site scripting (XSS) flaws, Buffer overflows- SQL Injection flaws, Improper error handling, Insecure storage, Denial-of-service, Insecure configuration management.	
Unit-4	**Securing Database to Database Communications** Monitor and limit outbound communications – secure database links – protect link usernames and passwords – monitor usage of database links – secure replication mechanisms - map and secure all data sources and sinks. Trojans – four types of database Trojans.	7
Unit-5	**Encrypting and Auditing the Data** Encrypting data in transit – encrypting data at rest – auditing architectures – audit trail – architectures of external audit systems - archive auditing information – secure auditing information – audit the audit system.	6
Unit-6	**Security Software Design:** Methodological approach to Security software design, Secure operating system design, Secure DBMS design security, Packages database security design, Statistical database protection & Intrusion detection systems	8

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Database Security and Auditing	Hassan A. Afyouni	India Edition	2	2009
2	Database Security	Castano	Pearson Education	2	2012
3	Database Security	Silvana Castano	Addison-Wesley	3	2010
4	Database System Concepts	Silberschatz, Korth and Sudarshan	PHI	6	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Database security	Alfred basta, Melissa zgola	CENGAGE learning	1	2008
2	Database Security	Alfred Basta, Melissa Zgola, Dana Bullaboy, Thomas L. Witlock SR	google books	--	2011

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	**0ICPE314 - Professional Elective – III (Smart Contracts and Solidity)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	3
Evaluation Scheme: ISE-I /MSE/ISE-II/ ESE	10/30/10/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE314_1	**Understand** the working and importance of smart contracts (K1)
0ICPE314_2	**Learn** the solidity language required for coding Ethereum smart contracts (K2)
0ICPE314_3	**Apply** various Ethereum protocols for real time applications (K3)
0ICPE314_4	**Analyze** the various smart contracts development environments (K4)
0ICPE314_5	**Create** and deploy a DApp on a Ethereum test network (K6)

Course Contents

Unit No.	Unit Name	Contact Hours
Unit-1	**Introduction to Ethereum**, concepts of Smart Contracts, Dapps, And DAOs, What is Ethereum Virtual Machine (EVM), Ethereum Technology Overview, Architectural Overview, Ethereum Block chain Platform, Current and Potential Uses of Ethereum.	8
Unit-2	**Introduction to Programming** Smart Contracts, A Simple Smart Contract, Account Types, Gas, and Transactions, Accessing Contracts and Transactions, Mix, Dapps, Developer Tools, Ethereum Tests,Web3 Base Layer Services, Installing, Building, Testing, & Deploying Ethereum nodes.	7
Unit-3	**Introduction to Solidity Programming**, Layout of a Solidity Source File, Structure of a Contract, Types, Units and Globally Available Variables, Input Parameters and Output Parameters, Control Structures, Function Calls, Creating Contracts via new, Order of Evaluation of Expressions, Assignment, Scoping and Declarations, Error handling: Assert, Require, Revert and Exceptions.	6

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Unit-4	**Solidity Programming** –Contracts, Creating Contracts, Visibility and Getters, Function Modifiers, Constant State Variables, Functions, Inheritance, Abstract Contracts, Interfaces, Libraries.	7
Unit-5	**Introduction to Decentralized Apps** (Dapps),Decentralized Application Architecture, Connecting to the Block chain and Smart Contract, Decentralized Apps – Coding Details, Voting Contract and App,.	7
Unit-6	**Blind Auction Contract and App**, Coding Style Guide, Design Patterns, Coding Style Guide, Code Layout, Naming Conventions, Common Design Patterns, Withdrawal from Contracts, State Machine	7

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mastering Ethereum" O"Reilly	Andreas M. Antonopoulos, Dr.Gavin wood	Media Inc	2	2019
2	Blockchain Technology: Cryptocurrency and Applications	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan	Oxford University Press	1	2019
3	The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Josh Thompson	Create Space Independent Publishing Platform	1	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Blockchain Technology: Cryptocurrency and Applications	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan	Oxford University Press	1	2019
2	The Blockchain for Beginnings, Guild to Blockchain	Josh Thompson	Create Space Independent	1	2017

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
	Technology and Blockchain Programming		Publishing Platform		

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	**0ICHS315- Universal Human Values-II**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	2/0/0
Credits	2
Evaluation Scheme: ISE I/ ISE II	25/25

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICHS315_1	**Explore** holistic vision of life - themselves and their surroundings
0ICHS315_2	**Develop** competence and capabilities for maintaining Health and Hygiene.
0ICHS315_3	**Analyze** various problems in life, family, Society and in handling problems with Sustainable Solutions.
0ICHS315_4	**Apply** values to their own self in different day-to-day settings in real life and in handling problems with sustainable solutions.
0ICHS315_5	**Adopt** the value of appreciation and aspiration for excellence and gratitude for all.

Course Contents:

Unit No.	Unit Name	Contact Hrs
Unit 1	**Introduction to Human Value:** Right Understanding; Relationship and Physical Facility; Understanding Value Education; Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity -the Basic Human Aspiration-Current Scenario and Method to Fulfill the Basic Human Aspirations	5
Unit 2	**Harmony in the Human Being:** Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.	5

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Unit 3	**Harmony in the Family and Society and Nature:** Harmony in the Family – the Basic Unit of Human Interaction; 'Trust' – the Foundational Value in Relationship; 'Respect' – as the Right Evaluation: Other Feelings, Justice in Human-to-Human Relationship;	4
Unit 4	**Understanding Harmony in the Society**; Vision for the Universal Human Order; Understanding Harmony in the Nature; Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature.	5
Unit 5	**Implications of the Holistic Understanding** – a Look at Professional Ethics Definitiveness of (Ethical) Human Conduct; A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order;	5
Unit 6	**Competence in Professional Ethics**; Holistic Technologies, Production Systems and Management Models; Strategies for Transition towards Value-based Life and Profession	4

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books	2	2019
2	A Foundation Coursein Human Values and Professional Ethics	RRGaur, R sthana,G P Bagaria	Excel Books	2	2019
3	Human Values	A.N Tripathy	New Age International	2nd	2006

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Indian Ethos and Modern Management: Amalgam of the Best of the Ideas from the East and the West	B.L. Bajpai	New Royal Book	1st	2004

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2	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria	Excel Books	3rd	2010
3	An Introduction to Ethics	William Lilly	Allied	1st	1967
4	Small Is Beautiful	E. FSchumacher.	Hartley & Marks	1st	1999

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPC358- **Data Encryption, Steganography and Digital Watermarking Laboratory**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE / ESE	25/ 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC358_1	**Describe** watermarking and steganography fundamental concepts and principles (K2)
0ICPC358_2	**Identify** and assess different types of data hiding techniques in various image formats like GIF, BMP etc., and various data hiding methods like LSB, EzStego, OutGuess, and F5 (K3)
0ICPC358_3	**Analyze** the block codes and its various usage for covert communication (K4)
0ICPC358_4	**Demonstrate** the use of watermarking for copyright protection and steganography for secret communication in various digital media (K5)
0ICPC358_5	**Design** and implement efficient data hiding methods (K6)

Exp. No.	Experiment List
1.	Conceal the data that is compressed and hidden within another file
2.	Conceal raw files within BMP, GIF and WAV files using S tools
3.	Hide multiple files in one container using S tools
4.	Produce some discernible change in the file size, statistics or bot using steganographic techniques
5.	Discovering and rendering covert messages using Steganalysis
6.	Create a digital watermarking on an image and audio clip.
7.	Develop a broadcast system for identifying data that is added to the video/audio signal prior to transmission.
8.	Demonstrate content authentication using Digital water marking technique
9.	Detect and extract watermark from an image using M-Sequence Generator Technique
10.	Decode the watermarked image using DWT (Discrete Wavelet Transform)

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Digital Watermarking: Principles and Practice	Ingemar Cox, Matthew Miller, Jeffrey Bloom, Mathew Miller	Morgan Kaufmann Series in Multimedia Information and Systems	--	2008
2	Digital Watermarking and Steganography	Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, JessicaFridrich, and Ton Kalker	Morgan Kaufmann Publishers	2nd	2008
3	Digital Watermarking and Steganography: Fundamentals and Techniques	Frank Y. Shih	CRC Press, USA	--	2007

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Digital Watermarking and Steganography: Fundamentals and Techniques	Juergen Seitz	Pearson Education	--	2007
2	Digital Watermarking for Digital Media	Juergen Seitz	IGI Global	--	2005

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPE359- **Professional Elective Laboratory –III (Wireless Sensor Networks Laboratory)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE359_1	**Understand: The** architecture challenges and technologies for wireless networks. (K^2)
0ICPE359_2	**Explain:** Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks (K^3)
0ICPE359_3	**Apply:** the design principles of WSN architectures and operating systems for simulating environment situations. (K^3)
0ICPE359_4	**Analysis: T**echnical knowledge about how to build and deploying a WSN with various critical parameters (K^4)
0ICPE359_5	**Demonstrate:** the concept of programming in the WSN environment. (K^2)

Exp. No.	**Experiment List**
Implement Experiment No: 1 to 5 using NS2/NS3 Simulation Tool. Implement Experiment No: 6 to 8 using MATLAB Tool	
1.	Create a sample wireless topology using Simulation Tool
2.	Create a mobile Ad-hoc network using a Simulation Tool.
3.	Implement an Ad-hoc On-demand Distance Vector protocol using Simulation Tool
4.	Implement a Transmission Control Protocol using Simulation Tool
5.	Implement a Low Energy Adaptive Hierarchy protocol using Simulation Tool
6.	Implement a Power Efficient Gathering in Sensor Information System using a Simulation Tool.
7.	Implement a Sensor Protocol for Information via Negotiation (SPIN) using Simulation Tool
8.	Implement a Power Efficient and Delay Aware MAC protocol using a Simulation Tool.
9.	Implement a Predictive Wake-up MAC protocol using a Simulation Tool.
10.	Implement a Scheduling based protocol for WSNs using Simulation Tool

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Advanced Network Simulation	Dr. Anil kumar	Packt	2	2023
2	Wireless Sensor Networks An Information Processing Approach	Feng Zhao & Leonidas J.Guibas	Elsevier	3	2007
3	Fundamentals of Wireless Sensor Networks Theory and Practice	Waltenegus Dargie , Christian Poellabauer	John Wiley & Sons Publications	2	2011
4	AdHoc Wireless networks	C. Siva Ram Murthy, and B. S. Manoj,	Pearson Education	1	2008

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Network Simulation	Richard M. Fujimoto , George F. Riley , Kalyan S. Perumalla	Elsevier publication	3	2018
2	Jochen Schiller	Mobile Communications	Pearson Education	2	2003
3	Wireless Communications and Networks	William Stallings	Pearson Education	2	2004

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TY - IoT - 63/73

Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPE360- **Professional Elective Laboratory –III (Database Security Laboratory)**
Prerequisite/s	0ICPC206 -Database Management System
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE360_1	**Identify** security threats in database systems. (K2)
0ICPE360_2	**Avoid** unauthorized data observation and modification. (K3)
0ICPE360_3	**Ensure** data confidentiality and prove that the data integrity is preserved & only authorized user has access to the data. (K3)
0ICPE360_4	**Solve** Complex Problems in a Team of database works. (K3)
0ICPE360_5	**Design** and Implement secure database systems. (K4)

Exp. No.	Experiment List
1.	Study of Security Concepts Discussion & Security Architecture.
2.	Application of User Creation and Authentication
3.	Administration of Profiles, Passwords, Privileges, and Roles
4.	Study of Security Models for Database Applications
5.	Implementation of Virtual Private Databases
6.	Study and Implementation of Database Auditing Models
7.	Demonstration of Application and Data Auditing
8.	Security and Auditing Project Cases

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Database Security and Auditing	Hassan A. Afyouni	CENGAGE Learning	--	2009

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2	Database Security	Castano	Pearson Edition	2nd	--

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Database security	alfred basta, melissa zgola	CENGAGE Learning	Indian Edition	--

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPE361- **Professional Elective Laboratory –III (Smart Contracts and Solidity Laboratory)**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPE361_1	**Understand** the working and importance of smart contracts(K1)
0ICPE361_2	**Learn** the solidity language required for coding Ethereum smart contracts(K2)
0ICPE361_3	**Deploy** Truffle and Ganache framework for project creation and compilation(K4)
0ICPE361_4	**Evaluate** the different Ethereum protocols for real time applications(K5)
0ICPE361_5	**Create** and deploy a DApp on a Ethereum test network (K6)

Exp. No.	Experiment List
1.	Study of bitcoin and P2P Payment gateway.
2.	Study of Hyperledger Architecture and its features.
3.	Create a simple Ethereum network model.
4.	Write a simple chaincode API model
5.	Generate the crypto material for the various participants in the bootstrapping network
6.	Generate the genesis block for the Orderer node and start ordering service (solo node) in the bootstrapping network
7.	Generated the configuration transaction block to create a new channel in the bootstrapping network.
8.	Sign the configuration block and create the new channel
9.	Make peers of all the organizations join the channel that we created in the bootstrapping network
10.	Study of Hyperledger Explorer and Hyperledger Composer Solution

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Mastering Ethereum" O"Reilly	Andreas M. Antonopoulos, Dr.Gavin wood	Media Inc	2	2019
2	Blockchain Technology: Cryptocurrency and Applications	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan	Oxford University Press	1	2019
3	The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Josh Thompson	Create Space Independent Publishing Platform	1	2017

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Blockchain Technology: Cryptocurrency and Applications	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan	Oxford University Press	1	2019
2	The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Josh Thompson	Create Space Independent Publishing Platform	1	2017

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPC362- **Embedded System for IoT Laboratory**
Prerequisite/s	0ICPC207 - Microprocessor and Microcontroller
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme: ISE / ESE	50/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPC362_1	**Understand** basic components and building blocks of Internet of Things (K2)
0ICPC362_2	**Explain** the real time embedded system and its components (K2)
0ICPC362_3	**Apply** skills to conduct interfacing of embedded boards with components, actuators and sensors. (K3)
0ICPC362_4	**Analyze** the real world signals and perform remote process monitoring utilizing the concept of IoT (K4)
0ICPC362_5	**Design and implement** IoT enabled embedded control strategy for a given application. (K5)

Exp.No.	Experiment List
1	Installation of IoT Tool Chain.
2	Study and Develop a program based on interfacing with temperature sensor.
3	Study and Develop a program based on interfacing with Ultrasonic sensor.
4	Study and Develop a program based on interfacing with Optical sensor.
5	Study and Develop a program based on interfacing with PIR sensor.
6	Study and Develop a program based on interfacing with Output Peripheral such as LED's.
7	Study and Develop a program based on interfacing with Output Peripheral such as 7-segment Display
8	Study and develop a program based on interfacing with actuator such as stepper motor.
9	Study and develop a program based on interfacing with actuator such as DC motor.
10	Implementation of Inbuilt Touch Sensing, Blue tooth, and Wi-Fi communication

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Embedded system-Architecture, Programming, Design	Rajkamal	TataMcgraw Hill	2	2011.
2	Embedded System Design	Peckol	John Wiley	3	2010
3	Embedded System Foundations of Cyber Physical Systems.	Peter Mardwel	Springer	2	2008
4	The Internet of Things Enabling Technologies	Pethuru Raj and Anupama C. Raman	CRC Press	1	2015

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Embedded Systems Architecture	Tammy Noergaard	Elsevier	1	2006
2	Embedded system Design using C8051	Han-Way Huang	CENAGE Learning	1	2009
3	Real-Time systems Theory and Practice	Rajib Mall	Person Education	2	2007
4	Industrial Internet of Things: Cybermanufacturing Systems	Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat	Springer,	1	2017

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	0ICPR363- **Minor Project**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE / ESE	25 / 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
0ICPR363_1	**Interpret** the problem statement of a given system, identify need, analyze the problem and design ER model for the the system as well as prepare the relational database schema for the system by identifying integrity constraints.
0ICPR363_2	**Demonstrate** installation and configuration of Oracle /MySQL / SQL Server etc.
0ICPR363_3	**Apply** the SQL queries for database definition and manipulation, use PL/SQL constructs.
0ICPR363_4	**Experiment** with indexing, hashing techniques, transaction processing, concurrency control and security techniques.
0ICPR363_5	**Follow** professional and ethical principles during laboratory work in a team during performing laboratory activities.

Exp. No.	Experiment List
1.	Drawing an E-R Diagram for any organization.
2.	Converting E-R diagram into Relational Tables.
3.	Installation and Demonstration of DBMS Oracle / MySQL / SQL Server / PostgreSQL etc.
4.	Study and Implementation of Data Definition Language (DDL) Queries (e.g. create, alter and drop tables).
5.	Study and Implementation of Data Manipulation Language (DML) Queries (e.g. insert, delete, update and select statements).
6.	Study and Implementation of Basic SQL SELECT statement for displaying / extracting data from single table or multiple tables.
7.	Study and implementation of SQL constructs for aggregating data, use of group by, having clauses.
8.	Study and implementation of nested sub-queries, complex queries, views and Joins.
9.	Study and Implementation of Triggers.
10.	Study and Implementation of Functions and Stored Procedures.

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11.	Implementation of Database connectivity with object oriented language (Java).
12.	Few aspects of authorization such as creating and managing users, roles, granting and revoking of privileges etc.
13.	Creating Indices for the tables, implementing static hashing.
14.	Study of Transaction processing and concurrency control techniques.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	McGraw Hill Education	6th	2011
2	Database Systems- A practical approach to Design, Implementation and Management	Thomos Connolly, Carolyn Begg	Pearson Education.	4th	2009
3	Database Systems – Design, Implementation and Management	Rob & Coronel	Thomson Course Technology	5th	2008
4	Database Management Systems	Raghu Ram Krishnan	McGraw Hill	3rd	2002

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Fundamentals of Database Systems	Ramez Elmasri and Shamkant Navathe	Pearson Education	5th	2007
2	Database Systems: Design, Implementation and management	Peter Rof, Carlos Coronel	Cengage Learning	7th	2014
3	Principles of Database Systems	J. D. Ullaman	Galgotia publications	1st	2011
4	SQL: A Complete Reference	Alexis Leon, Mathews Leon	McGraw Hill Education	1st	2002

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code & Course Title	**Value Added Course 6**
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme:	Audit

Course Outcomes (COs) : The students will be able to:	
VAC6_1	**Solve** problems based on HCF, LCM, Interest, Clock, Cubes and Puzzles.
VAC6_2	**Solve** problems based on Coding and Decoding, Seating Arrangements and Venn diagrams.
VAC6_3	**Solve** problems based on Ratio Proportion, Partnership, Allegation, Divisibility and Number Theory
VAC6_4	**Demonstrate** presentations using concepts delivered on confidence building and time management skills.

Course Contents:

Unit No	**Unit Name**	**Contact Hours**
Unit 1	HCF LCM, Simple Interest, Compound Interest	4
Unit 2	Coding- Decoding, Seating Arrangement Venn Diagrams	6
Unit 3	Clocks, Cubes, Puzzles,	4
Unit 4	Ratio Proportion, Partnership	4
Unit 5	Confidence Building, Time Management	5
Unit 6	Allegation, Divisibility and Number Theory	5
	Self-Study Module	

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
3	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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