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)

Teaching and Evaluation Scheme

T. Y. B. Tech Semester V

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL					GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
1ICOE3**	Open Elective - I	3	-	-	3	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICPC301	Design and Analysis of Algorithms	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC302	Microcontrollers	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	100	40	200
1ICPC303	Smart Contracts and Solidity	3	-	2	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICIC304	Minor Course - II	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICHS305	Entrepreneurship	-	-	2	1	-	-	-	-	-	-	-	50	-	-	25	10	50
1ICPE3**	Professional Elective - I	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICEL309	Industrial Training/ Internship	-	-	-	1	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICCC310	Aptitude and Reasoning Part- III	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		17	0	10	23													800
	Total Contact Hours	27																

* External Examiner

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

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

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Open Elective Courses			
Sl.No	**Course Code**	**Course Category**	**Course Name**
1	2ILOE351	Health Care Management	Economics of Health and Education
2	2ILOE352	Business Marketing	Business to Business Marketing (B2B)
3	2ILOE353	Intellectual Property Rights	Patent Law for Engineers and Scientists
4	2ILOE354		Economics of Innovation
5	2ILOE355	Business Laws	E-Business
6	2ILOE356	Finance and Accounting	Management Accounting
7	2ILOE357	Banking and Insurance	Economics of Banking and Finance Markets
8	2ILOE358	Investment Management	Quantitative Investment Management
9	2ILOE359	Human Resource Management	Human Resource Development
10	2ILOE360	Business Management	Advanced Business Decision Support Systems
11	2ILOE361	Language	Introduction to Japanese Language and Culture - II
12	2ILOE362		German - I
13	2ILOE363	Retail and Channel Management	Operations and Supply Chain Management

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TY - IoT - ST - 03/06

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Teaching and Evaluation Scheme

T. Y. B. Tech Semester VI

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL					GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE	ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min				Max	Min			
1ILOE3**	Open Elective - II	3	-	-	3	50	20	-	-	-	50	20	-	-	-	-	-	50
1ICPC311	Compiler Design	2	-		2	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPC312	Data Encryption	3	-	2	4	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICIC313	Minor Course - III	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	100
1ICPE3**	Professional Elective - II	3	-	2	4	40	16	30	30	24	100	40	50	50*	20	100	40	200
1ICPC317	SDLC Laboratory	2	-	2	3	-	-	-	-	-	-	-	50	50*	20	100	40	100
1ICEL318	Mini Project	-	-	4	2	-	-	-	-	-	-	-	50	-	-	50	20	50
1ICCC319	Aptitude and Reasoning Part- IV	-	-	2	1	-	-	-	-	-	-	-	50	-	-	50	20	50
		16	**0**	**12**	**22**													**750**
	Total Contact Hours	**28**																

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Minor Course - III					
Course Code	**Course Name**	**L**	**T**	**P**	**Credits**
1ICIC313	Smart Sensors and Actuators	3	-	-	3

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

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Open Elective Courses			
Sl.No	**Course Code**	**Course Category**	**Course Name**
1	2ILOE351	Health Care Management	Economics of Health and Education
2	2ILOE352	Business Marketing	Business to Business Marketing (B2B)
3	2ILOE353	Intellectual Property Rights	Patent Law for Engineers and Scientists
4	2ILOE354		Economics of Innovation
5	2ILOE355	Business Laws	E-Business
6	2ILOE356	Finance and Accounting	Management Accounting
7	2ILOE357	Banking and Insurance	Economics of Banking and Finance Markets
8	2ILOE358	Investment Management	Quantitative Investment Management
9	2ILOE359	Human Resource Management	Human Resource Development
10	2ILOE360	Business Management	Advanced Business Decision Support Systems
11	2ILOE361	Language	Introduction to Japanese Language and Culture - II
12	2ILOE362		German - I
13	2ILOE363	Retail and Channel Management	Operations and Supply Chain Management

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TY – IOT – ST – 06/06

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Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	1ICPC301- **Design and Analysis of Algorithm**
Prerequisite/s	1ICPC202 – Data Structures
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICPC301_1	**Discuss** the fundamentals of algorithm design and analysis techniques. (K2)
1ICPC301_2	**Apply** knowledge of computing and mathematics to algorithm design. (K3)
1ICPC301_3	**Apply** and analyze graph traversal and Dynamic programming algorithmic approach. (K3)
1ICPC301_4	**Analyze** the various algorithm design techniques for a given problem. (K4)
1ICPC301_5	**Classify** computational problems into P, NP, NP-Hard and NP Complete. (K5)

Course Contents:		
Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	Divide and Conquer: What is algorithm, Algorithm Specification, Recurrence relations, Performance Analysis, Randomized Algorithms, Divide and Conquer: The general method, Binary search,	7

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	Finding the maximum and minimum, Merge sort, Quick sort, DC Selection Algorithm, analysis of Divide and Conquer algorithms.	
Unit 2	The Greedy Method: The general method, Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Optimal merge Patterns, Single source shortest paths	7
Unit 3	Backtracking: The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle, and Graph Coloring	6
Unit 4	Basic Traversal and Search Techniques: Techniques for Binary Trees, Game Tree; Techniques for Graphs – Breadth First Search & Traversal, Depth First Search & Traversal, AND/OR graphs; Connected components and Spanning Trees; Bi-connected components and depth first search.	7
Unit 5	Dynamic Programming: The general method, Multistage graphs, All pair shortest paths, 0/1 knapsack, Reliability design, Traveling Sales person problem	6
Unit 6	NP Hard, NP Complete Problems: Basic Concepts, Introduction to NP Hard Graph Problems.	6

Text Books:

Sr.No	Title	Author	Publisher	Edition	Year of Publication
1	Fundamentals of Computer Algorithms	Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran	Universities Press	2nd	2008

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2.	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, and Clifford Stein	MIT Press	1st	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Publication
1	Fundamentals of Algorithmics	Gilles Brassard, Paul Bratley	Pearson Education	1st	2000
2	Computer Algorithms- Introduction to Design and Analysis	Allen Van Gelder , Sara Baase	Pearson Education	1st	2008

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Course Details:

Class	B. Tech, Sem-V
Course Code and Course Title	1ICPC302- **Microcontrollers**
Prerequisite/s	1ICES112 - Digital Electronics
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits:	4
Evaluation Scheme (Theory) : ISE/MSE/ESE **Evaluation Scheme (Practical): ISE/ESE**	40/30/30 50/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
1ICPC302_1	**Explain** the architecture and operations of 8085 microprocessor and 8051 microcontroller. (K2)
1ICPC302_2	**Analyze** the different machine cycles and bus timings of the 8085 microprocessor. (K4)
1ICPC302_3	**Understand** the different instruction formats and addressing modes of the 8085 microprocessor and 8051 microcontroller.(K2)
1ICPC302_4	**Apply** knowledge and demonstrate programming proficiency using instruction set for 8085 microprocessor and 8051 microcontroller. (K3)
1ICPC302_5	**Design** and implement interfaces for an LED, LCD, DC motor, and stepper motor with the 8051 microcontroller. (K6)

Course Contents:		
Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	**Introduction to 8085 Microprocessor:** The 8085 Microprocessor Architecture and its operations, memory map and addresses, memory and Instruction fetch, memory classification, Memory mapped I/O vs I/O mapped I/O.	6
Unit 2	**8085 Microprocessor Architecture** The 8085-pin diagram, Microprocessor communication and bus timing, De- multiplexing address and Data bus, generating control signals, 8085 based -machine cycles and bus timing, op-code fetch machine cycle, memory read and write machine cycle.	7

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Unit 3	**8085 assembly language programming** The 8085-programming model, instruction classification, instruction format, 8085 addressing modes, 8085- Flag register, Data transfer instructions, Arithmetic instructions and Logic instructions. Introduction to 8086 microprocessor.	7
Unit 4	**Introduction to 8051 Microcontroller** Microprocessor Vs Microcontroller, Architecture of 8051, Functional pin out diagram of 8051, Flag register, Internal Memory organization. External Memory (ROM & RAM) interfacing.	6
Unit 5	**8051 Instruction Set:** 8051 Addressing modes, Data transfer instructions, Arithmetic instructions, Logic instructions, Boolean or Bit manipulation instructions. Simple Assembly language program examples (without loops) to use these instructions.	6
Unit 6	**Interfacing Applications & Case Studies** Interfacing 8051 with LCD, LED, DC motor and stepper motor. Case Studies: Bluetooth controlled home automation system using 8051, traffic light controller using 8051, industrial automation using 8051 microcontroller.	7

Exp. No.	Title of Experiment
1.	Develop Program for Addition Operation of two 16 bit Numbers.
2.	Develop Program for Subtraction Operation of two 16 bit Numbers.
3.	Develop Program that is based on Branching Operations.
4.	Develop Program to perform one byte BCD addition.
5.	Develop Program to move a block of data bytes in memory from one location to another location.
6.	Develop program for arithmetic operation like addition, subtraction, multiplication and division for 8051.
7.	Develop a program to generate square wave using 8051 Microcontroller simulator tool.
8.	Develop a program for interfacing LED interfacing with 8051 Microcontroller.

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9.	Develop a program for interfacing LCD interfacing with 8051 Microcontroller.
10.	Develop a program for interfacing DC motor interfacing with 8051 Microcontroller.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microprocessor Architecture – programming and applications with 8085	Ramesh Gaonkar	Penram International	4th	2007
2	The INTEL Microprocessors - Architecture ,Programming and Interfacing	Barry B. Brey S	PHI Ltd	8th	2010
3	The 8051 Microcontroller and Embedded systems using assembly and C	Mazidi & D Mackinlay	Pearson Education	2nd	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microprocessors and Microcontrollers	N. Senthi Kumar, M. Saravanan and S. Jeevananthan	Oxford University Press	2nd	2001
2	"Microcontrollers: Architecture, Programming, Interfacing and System Design"	Raj Kamal	Pearson Education	1st	2005
3	8051 microcontroller	Kenneth J Ayala	Cencage Learning	3rd	2012

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Course Details:

Class	**T.Y, B. Tech, Sem - V**
Course Code and Course Title	1ICPC303 - **Smart Contracts and Solidity**
Prerequisite/s	1ICPC209- Fundamentals of Blockchain
Teaching Scheme: Lecture/Tutorial /Practical	3/0/2
Credits	3
Evaluation Scheme (Theory): ISE/MSE/ESE	40/30/30

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICPC303_1	**Explain** the fundamental concepts of blockchain technology and its role in enabling smart contracts. (K2)
1ICPC303_2	**Apply** Solidity programming skills to create and deploy smart contracts on blockchain platforms like Ethereum. (K3)
1ICPC303_3	**Utilize** blockchain development tools and frameworks to test and deploy smart contracts. (K3)
1ICPC303_4	**Create** comprehensive smart contract designs for complex applications, considering security, scalability, and user experience. (K6)
1ICPC303_5	**Design** smart contract projects, including detailed code implementations, testing strategies, and deployment considerations, along with real-world use cases.(K6)

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.	7

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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.	6
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.	7
Unit-4	Solidity Programming –Contracts, Creating Contracts, Visibility and Getters, Function Modifiers, Constant State Variables, Functions, Inheritance, Abstract Contracts, Interfaces, Libraries.	6
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,.	6
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	2nd	2019

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2	The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Josh Thompson	Create Space Independent Publishing Platform	1st	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	1st	2019
2	The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Josh Thompson	Create Space Independent Publishing Platform	1st	2017

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Course Details:

Class	**T.Y, B. Tech, Sem - V**
Course Code and Course Title	1ICIC304 – Minor Course – II : **Embedded System for IoT**
Prerequisite/s	–
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	3
Evaluation Scheme (Theory) : ISE /MSE/ ESE	40/30/30

Course Outcomes (COs):

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

1ICIC304_1	**Understand** the fundamental concepts of embedded systems (K2).
1ICIC304_2	**Apply** proficiency in interfacing sensors and actuators with Arduino, utilizing programming skills effectively to implement projects. (K3)
1ICIC304_3	**Analyze** the functionalities and use cases of RFID, ZigBee, and Bluetooth technologies in various applications. (K4)
1ICIC304_4	**Explain** the fundamental concepts and principles of the Web of Things (WoT) and differentiate them from the Internet of Things (IoT). (K2)
1ICIC304_5	**Design** IoT applications that interface sensors and actuators to perform specific tasks. (K5)

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Course Contents:

Unit No.	Unit Name	Contact Hours
Unit-1	Introduction to Embedded Systems: Definition and characteristics of embedded systems, Embedded vs General-purpose computing systems, Types and applications of embedded systems, The embedded system constraints: processing constraints, memory constraints, input/output constraints, response time constraints, predictability/reliability constraints	7
Unit-2	Hardware Components for IoT: Microcontrollers and Microprocessors: Architecture and functionalities, Introduction to Arduino, Types of Arduino, Arduino Programming Structure, Sketches, Pins, Input/Output Pins using sketches, Introduction to Arduino Shields, Integration of sensors and actuators with Arduino.	6
Unit-3	IoT Enabling Technologies: RFID and NFC (Near-Field Communication), Bluetooth Low Energy (BLE), 6LowPAN, Z-Wave, LoRa, HTTP, WebSocket, MQTT, CoAP and Node-RED Platforms.	7
Unit-4	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-5	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
Unit-6	Applications Development: Development of IoT Applications : Home Automation, Smart Agriculture, Smart Cities, Smart Healthcare	6

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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	2nd	2020
2	Embedded Software for the IoT	Klaus Elk	DeG	1st	2018
3	Designing Embedded Systems and the Internet of Things (IoT) with the ARM Mbed	Perry Xiao	Wiley	1st	2018

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Embedded Systems Architecture	Tammy Noergaard	Elsevier	1st	2016
2	Embedded system Design using C8051	Han-Way Huang	CENAGE Learning	1st	2019
3	Real-Time systems Theory and Practice	Rajib Mall	Pearson Education	2nd	2007

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Course Details:

Class	T.Y, B. Tech, Sem - V
Course Code and Course Title	1ICHS305- **Entrepreneurship**
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:	
1ICHS305_1	**Identify and evaluate** potential business opportunities in the engineering domain (K5).
1ICHS305_2	Conduct market research and **analyze** the competitive landscape. (K3)
1ICHS305_3	**Craft** a comprehensive business plan, including financial projections. (K6)
1ICHS305_4	**Understand** the fundamentals of marketing, sales, and operations for engineering ventures. (K2)
1ICHS305_5	**Pitch** their business ideas to potential investors. (K6)
1ICHS305_6	**Grasp** the legal and ethical considerations of starting a business. (K2)

Course Contents:

Experiment List:	
Sr. No.	**Experiment**
1.	The Entrepreneurial Ecosystem
2.	Idea Identification and Prototyping

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3.	Testing, Validation and Commercialization
4.	Market Analysis and Competitive Landscape
5.	Legal Procedure to setup an Startup Business
6.	Understanding Finance Basics
7.	Business Planning and Development
8.	Marketing and Sustainability
9.	Pitching and Fundraising
10.	Startup Case Studie
Assessment Activities	
1.	Assessment 1 : Business Plan
2.	Assessment 2 : Peer Review of Business Plan
3.	Assessment 3 : Elevator Pitch Competition
4.	Assessment 4 : "Shark Tank" Simulation

Reference Material:	
1.	https://www.startupindia.gov.in/content/sih/en/international/go-to-market-guide/indian-startup-ecosystem.html.
2.	https://www.startupindia.gov.in/content/sih/en/learning-and-development_v2.html.
3.	https://onlinecourses.nptel.ac.in/noc24_mg93/preview.

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Assessment Modes:

Sr. No.	Method Technique							Marks		Weightage
		1	2	3	4	5	6	Max	Min	
1.	ISE: BP	☑	☑	☑	☑		☑	10	20	20%
2	ISE: PR	☑	☑	☑	☑		☑	10		20%
3	ISE: EPC	☑	☑		☑	☑		10		20%
4	ISE: STS	☑	☑	☑	☑	☑	☑	20		40%

- ISE - In-Semester Examination,
- BP - Business Plan, PR - Peer Review of Business Plan
- EPC - Elevator Pitch Competition, STS - "Shark Tank" Simulation

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Course Details

Class	**T.Y, B. Tech, Sem - V**
Course Code and Course Title	1ICPE306 –**Embedded System for IoT**
Prerequisite/s	1ICPC211- Introduction to Internet of Things
Teaching Scheme: Lecture/Tutorial /Practical	2/0/2
Credits	3
Evaluation Scheme (Theory) : ISE/MSE/ESE **Evaluation Scheme (Practical): ISE/ESE**	Not Applicable 50/50

Course Outcomes (COs):	
1ICPE306_1	**Understand** the fundamental concepts of embedded systems (K2).
1ICPE306_2	**Apply** proficiency in interfacing sensors and actuators with Arduino, utilizing programming skills effectively to implement projects. (K3)
1ICPE306_3	**Analyze** the functionalities and use cases of RFID, ZigBee, and Bluetooth technologies in various applications. (K4)
1ICPE306_4	**Explain** the fundamental concepts and principles of the Web of Things (WoT) and differentiate them from the Internet of Things (IoT). (K2)
1ICPE306_5	**Design** IoT applications that interface sensors and actuators to perform specific tasks. (K5)

Course Contents

Unit No.	Unit Name	Contact Hours
Unit-1	Introduction to Embedded Systems: Definition and characteristics of embedded systems, Embedded vs General-purpose computing systems, Types and applications of embedded systems, The embedded system constraints: processing constraints,	7

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	memory constraints, input/output constraints, response time constraints, predictability/reliability constraints	
Unit-2	Hardware Components for IoT: Microcontrollers and Microprocessors: Architecture and functionalities, Introduction to Arduino, Types of Arduino, Arduino Programming Structure, Sketches, Pins, Input/Output Pins using sketches, Introduction to Arduino Shields, Integration of sensors and actuators with Arduino.	6
Unit-3	IoT Enabling Technologies: RFID and NFC (Near-Field Communication), Bluetooth Low Energy (BLE), 6LowPAN, Z-Wave, LoRa, HTTP, WebSocket, MQTT, CoAP and Node-RED Platforms.	7
Unit-4	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-5	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
Unit-6	Applications Development: Development of IoT Applications : Home Automation, Smart Agriculture, Smart Cities, Smart Healthcare	6

Exp.No.	Experiment List
1	Installation and setup of IoT platform.
2	Study and Develop a program based on interfacing with temperature sensors.
3	Study and Develop a program based on interfacing with Ultrasonic sensors.
4	Study and Develop a program based on interfacing with Optical sensors.
5	Study and Develop a program based on interfacing with PIR sensors.

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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 actuators such as stepper motors.
9	Study and develop a program based on interfacing with actuators such as DC motors.
10	Implementation of Inbuilt Touch Sensing, Bluetooth and Wi-Fi communication

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	2nd	2020
2	Embedded Software for the IoT	Klaus Elk	DeG	1st	2018
3	Designing Embedded Systems and the Internet of Things (IoT) with the ARM Mbed	Perry Xiao	Wiley	1st	2018

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Embedded Systems Architecture	Tammy Noergaard	Elsevier	1st	2016
2	Embedded system Design using C8051	Han-Way Huang	CENAGE Learning	1st	2019
3	Real-Time systems Theory and Practice	Rajib Mall	Pearson Education	2nd	2007

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Course Details:

Class	**T.Y, B. Tech, Sem - V**
Course Code and Course Title	1ICPE307- PE-1 **Steganography and Digital Watermarking Laboratory**
Prerequisite/s	1ICPC210- Information theory for Cyber Security
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE **Evaluation Scheme (Practical): ISE/ESE**	Not Applicable 50/50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICPE307_1	**Understand** the various Classifications of Information hiding, Steganography, Watermarking and Steganalysis. (K2)
1ICPE307_2	**Identify** the important Models of Watermarking and Watermarking communication with and without side information. (K3)
1ICPC307_3	**Evaluating** the various Multiplexed Communications models, different Geometric models of watermarking. (K4)
1ICPE307_4	**Demonstrate** the theoretic foundations of steganography and steganalysis. (K5)
1ICPE307_5	**Develop** a real life applications for Content Authentication by using Watermarking techniques. (K6)

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Course Contents:		
Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	**Introduction** Information hiding, Classifications of Information hiding, steganography, and watermarking, History of Watermarking and Steganography, Importance of Digital Watermarking and Steganography, Applications of Watermarking and Steganography, Properties of watermarking system, Steganography and Stegnalysis system.	4
Unit 2	**Models of Watermarking** Notation, Communications, Components of communication systems, Classes of Transmission Channels, Secure Transmission, Communication based models of watermarking, Basic model, Watermarking as Communications with Side Information at the Transmitter, Watermarking as Communications without Side Information at the Transmitter.	5
Unit 3	**Multiplexed and Geo-metric models of Watermarking** Watermarking as multiplexed communications, Geo-metric models of watermarking, Distribution and Regions in Media Space, Marking Spaces.	4
Unit 4	**Steganography** Steganography communication – Notation and terminology – Information Theoretic Foundations of steganography – Practical steganographic methods – Minimizing the embedding impact – Steganalysis	4
Unit 5	**Steganalysis**Steganalysis Scenarios, Detection, Forensic Steganalysis, The Influence of the Cover Work on Steganalysis, Some Significant Steganalysis Algorithm, LSB Embedding and the Histogram Attack, Sample Pair Analysis.	5

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Unit 6	**Digital Watermarking** Difference between Watermarking and Steganography, Classification (Characteristics and Applications), types and techniques (Spatial-domain, Frequency-domain, and Vector quantization-based watermarking), Watermark security & authentication.	4

Exp. No.	Experiment List
1.	Create a technique to Conceal the compressed data and hide it within another file.
2.	Create a technique to Conceal the raw files within BMP, GIF and WAV files using S-tools.
3.	Create a technique to hide multiple files in one container using S-tools.
4.	Write a Program to Produce discernible change in the file size by using steganography techniques.
5.	Write a Program to discover and render covert messages using Steganalysis method.
6.	Create a digital watermarking technique on an image and audio clip for transmission.
7.	Write a Program to decode the watermarked image using DCT (Discrete Cosine Transform).
8.	Write a Program to add a logo using spatial domain digital water marking techniques.
9.	Demonstrate content authentication using Digital water marking Technique.
10.	Write a Program to 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 and Steganography.	Ingemar J. Cox Matthew L. Miller Jeffrey A. Bloom	Morgan Kaufmann Publishers	2nd	2008
2.	Steganography in Digital Media. (Principles, Algorithms, and Applications).	JESSICA FRIDRIC	Cambridge University Press	1st	2010

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	Digital Watermarking and Steganography (Fundamentals and Techniques)	Frank Y. Shih	CRC Press	1st	2008
2.	Information Hiding Techniques for Steganography and Digital Watermarking	Stefan Katzenbeisser , Fabien A.P. Petitcolas	Artech House Print on Demand	1st	1999
3.	Multimedia security: steganography and digital watermarking techniques for protection of intellectual property	Chun-Shien Lu	Idea Group Publishing	1st	2004

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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ICPE308- PE1-**Blockchain Platform and Usecases**
Prerequisite/s	1ICPC113- Computer Networks 1ICPC202-Data Structures 1ICPC209-Fundamental of Blockchain
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	3
Evaluation Scheme (Theory) : ISE/MSE/ESE **Evaluation Scheme (Practical): ISE/ESE**	Not Applicable 50/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
1ICPE308_1	**Describe** the foundational principles of blockchain technology, including decentralization, consensus mechanisms, and cryptographic techniques (K2)
1ICPE308_2	**Design** decentralized applications (DApps) that leverage blockchain platforms for specific use cases.(K3)
1ICPE308_3	**Assess** the potential of blockchain technology in various sectors such as finance, supply chain management, healthcare, government, energy, and real estate.(K4)
1ICPE308_4	**Compare** and contrast major blockchain platforms such as Ethereum, Hyperledger Fabric, and others in terms of architecture, consensus mechanisms, scalability, and suitability for various applications.(K5)
1ICPE308_5	**Develop** and deploy smart contracts using programming languages like Solidity (K6)

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Course Contents:		
Unit No.	**Unit Name**	**Contact Hours**
Unit 1	Introduction to Blockchain Technology Overview of distributed ledger technology (DLT),decentralization, consensus mechanisms, cryptographic principles	4
Unit 2	Blockchain Platforms Overview: Introduction to major blockchain platforms: Ethereum, Hyperledger Fabric, Corda, Binance Smart Chain, Solana, Comparison of platforms based on architecture, consensus mechanisms, scalability, and use cases	5
Unit 3	Smart Contracts and Decentralized Applications (DApps): Smart contracts: concepts, design patterns, Solidity programming language, Development frameworks and tools (Truffle, Remix), Case studies of popular DApps and their impact	4
Unit 4	Blockchain Use Cases in Finance and Banking: Applications of blockchain in banking (e.g., cross-border payments, trade finance), Central bank digital currencies (CBDCs) and stablecoins, Regulatory considerations and challenges. Blockchain Use Cases in Healthcare: Patient data management and interoperability,Drug traceability and counterfeit prevention,Privacy and security considerations	4
Unit 5	Blockchain Use Cases in Supply Chain Management: Traceability and provenance of goods using blockchain, Supply chain transparency and efficiency,Case studies of successful implementations (e.g., IBM Food Trust, VeChain) Blockchain Use Cases in Government and Public Sector: Identity management and digital voting systems, Blockchain for transparent and accountable governance, Case studies from various countries and regions	5
Unit 6	Emerging Trends and Future Directions: DeFi (Decentralized Finance) and its impact on traditional finance, Non-fungible tokens (NFTs): concepts, applications, and controversies, Blockchain interoperability and the role of cross-chain protocols	4

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Exp. No.	Experiment List
1.	i) Install and configure a local blockchain network using Ganache (for Ethereum) ii) Write and Deploy a simple smart contract (e.g., a simple storage contract).
2.	Deploy the contract on a local Ethereum network (using Remix IDE or Truffle framework).
3.	Develop a simple DApp (Decentralized Application) to interact with the deployed smart contract and Use Web3.js to connect the DApp to the blockchain.
4.	Set up a basic Hyperledger Fabric network using Docker and Understand the components like peer nodes, ordering service, and channels.
5.	Write a simple chaincode in Go/JavaScript and Deploy the chaincode on the Hyperledger Fabric network and perform basic transactions.
6.	i) Create a smart contract for a basic token (ERC-20) on Ethereum. ii) Develop a basic DApp to facilitate token exchange between users.
7.	i) Design a smart contract to track products through a supply chain. ii) Build a web interface to visualize the supply chain and interact with the blockchain.
8.	i) Create a smart contract for identity verification and Implement a DApp where users can create, verify, and manage their identities on the blockchain.
9.	Design and implement a blockchain-based voting system and Ensure the system provides transparency, security, and anonymity
10.	i) Create a prototype for a blockchain-based healthcare record management system. ii) Develop a smart contract for patient record management and access control.

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Blockchain Technology	Chandramouli subramanian	Universities Press	1st	2020
2	Block Chain & Crypto Currencies	Anshul Kaushik	Khanna Publishing House	1st	2018
4	Blockchain for Dummies	Tiana Laurence	John Wiley & Sons.	2nd	2019

Reference 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	1st	2017
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.	Greyscale Indian	1st	2017

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Course Details:

Class	**T.Y, B. Tech, Sem - V**
Course Code and Course Title	1ICEL309- Industrial Training/Internship
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/0
Credits	1
Evaluation Scheme (Practical) : ISE	50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICEL309_1	**Make use of** technology for saving real world problem (K3)
1ICEL309_2	**Take part in** developing solutions by examining the situations (K4)
1ICEL309_3	**Justify** the solutions for given problem (K5)
1ICEL309_4	**Plan and create** the detailed module for proposed solution (K5)

Activity:
The Internship Program allows T.Y. students to gain practical experience in the workplace before receiving their undergraduate degrees. The internship is a required academic course. The student identifies companies willing to hire him/her on a full-time basis for 2 Weeks (80-90 hrs) period (minimum required). The Internship Program supervises the students and awards academic credits (1) upon successful completion of all the required assignments. After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics.

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Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor.

The Internship report will be evaluated on the basis of following criteria:

i. Originality.
ii. Adequacy and purposeful write-up.
iii. Organization, format, drawings, sketches, style, language etc.
iv. Variety and relevance of learning experience.
V. Practical applications, relationships with basic theory and concepts taught in the course.

And/Or

If student has an innovative idea then he/she can work on that idea as step towards a technical Startup. Student is expected to enroll in pre incubation/incubation center to work on his idea.

Activity will be evaluated on the basis of following criteria

i. Market analysis
ii. Business plan/module
iii. IP ownership (Patent Search) etc.

He/she has to prepare a detailed report under guidance of mentor provided by department and submit the report of the activity carried out.

And/Or

Student is expected to participate in any technical national / international competition like Programming hackathon / Project competition with a significant achievement anytime during the semester during weekends or holidays.

Activity will be evaluated on the basis of following criteria

i. Participation in National / International technical symposium or hackathon/ Programming / Project Competition.
ii. Achievement in the event if any with evidence of certificates
iii. Demonstration of the same work at department with a report of the event and/or project report

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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. Semester-V**
Course Code and Course Title	1ICCC310-Aptitude and Reasoning Part-III
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme (Practical) : ISE	50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICCC310_1	Solve problem based on basic and advance Permutation and Combination. (K3)
1ICCC310_2	Solve problem based on Probability, Application of Probability, Cubes, Dices, cube painting and Syllogism (K3)
1ICCC310_3	Solve problem based on Mensuration 3D, Circle & Triangle. (K3)
1ICCC310_4	Demonstrate on Resume writing skill, closed, advanced grammar, Synonyms and Antonyms. (K3)

Course Contents:

Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	Basic Permutation and Combination, Advance Permutation and Combination	04
Unit 2	Probability, Application of Probability	05

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Unit 3	Cubes, Dices & cube painting, Syllogism	04
Unit 4	Mensuration 3D, Circle & Triangle	04
Unit 5	Resume writing & resume making, Interview Techniques	05
Unit 6	Closed Test & advanced Grammar, Synonyms & Antonyms	04

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Quantitative Aptitude for Competitive Examinations	R.S. Agarwal	S Chand	Revised	2022
2.	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Agarwal	S Chand	Revised	2024
3.	English Grammar And Composition	P C Wren, H Martin	S Chand	2nd	2019

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Course Details:

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	1ICPC311-**Compiler Design**
Prerequisite/s	1ICPC204 – Operating System
Teaching Scheme: Lecture/Tutorial/Practical	2/0/0
Credits:	2
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICPC311_1	**Identify** and Interpret the different phases of a compiler and their functioning. (K2)
1ICPC311_5	**Apply** code optimization transformations to improve the performance of target code. (K3)
1ICPC311_3	**Deploy** efficient techniques for semantic analysis to generate intermediate code.(K3)
1ICPC311_4	**Propose** techniques to generate machine code which conforms to the target machine specifications. (K5)
1ICPC311_2	**Design** a well-structured system to ensure the syntactic correctness of a program.(K6)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Lexical Analysis Introduction to Compiler, Phases and Passes, Bootstrapping, Cross Compiler, Role of a Lexical Analyzer, Specification and Recognition of Tokens, Look ahead operation, Lexical Phase errors, LEX tool.	4

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Unit 2	Syntax and Semantic Analysis Expressing Syntax: CFG, Top-Down Parsing: Recursive Descent, Predictive Parsers. Bottom-Up Parsing: LR Parsers: Constructing SLR parsing tables, Constructing Canonical LR parsing tables, Constructing LALR parsing tables, Using ambiguous grammars, Parser generator YACC, Symbol-Table Structure, Error Detection &Recovery strategies.	4
Unit 3	Syntax-Directed Translation and Intermediate Code Generation (9 Hours) Syntax-Directed Definitions, Attribute grammar, Dependency graphs, S and L attributed grammar, Bottom-Up Evaluation, Top-Down Translation, Intermediate Representations – Need, Forms, SDT scheme for Intermediate Code Generation of assignment statement, declaration statement. Control flow translation of Boolean expression (Back patching), if, if-else statement, while statement, array assignment. Error Detection & Recovery: semantic errors.	5
Unit 4	Code Generation (6 Hours) Issues in Code Generation, Target Language, Basic Blocks and Flow Graphs, Next-use information, Simple Code generator, DAG representation of Basic Blocks, Register allocation and Assignment, Peephole Optimization.	4
Unit 5	Code Optimization (8 Hours) Introduction: Principal Sources of Optimization, Optimization of basic Blocks (local and global) Data Flow Analysis: data flow equations, reaching definitions, live variable analysis, available expressions, Loops in flow graphs: Dominators, Back edges and Reducibility.	4
Unit 6	Introduction to compilation for modern architectures Automatic Parallelization, Instruction Scheduling, Software Pipelining. Introduction to advanced topics – Just-In-Time Compilation, Dynamic compilation, Interpreters (JVM/ Dalvik), Cross compilation using XMLVM, Case studies : GCC, g++,LLVM.	5

Exp. No.	Experiment List
1.	Assignment to understand basic syntax of LEX specifications, built-in functions and Variables.
2.	Implement a Lexical Analyzer using LEX for a subset of C.

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3.	Implement a parser for an expression grammar using YACC and LEX. Extend to handle variables with single letter names.
4.	Generate and populate appropriate Symbol Table
5.	Write a YACC specification to check the syntax of following of 'C' language statements with error detection. a.) if and if…else b.) for c.) switch…. Case
6.	Implementation of Semantic Analysis Operations (like type checking, verification of function parameters, variable declarations and coercions) possibly using an Attributed Translation Grammar.
7.	Implement the front end of a compiler that generates the three address code for a simple language.
8.	Generate an appropriate Target Code from the given intermediate code assuming suitable processor details.
9.	Implement Dead-Code Elimination, Loop optimizations for input 3-address code.
10.	Implement Common Sub-expression Elimination and Copy Propagation optimizations for an input 3-address code.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	"Compilers: Principles, Techniques and Tools"	A. V. Aho, M. S. Lam, R. Sethi, J. D. Ullman	Addison Wesley	1st	2007
2	"Engineering a Compiler"	K. Cooper, L. Torczon, Morgan Kaufmann	Tata McGraw Hill	2nd	2003

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Compiler Design	K. Muneeswaran	Oxford University	1st	1992

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	1ICPC312- **Data Encryption**
Prerequisite/s	1ICPC210- Information theory for Cyber Security
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits:	4
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30
Evaluation Scheme (Practical): ISE/ESE	Not Applicable

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICPC312_1	**Explain** the principles and practices of symmetric and asymmetric encryption techniques.
1ICPC312_2	**Implement and analyze** various encryption algorithms.
1ICPC312_3	**Design** secure systems using appropriate encryption methods.
1ICPC312_4	**Evaluate** the security of encryption systems and identify potential vulnerabilities
1ICPC312_5	**Apply** encryption techniques to real-world scenarios in securing data communication.

Course Contents:		
Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	**Introduction to Data Encryption:** Basics of Cryptography, Historical Encryption Methods, Modern Cryptographic Algorithms, Overview of Symmetric and Asymmetric Encryption, Applications of Data Encryption.	6
Unit 2	**Symmetric Key Encryption:** Symmetric Key Cryptography, Block Ciphers and Stream Ciphers, DES, 3DES, and AES Algorithms, Modes of Operation (ECB, CBC, CFB, OFB, CTR), Key Management and Distribution.	7

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Unit 3	**Asymmetric Key Encryption:** Principles of Public Key Cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography (ECC), Digital Signatures and Certificates.	6
Unit 4	**Hash Functions and Data Integrity:** Introduction to Hash Functions, MD5, SHA-1, SHA-256 Algorithms, and Message Authentication Codes (MACs), HMAC, Data Integrity and Authentication.	7
Unit 5	**Encryption Protocols:** Secure Sockets Layer (SSL), Transport Layer Security (TLS), Internet Protocol Security (IPsec), Pretty Good Privacy (PGP), Secure Shell (SSH), Wireless Encryption Protocols (WEP, WPA, WPA2).	7
Unit 6	**Advanced Topics and Future Trends:** Quantum Cryptography, Homomorphic Encryption, Blockchain and Cryptography, Cryptographic Failures and Attacks, Future Trends in Data Encryption	6

Exp. No.	Experiment List
1.	Implementation of Substitutions and Transposition Ciphers.
2.	Write a program to encrypt and decrypt data using Data Encryption Standard.
3.	Implementation of International Data Encryption Standard.
4.	Write a program to encrypt and decrypt data using Advanced Encryption Standard.
5.	Write a program to encrypt and decrypt messages using RSA.
6.	Write a program to simulate the Diffie-Hellman key exchange.
7.	Write a program to create and verify digital signatures using RSA.
8.	Implementation of Message Authentication Codes.
9.	Implementation a Set up an HTTPS server using OpenSSL.
10.	Create a technique to hiding of confidential information with images.

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Cryptography and Network Security: Principles and Practice.	William Stallings,	Pearson	7th	2014
2	Applied Cryptography: Protocols, Algorithms, and Source Code in C.	Bruce Schneier	Wiley	2nd	2017
3	Introduction to Modern Cryptography: Principles and Protocols.	Jonathan Katz and Yehuda Lindell	CRC Press	2nd	2007

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Network Security Essentials: Applications and Standards.	William Stallings,	Pearson	6th	2017
2	Understanding Cryptography: A Textbook for Students and Practitioners.	Christof Paar and Jan Pelzl,	Springer.	1st	2014

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Course Details:

Class	T.Y, B. Tech, Sem - VI
Course Code and Course Title	1ICIC313- **Minor Course III – Smart Sensors and Actuators**
Prerequisite/s	1ICIC212 – Minor Course-I : Introduction to IoT
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits:	3
Evaluation Scheme (Theory) : ISE/MSE/ESE	40/30/30

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICIC313_1	**Identify** sensors, actuators, Micro sensors and Micro actuators to solve a problem using Sensor fundamentals and its characteristics. (K2)
1ICIC313_2	**Use** Microsensors and Microactuators to solve the problems in different scenarios using Arduino IDE. (K3)
1ICIC313_3	**Connect** sensors and actuators with ESP32 to solve a problem using pin description of ESP32 microcontroller.(K3)
1ICIC313_4	**Analyze** various sensors system for real world applications using Raspberry Pi. (K4)
1ICIC313_5	**Design** a solution for given specific problem using sensors and ESP32 with Arduino IDE. (K6)

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

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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, automobile sensor, home appliance sensors. Real time application of sensors, Technologies related to sensors: Metal detector, Global Positioning system, Blood Glucose monitoring, Photoelectric sensor.	7
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)	7
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.	7
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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Course Details:

Class	**S.Y, B. Tech, Sem - VI**
Course Code and Course Title	1ICPE314- **PE-III - Ubiquitous Sensing, Computing and Communication**
Prerequisite/s	
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits:	4
Evaluation Scheme (Theory): ISE/MSE/ESE **Evaluation Scheme (Practical): ISE/ESE**	40/30/30 50/50

Course Outcomes (COs): **Upon successful completion of this course, the student will be able to:**	
1ICPE314_1	To understand merging technological options, platforms and case studies of IoT implementation in home & city automation.(K2)
1ICPE314_2	To determine the Market perspective of IoT (K2)
1ICPE314_3	To understand the various types of computing in ubiquitous sensing.(K2)
1ICPE314_4	To understand the analytics and management of data related to IOT.(K2)
1ICPE314_5	Understand the concepts of Design Thinking. Knowledge for the design and analysis of Industry 4.0Systems for Electronics Engineering students. (K2)
1ICPE314_6	To Design and deploy IIoT applications using embedded PC-based development boards and edge computing, addressing current societal needs with innovative solutions. (K6)

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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

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Course Contents:		
Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	Introduction: Overview, Challenges in IoT, Networking Basics of IoT, NFC, Wireless LAN.	7
Unit 2	Location in ubiquitous computing: Personal assistants, Location aware computing, Location tracking, Architecture, Location based service and applications, Location based social networks (LBSN), LBSN Recommendation. Context-aware computing: Context and Context-aware Computing, Issues and Challenges, Developing Context-aware Applications, System Architecture.	7
Unit 3	Privacy and security in ubiquitous computing, Energy constraints in ubiquitous computing. Wearable computing, Glass and Augmented Reality, Eye-Tracking, Digital Pen and Paper, Mobile social networking & crowd sensing, Event based social network	6
Unit 4	Mobile affective computing: Human Activity and Emotion Sensing, Health Apps, Mobile p2p computing, Smart Homes and Intelligent Buildings, Mobile HCI, Cloud centric IoT, Open challenges, Architecture, Energy Efficiency, Participatory sensing, Protocols, QoS, QoE	6
Unit 5	IoT and data analytics IoT and Data Management, Data cleaning and processing, Data storage models. Search techniques, Deep Web, Semantic sensor web, Semantic Web Data anagement, Searching in IoT. Real-time and Big Data Analytics for The Internet of Things, Heterogeneous Data Processing, High-dimensional Data Processing, Parallel and Distributed Data Processing.	7
Unit 6	Case Studies of IIoT Systems: IIoT application development with Embedded PC based development boards, Development of mini Project on new version of Operating systems and Edge development board. That project should also address to the current societal needs	6

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Exp. No.	Experiment List
1.	Deploy a network of IoT sensors to monitor environmental conditions such as temperature, humidity, and air quality.
2.	Develop a wearable device to monitor vital signs such as heart rate and body temperature.
3	Use smart switches, motion detectors, and cameras connected via a central hub like Raspberry Pi. Implement control via a smartphone app.
4	Use cameras and image processing algorithms to detect vehicle count and speed. Send data to a central server for analysis.
5	Use smart plugs to measure power usage and develop algorithms to optimize energy use based on patterns.
6	Deploy sensors in a small plot and collect data. Use this data to automate irrigation and other farming activities.
7	Use technologies like RFID, Bluetooth beacons, or Wi-Fi triangulation. Develop software to display real-time positioning
8	Install vibration and stress sensors on a model structure. Collect data and analyze it for signs of wear and tear.
9	Use Raspberry Pi or similar devices to process data from sensors and send only relevant information to a central server.
10	Use various sensors to detect parameters like seismic activity, temperature, and gas levels. Design a communication protocol for rapid alert dissemination.

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Ubiquitous Computing Fundamentals	John Krumm	CRC Press	1st	2009
2	Enterprise IoT	Shroff	O'Reilly Publisher	1st	2016

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Ubiquitous Computing and Computing Security of IoT	N. Jeyanthi, Ajith Abraham, Hamid Mcheick	Springer Cham	1st	2019

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Course Details:

Class	**T.Y, B. Tech, Sem - VI**
Course Code and Course Title	**1ICPE315- Security Assessment and Risk Analysis**
Prerequisite/s	**1ICPC210- Information Theory for Cyber Security**
Teaching Scheme: Lecture/Tutorial/Practical	**3/0/2**
Credits:	**4**
Evaluation Scheme (Theory) : ISE/MSE/ESE **Evaluation Scheme (Practical): ISE/ESE**	**40/30/30** **50/50**

Course Outcomes (COs): **Upon successful completion of this course, the student will be able to:**	
1ICPE315_1	Understanding Risk Management Basics and Cyber Risk Fundamentals. (K2)
1ICPE315_2	Demonstrate techniques for identifying and evaluating cyber risks. (K3)
1ICPE315_3	Determine appropriate scales for likelihood and consequence assessments in cyber risk scenarios. (K4)
1ICPE315_4	Evaluate organizational compliance with standards and frameworks. (K5)
1ICPE315_5	Define and develop metrics for measuring information security effectiveness. (K6)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction: what is risk and risk management, risk assessment, monitoring and review, cyberspace, cyber system. What is cyber risk, communication and consultation of cyber risk, cyber risk assessment, monitoring and review of cyber risk	7

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Unit 2	Basics of Security and Risk Assessment: Context establishment, context, goals and objectives, target of assessment, interface to cyberspace and attack surface, scope, focus and assumption, assets, scale and risk evaluation criteria,	7
Unit 3	Risk Assessment Process: Risk identification techniques, malicious risks, non-malicious risks, risk analysis, threat analysis, vulnerability analysis, likelihood of incidents, consequences of incidents, Risk evaluation, consolidation of risk analysis results, evaluation of risk level, risk aggregation, risk grouping, risk treatment identification, risk acceptance	6
Unit 4	Analysis of Risk assessment: Two-factor measure, three-factor measure, many-factor measure, which measure to use for cyber risk?, classification of scales, qualitative versus quantitative risk assessment, scale for likelihood, scale for consequence, what scale to use for cyber risk	6
Unit 5	Security Assessment Analysis: Defining information security metrics, Risk analysis techniques, Automating metric calculations and tools. What is an IT security assessment, what is an IT security audit, what is compliance, how does and audit differs from assessment, case study: Enron, WorldCom, TJX Credit Card Breach	6
Unit 6	Case Studies: Organization do to be in compliance, Auditing within IT infrastructure, managing IT compliance, Auditing standards and frameworks, COSO, COBIT, ISO/IEC 27001 standard, ISO/IEC 27002 standard, NIST 800-53,	7

Exp. No.	**Experiment List**
1.	To audit the c/c++ or Python code using RATS code checking tool.
2.	Implement Flawfinder stand-alone script to check for calls to know potentially vulnerable library function calls
3.	Implement FindBugs standalone GUI application,or Eclipse plugin for loading custom rules set.
4.	Implement pychecker stand-alone script to find bugs in the code.

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5.	Installation of splunk and study basic working as to stores data in its index and therefore separate database required.
6.	Implement splunk to discovers useful information automatically without searching manually
7.	Implement splunk to converts log data into Visual graphs and reports to simplify analysis, reporting and troubleshooting
8.	Submit a report on cyber security risk assessment for SCADA and DCS networks.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Cyber-Risk Management	Atle Refsdal Bjornar Solhaug, Ketil Stolen	Springer	1st	2015
2.	Information Security Risk Assessment Toolkit–	Mark Talabis and Jason Martin	Elsevier	1st	2013
3.	T Security Risk Control Management – An Audit Preparation Plan	Raymond Pompon	Apress	1st	2016

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	Auditing IT Infrastructures for Compliance	Marty M. Weiss and Michael G. Solomon	Jones & Bartlett Learning	2nd	2015
2.	Quantitative Risk Assessment: The Scientific Platform	Terje Aven	Cambridge University Press	1st	2011

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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ICPE316- PE-II **-Blockchain Security and Performance**
Prerequisite/s	1ICPC113- Computer Networks 1ICPC 202-Data Structures 1ICPC209-Fundamental of Blockchain
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits	4
Evaluation Scheme: (Theory) ISE /MSE/ ESE (Practical) ISE /ESE	40/30/30 50/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
1ICPE316_1	Describe the foundational principles of blockchain security, including cryptographic techniques, consensus algorithms, and decentralization..(K2)
1ICPE316_2	Analyze the security risks associated with blockchain technology, such as 51% attacks, double spending, and smart contract vulnerabilities. (K4)
1ICPE316_3	Apply security best practices for blockchain networks, including key management, secure wallet management, and network security. (K3)
1ICPE316_4	Optimize blockchain architecture and design for improved performance(K5)
1ICPE316_5	Assess regulatory and compliance considerations related to blockchain security.(K5)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Basics: The Double-Spend Problem, Byzantine Generals' Computing Problems, Distributed Systems, Distributed Consensus, Distributed ledger technology, Types of blockchains (public, private, consortium). Cryptographic Foundations: Cryptographic hash functions, Digital signatures and public-key cryptography, Merkle trees and their role in blockchain	6

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Unit 2	Blockchain Security: Threat models and attack vectors, Double-spending problem and consensus mechanisms, 51% attacks and Byzantine Fault Tolerance (BFT),	7
Unit 3	Consensus Algorithms : Proof of Work (PoW), Proof of Stake (PoS), and alternatives, Practical Byzantine Fault Tolerance (PBFT), PAXOS, RAFT, Comparison and analysis of consensus algorithms	7
Unit 4	Smart Contract Security: Introduction to smart contracts, Vulnerabilities (e.g., reentrancy, overflow, logic errors), Best practices for secure smart contract development.	7
Unit 5	Performance Optimization Techniques: Network performance and latency issues, Optimization strategies for transaction throughput, Benchmarking and performance measurement tools	6
Unit 6	Case Studies and Real-World Applications: Ethereum and decentralized applications (dApps), Hyperledger and enterprise blockchain solutions, Regulatory considerations and privacy concerns	6

Exp. No.	Experiment List
1.	Create a smart contracts with known vulnerabilities (e.g., reentrancy, integer overflow) and demonstrate how these vulnerabilities can be exploited.
2.	Simulate and analyze various network-level attacks such as 51% attacks, Eclipse attacks, or DDoS attacks on blockchain networks (using test networks or simulated environments).
3.	Set up nodes to run different consensus algorithms (e.g., Proof of Work, Proof of Stake) and compare their security properties
4.	Conduct penetration testing on blockchain applications or nodes to identify vulnerabilities in the implementation or configuration.
5.	Compare performance metrics such as transaction throughput and confirmation times under different network conditions.
6.	Experiment with different transaction optimization techniques (e.g., batching transactions, fee optimization) to improve blockchain efficiency.
7.	Set up interoperability tests between different blockchain platforms (e.g., Ethereum and Polkadot) to understand cross-chain communication and its performance implications.
8.	Create a smart contract code and Optimize & measure the impact on performance metrics.

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9.	Analyze real-world blockchain data (e.g., Bitcoin transaction history) to trace transactions and investigate potential misuse or fraud using tools like blockchain explorers and forensic analysis software.
10.	Implement compliance measures (e.g., KYC/AML procedures) and assess their impact on transaction validation and performance.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Blockchain Technology	Chandramouli subramanian	Universities Press	-	-
2	Block Chain & Crypto Currencies	Anshul Kaushik	Khanna Publishing House	-	-
4	Blockchain for Dummies	Tiana Laurence	John Wiley & Sons.	2nd	2019

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Editio n
1	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	Imran Bashir	Packt Publishing	1st	2017
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 Antonopo ulos.	O'Reilly	1st	2017

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Course Contents:

Class	**T.Y, B. Tech, Sem - VI**
Course Code and Course Title	**1ICPC317- SDLC**
Prerequisite/s	**–**
Teaching Scheme: Lecture/Tutorial/Practical	**2/0/2**
Credits:	**3**
Evaluation Scheme (Practical): ISE/ESE	**50/50**

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ICPC317_1	Comprehend systematic methodologies of SDLC (Software Development Life Cycle) (K2)
1ICPC317_2	Discriminate competing and feasible system requirements(K2)
1ICPC317_3	Prepare SRS document for a project (K3)
1ICPC317_4	Apply software design and development techniques (K4)
1ICPC317_5	Develop a quality software project through effective team-building, planning, scheduling and risk (K5)

Course Contents:

Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	The software Problem: Cost, Schedule & Quality, Scale and Change, Software Processes: Process & Project, Component Software Processes, Software Development process Models, Project Management Process.	4
Unit 2	Software Requirements Analysis & specification: Value of Good SRS, Requirement Process, Requirements Specification, Other Approaches for Analysis, Validation	5

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Unit 3	Software Planning & Scheduling: Responsibilities of Software Project Man agent, Project Planning, Project Scheduling, Project Staffing, People CMM, Risk Management	4
Unit 4	Design: Design Concepts, Function Oriented Design, Object Oriented Design, Detail Design, Verification, Metrics	4
Unit 5	Coding & Testing Coding & Code Review, Testing, Unit Testing, Black Box Testing, White Box Testing, Program Analysis Tools, Integration Testing, System Testing	5
Unit 6	Software Reliability & Quality Management Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI capability Maturity Model, Six Sigma, Agile Software Development & Extreme Programming, Agile Project Management	4

Exp. No.	Experiment List
1.	To realize the phases in software development project, overview, need, coverage of topics
2.	To assign the requirement engineering tasks
3.	To perform the system analysis : Requirement analysis, SRS
4.	To perform the function oriented diagram : DFD and Structured chart
5.	To perform the user's view analysis : Use case diagram
6.	To draw the structural view diagram : Class diagram, object diagram
7.	To draw the behavioural view diagram : Sequence diagram, Collaboration diagram
8.	To draw the behavioural view diagram : State-chart diagram, Activity diagram
9.	To perform various testing using the testing tool unit testing, integration testing

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10.	To demonstrate the performance of server and web portal using modern engineering tools

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

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	RohitKhura n	Vikas Publishing House Pvt. Itd	2nd	2010

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Course Details:

Class	T.Y. B. Tech. Semester-VI
Course Code and Course Title	1ICCC319-**Aptitude and Reasoning** Part-IV
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial /Practical	0/0/2
Credits	1
Evaluation Scheme: ISE / ESE	50

Course Outcomes (COs): **Upon successful completion of this course, the student will be able to:**	
1ICCC319_1	Solve problem based on basic and advance probability, Permutation and Combination (K3)
1ICCC319_2	Solve problem based on Syllogism, graphs, data interpretations (K3)
1ICCC319_3	Solve problem based on gaming round (K3)
1ICCC319_4	Demonstrate on Resume writing skill, closed, advanced grammar, Synonyms and Antonyms (K3)

Course Contents:		
Sr. No.	**Unit Name**	**Contact Hours**
Unit 1	Advance Probability, Advance Permutation, Combination	04
Unit 2	Statement Assumption, Syllogism	04
Unit 3	Mixed Bar Graph, Pie Chart, Data Interpretation(Avg & Ratio Proportion based)	05
Unit 4	Gaming Round OR Capgemini	04

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Unit 5	Company Specific Revision forArithmetic (S.T.D., Time RateWork) Revision of Calendar Reminder theorem Power Cycle	04
Unit 6	Verbal Ability Revision Part 1, Verbal Ability Revision Part 2, Interview Etiquettes & Grooming	05

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Quantitative Aptitude for Competitive Examinations	R.S. Agarwal	S Chand	Revised	2022
2.	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Agarwal	S Chand	Revised	2024
3.	English Grammar And Composition	P C Wren, H Martin	S Chand	2nd	2019

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