Walchand College of Engineering

(Government aided autonomous institute)

Vishrambag, Sangli. 416415

Credit System for Minor Certification

in

Computer Science and Engineering

Batch 2019-2022

Offered by

Department of Computer Science and Engineering

Credit System for Minor Certification in Computer Science and Engineering

offered by Department of Computer Science and Engineering (2019-22)

Sr.No.	Year	Sem	Course Code	Course Name	L/I	T	P	Hrs	Credits	ISE-1/ T1/ LA1	MSE	ISE-2/T2/ LA2	ESE
1	SY	I	1CSM01	Data Structures	3	-	-	3	3	10	30	10	50
2		II	1CSM02	Software Engineering	3	-	-	3	3	10	30	10	50
3	TY	I	1CSM03	Database Engineering	3	-	-	3	3	10	30	10	50
4		II	1CSM04	Computer Network	3	-	-	3	3	10	30	10	50
5	B.Tech	I	1VA0018	Machine Learning	2	-	-	2	2	30	-	-	70
6		II	1VA0020	Cyber Security	2	-		2	2	-	-	-	100
7		II	1VA0021	Fundamentals of IOT	2	-		2	2	-	-	-	100
8		II	1VA0030	Application of IOT	1	-	2	3	2	30	-	30	40
Total					19	-	2	21	20				

Dr. N.L. Gavankar

Mr. A.R. Surve

Ms. S.S Rokade

Mr. M.K. Chavan

Mr. S.D. Pujari

Mrs. A.M. Chimanna

Walchand College of Engg. Sangli CSE DEPT.

Dr. M.A. Shah
HoD CSE
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Title of the Course: Data Structures Course code: 1CSM01	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses: Programming in C including pointers and File Handling

Textbooks:

1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures, A Pseudocode Approach With C",Cengage Learning, Second Edition, 2014
2. S. Lipschutz, "Data Structures,Schaum's" Outlines Series, Tata McGraw-Hill, 2013
3. Ellis Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 2008

References:

1. Yashavant Kanetkar, "Understanding pointers in C", BPB Publication, 4th Edition, 2009
2. Jean-Paul Tremblay, Paul. G. Soresan, "An introduction to data structures with Applications", Tata Mc-Graw Hill International Editions, 2nd edition 1984
3. N. B. Venkateshwarlu, E. V. Prasad, "C and Data Structures", S. Chand and Company, 2010

Course Objectives :

1. To impart basic concepts of Data Structure and analyse efficiency of algorithm
2. To make the students understand elementary linear and non-linear data structures and make the students capable of applying appropriate data structure for modelling a given problem.
3. To provide a foundation to analyse and apply various searching and sorting techniques.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Explain the fundamental concepts of various linear and non-linear data structures with ADTs and write recursive algorithms.	2	Understanding
CO2	Identify suitable data structures to be used and apply it to solve the various problems.	3	Applying
CO3	Compare and analyse various searching and sorting methods based on inherent properties of data structures and the complexity of algorithms.	4	Analyzing

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3													
CO2	3	3		2									3	
CO3	3	3		2									3	

1: Low, 2: Medium, 3: High

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10

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ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1 Introduction **Basic Concepts:** Algorithm, Pseudocode, ADT, Data Structure, Algorithmic Efficiency **Recursion:** Direct and Indirect recursion, Recursive solution of Towers of Hanoi.	**Hrs. 5**
Module 2 Linked Lists Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as traversal, Searching, insertion and deletion, Representation of polynomials using linked lists	**Hrs. 7**
Module 3 Stacks and Queues Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using sequential and linked organization, Insert and Delete operations, Circular queue: representation and implementation, Priority queue	**Hrs. 8**
Module 4 Trees Basic terminology, binary trees and its representation, binary tree traversals, AVL Tree, Binary Search Trees, Heaps and its operations	**Hrs. 7**
Module 5 Graphs Terminology and Representation of graphs using adjacency matrix, adjacency list and adjacency matrix, Traversals Depth First and Breadth First, Minimum Spanning Tree	**Hrs. 5**
Module 6 Searching & Sorting Technique **Search:** Importance of searching, Sequential, Binary, Fibonacci search **Sorting:** Importance of sorting, Insertion, Heap, Quick sort, Merge sort **Hashing: Introduction** Hash functions.	**Hrs. 7**

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1:

- Explain the fundamental concepts and write recursive algorithms.

Module 2:

- Demonstrate concept of linked list and use of ADTs to solve the problem

Module 3:

- Discuss theoretically and use data structures like stacks and queues as the programmers' tool to develop the solution.

Module 4:

- Explain non-linear data structure tree and its basic operations.

Module 5:

- Discuss and implement graphs using various representations.

Module 6:

- Explain and compare various searching and sorting techniques.

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Title of the Course: Software Engineering Course Code: 1CSM02	L	T	P	Cr
	3	0	0	3

Desired requirements:

Textbooks:

1. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publishers, 3rd Edition, 2005.
2. Ian Sommerville, "Software Engineering", Addison-Wesley, 7th Edition, 2004.
3. James Rumbaugh, "Object Oriented Modeling and Design with UML", Pearson, 2nd Edition,2004.

References:

1. Roger S. Pressman, "Software Engineering: Practitioner's Approach", McGraw Hill, 7th Edition, 2010.
2. Jawadekar W.S., "Software Engineering: principles and practices". Tata McGraw Hills, 1st Edition.
3. Gillies A.C. and Smith p., "Managing Software Engineering: CASE studies and solutions". Chapman and Hall, London.

Course Objectives :

1. To unleash the orientation & importance of engineering approach to software development.
2. To infuse the knowledge of software processes & models practiced at IT industries.
3. To acquaint students with the SDLC phases in detail.
4. To emphasize on Design aspect with UML technology.
5. To inculcate the importance of software quality by virtue of software testing methods.

Course Learning Outcomes:

CO	After the completion of the course the student Learner be able to	Bloom's Cognitive	
		level	Descriptor
CO1	grasp industry processes on software development to become IT industry-savvy.	2	Understanding
CO2	prepare with the spirit of team-working and importance of using artifacts at SDLC phases.	3	Applying
CO3	distinguish and evaluate procedural & OO based development practices.	4	Analyzing
CO4	integrate expertise on CASE tools usage especially for design and testing of software to undertake industrial strength software projects.	6	Creating

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CO-PO Mapping : *1: Low, 2: Medium, 3: High*

PO and PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1			2								3	2	2	
CO2			1	2				2	2	3				
CO3					2									
CO4			2									2		3

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE I	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on pedagogy such as brainstorming, role play, quiz, presentations etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Software Processes	**6 Hrs.**
Need of software engineering approach, ETVX model, Project management process, Software development process & models, Configuration management process, Process management process.	
Module 2: Software Quality & Project Planning	**2 Hrs.**
Quality objectives, PAF Model, Quality standards CMM & ISO, Project management plan, Cost estimation using COCOMO, Risk management.	
Module 3: Software Requirement Analysis & Function Oriented Design	**2Hrs.**
Software requirement process, Characteristics & Components of SRS. Design principles, Module level concepts.	

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Module 4: Object Oriented Design with UML Diagrams	**2 Hrs.**
UML model, UML diagrams: Use-case, Class, Activity, State-chart, Interaction, Sequence, Collaboration, Component, Deployment.	
Module 5: Coding	**3Hrs.**
Best programming practices such as TDD & pair programming, verification.	
Module 6: Software Testing	**5Hrs.**
Testing purpose and concepts, test process, Levels of testing, Black Box and White Box Testing.	

Module wise Measurable Students Learning Outcomes :

The student should be able to:

Module 1: Software Processes

- Awareness of Software processes & Models used at IT.

Module 2: Software Quality & Project Planning

- Grasp quality parameters and standards such as PAF.
- Know & prepare project planning phases and responsibilities with WBS.

Module 3: Software Requirement Analysis & Function Oriented Design

- As per SDLC phase understand requirement process and need of SRS artifact. Understand functional & non-functional requirements as well. Realize the importance of design aspects, concepts & methodology. Practices to learn how to draw DFD on requirements.

Module 4:Object Oriented Design with UML & Continual Integration

- Building capability to draw & distinguish various UML diagrams on requirements. Articulating usage of Continual integration with Agile model process frameworks.

Module 5: User Interface Design & Coding

- Know the UI aspect of interactive design for enterprise applications.
- Learn best coding standards/practices such as TDD, pair programming and how to verify code.

Module 6: Software Testing

- Integrate expertise on how testing helps in quality of software. Know testing concepts, levels of testing. Learn and practice Black & white box testing along with test case generations using open- source tools.

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Title of the Course: Database Engineering Course code: 1CSM03	L	T	P	Cr
	3	0	0	3

Desired requirements: Data structures

Textbooks:

Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", Mc-Graw Hill, 4th Edition 2002 / 6th Edition 2011/ 7th Edition

References:

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, 3rd Edition. 2002
2. Ramez Elmasri and Shamkant Navathe, Benjamin Cummings, Fundamentals of Database Systems, 3rd Edition, 1999 / later

Course Objectives :

1. To enable the students to understand various functional components of database system and basic concepts of conceptual database design.
2. To use conceptual designs to prepare database schemas.
3. To make the students understand the relational model and the theoretical issues associated with relational database design.
4. To make the students learn and use SQL, understanding of essential DBMS concepts such as: database security, indexing, transaction processing, and concurrency.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Bloom's Cognitive Descriptor
CO1	**Explain** the fundamental database management system	2	Understanding
CO2	**Apply** ER model and relational model for database design of given problem	3	Applying
CO3	**Demonstrate** SQL query using open source or commercialize database.	3	Applying
CO4	**Illustrate** the fundamentals for database storage, indexing, transaction and concurrency control	2	Understanding

CO-PO Mapping :

PO and PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1	1												1	
CO2		2												
CO3					3								1	
CO4	1	2												

1: Low, 2: Medium, 3: High

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)

Ms. S. S. Rokade

ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Introduction	**5 Hrs.**
General introduction to database systems, its advantages and applications, Database System Architecture, Database users and Administrator, Data models, Database management system, Database languages, View of Database, Data Models.	
Module 2 Database Modelling using ER Model	**7 Hrs.**
Entity set, Entity types, attributes, Notations, Relationship sets, Relationship types, Keys- super key, candidate key, primary key, Extended Features of ER Model-Generalization, Specialization and aggregation	
Module 3 Relational Model & SQL	**8 Hrs.**
Structure of Relational Database, Reduction of ER model into Relational schemas, Schema-instance distinction, Referential integrity and foreign keys. Introduction to SQL, Data definition statements with constraints, Insert, Update and Delete, Set Operations, Aggregate functions group by and having clauses	
Module 4 Relational Database Design	**7 Hrs.**
Importance of a good schema design, Motivation for normal forms, Atomic domains and 1NF, Dependency theory - functional dependencies, Closure of a set of FD's, Definitions of 2NF, 3NF	
Module 5 Data Storage and Indexing	**5 Hrs.**
File organization, Organization of records in files, Data Dictionary, Database Buffer, and **Indexing**: Concept, Ordered Indices-Primary, Secondary	
Module 6 Transaction, Concurrency Control and Database security	**7 Hrs.**
Transaction processing: Concept, ACID properties, Transaction states , Serializability **Concurrency control**: Lock-based protocols, Timestamp - based Protocols, **Database security**: Authentication, Authorization and access control, Discretionary Access Control (DAC), Mandatory Access Control (MAC)	

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1

- explain the concept of database system and its applications.
- demonstrate database system architecture and various database models.

Module 2

- understand the problem statement and preparing the conceptual model using ER diagram..

Module 3

- describe and implement relational data model using any RDBMS..
- extract information from the database using SQL, compare various SQL constructs

Module 4

- demonstrate and use the concept of functional dependency and various normal forms for "good" database design

Module 5

- explain file organization concepts and various indexing techniques

Module 6

- explain the concept of transaction and implement transactions.
- describe and compare various concurrency control mechanisms and apply the concepts for hands-on experimentation.
- Illustrate different aspect of database security

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Title of the Course: Computer Network Course code: 1CSM04	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses:

Textbooks:

1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, 4th/5th Edition, 2017.

References:

1. William Stallings, "Data and Computer Communications", Prentice Hall(PHI) , 8th /9th Edition, 2010/2011
2. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education,5th /7th edition, 2012/2016

Course Objectives : The objective of the course is to provide a foundation and clear understanding of various concepts of networking which will give students insight about how the computer networks actually work in real time. Objectives are further divided as:

1. Elaborate various terminologies related to computer networking
2. Give information about networking components
3. Make students aware about various concepts and networking model behind day to day networking
4. Explain protocols used in real time applications

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	**Describe** fundamentals related to Computer networking	2	Understanding
CO2	**Interpret** various techniques behind networking	3	Apply
CO3	**Distinguish** among networking concepts and protocols	4	Analyze

CO-PO Mapping :

PO and PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1													
CO2		2												
CO3		2												1

1: Low, 2: Medium, 3: High

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

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Course Contents:	
Module 1 : Introduction	**5 Hrs.**
A Basic Model of Communication, Networks, Networking Concepts and Terminology: Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity, Data and Signals.	
Module 2: Transmission Media and Networking Devices	**6 Hrs.**
Guided Transmission Media, Wireless Transmission, Types of electronics communication, Electromagnetic spectrum, Networking Devices	
Module 3 : Networking Basics	**6 Hrs.**
Evolution of network, Introduction to Computer Networks, Physical & Logical Topology, Introduction to types of network, internetworking, Intranet,Internet	
Module 4 : Network Models and Routing	**6 Hrs.**
The OSI Model, Layers of OSI Model, TCP/IP Protocol Suit, Routing in Internet, Switching.	
Module 5 :Addressing	**8 Hrs.**
Physical Addressing, Logical Addressing: IPv4 addresses , IPv6 addresses, internetworking, Address Mapping Protocols	
Module 6 : Application Layer Protocols	**8 Hrs.**
The application Layer, Working of EMAIL, File Transfer Protocol (FTP), WWW, HTTP, Domain Name Space (DNS), SNMP	

Module wise Measurable Students Learning Outcomes :
After the completion of the course the student should be able to:

Module 1:
- Understand basic networking terminologies

Module 2:
- Differentiate types of transmission and networking devices

Module 3:
- Understand Idea behind computer networking and different types of network

Module 4:
- Articulate the knowledge of networking models and routing in Internet

Module 5:
- Apprehend the concept of addressing and address mapping protocol

Module 6:
- Learn application layer protocols used in real time application

Mr. M.R. Chavan

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Course Information	
Course Code	1VA0018
Course Name	Machine Learning
Desired Requisites:	Familiarity with basic knowledge of mathematics and programming is desirable.

Teaching Scheme		Examination Scheme (Marks)		
Lecture	2 Hrs/week	**ISE**	**ESE**	**Total**
Tutorial	-	30	70	100
Practical	-			
Interaction	-	**Credits: 2**		

Course Objectives	
1	To introduce the basic concepts of machine learning from a mathematically well motivated perspective.
2	To introduce the importance of data and preprocessing techniques in machine learning.
3	To demonstrate use of machine learning techniques in real life application.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Understand different machine learning algorithms and its usage in real life application.	Understand
CO2	Explain and predict how data affects the results of machine learning.	Apply
CO3	Apply machine learning techniques like classification, clustering, regression, etc., to solve a real-life problem.	Analyze
CO4	Measure strengths and weaknesses of various machine learning approaches	Evaluate
CO5	Build an application using machine learning techniques.	Create

Module	Module Contents	Hours
I	**Introduction to machine learning** Introduction to Machine Learning: Supervised, Unsupervised Classification, Regression, Reinforcement Learning.	3
II	**Linear Algebra Review** Linear Algebra, Mathematical concepts required for ML – Probability and Statistics	4
III	**Linear Regression and Logistic Regression** Linear Regression with One Variable, Linear Regression with Multiple Variables, Logistic Regression with example	6
IV	**Regularization** Overfitting, Underfitting, L1 and L2 regularization	2
V	**Decision** tree and **Support Vector Machines** Decision tree, Random forest, Performance measures, Classification using Support Vector Machines	6

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Prof. S.D. Pujari

VI	**Unsupervised Learning** Clustering, Dimensionality Reduction, Anomaly Detection, Recommender Systems	5

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1											2	
CO2	2	1											2	
CO3	3												2	1
CO4	1	2												
CO5			2										2	1

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment
The assessment is based on 1 in-semester examinations in the form of ISE of 30 marks. Also there shall be 1 End-Sem examination (ESE) of 70 marks. ISE shall be typically on modules 1, 2 and 3 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

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Course Information	
Course Code	1VA0020
Course Name	Cyber security
Desired Requisites:	

Teaching Scheme		Examination Scheme (Marks)			
Lecture	2 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	0	0	100	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	To acquire knowledge in security services, goals and mechanism. .
2	To understand the basic concept of Cryptography and Network Security.
3	To exhibit knowledge to secure corrupted systems, protect personal data,and secure computer networks in an Organization.
4	To develop a basic understanding of various types of cyber-attacksthrough which attackers target the computer system.
5	To understand the legal perspective of cyber-crime including the IndianITA 2000 and its latest amendment.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Understand and explain the fundamental concepts of informationsecurity, cyber security and data privacy in today's environment.	Understand
CO2	Apply information security and network security concept stoindividual computer; network as well as to any web application.	Apply
CO3	Demonstrate the ability to identify different cyber-crimes andrespective penalties in IT act.	Analyze

Module	Module Contents	Hours
I	**Introduction to information and cybersecurity** Introduction SecurityGoals, Attacks, Servicesand Mechanisms, A Model for Network Security	2
II	**Symmetric key encryption, stream andblock ciphers** Symmetric Ciphers StreamCipher, Classical Encryption Techniques. Symmetric Cipher Model,Transposition Techniques, Data Encryption Standard(DES), Advanced Encryption Standard (AES)	8
III	**Asymmetric key encryption** Asymmetric Ciphers Public key Cryptographyand RSA, Diffie Hellmankey Exchange	2

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IV	**Web browser and email security** Cyber security, Cyber- crime, Web Browsers and Email Security, Guidelinesto choose Web Browsers, Security measures for using Web Browsers, Antivirus, Email Security,IDS, Firewall	4
V	**Online banking security** Online Banking, Credit Card & UPI Security, POS& ATM Security Online Banking Guidelines, Mobile Banking, Security Techniques., Security for Debit & Credit, Security Techniques, Cards, UPI & e-Wallet Security, Security for using Micro- ATMs & POS (Point of Sales).,Proxy Servers and Anonymizers, Phishing and Identity Theft, Password Cracking, Networks. Key, loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless	8
VI	**Cyber-attacks and IT acts** Need of Cyber laws: The Indian context, The Indian IT Act, Digital signature and the Indian IT Act, Amendments to the Indian IT Act, Cyber- crime and punishment	2

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3											2		
CO2		3											3		
CO3	3	3											3		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based End-Sem examination (ESE) of 100 marks. 50% weightage on modules 1 to 3 and 50% weightage on modules 4 to 6.

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Course Information	
Course Code	1VA0021
Course Name	Fundamentals of IOT
Desired Requisites:	Basic Programming Skills

Teaching Scheme		Examination Scheme (Marks)			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	-	-	100	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	To illustrate the basic concepts of Internet of Things.
2	To illustrate basic concepts of IIOT.
3	To demonstrate Working of IOT devices.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Explain how to design and develop Applications in IOT.	Understand
CO2	To Illustrate how IOT devices works	Apply
CO3	To access different operations using IOT applications.	Analyze

Module	Module Contents	Hours
1.	**Introduction to Internet of Things** Introduction, Physical design of IOT, Logical Design of IOT	02
2.	**Introduction to Internet of Things** IOT Enabling Technology, Sensing, Actuation.	02
3.	**Basics of IOT Networking** Introduction to Networking	02
4.	**Basics of IOT Networking** IOT Network Protocols, Connectivity Technology	02
5.	**IOT and Communication Protocols** Communication Protocols	02
6.	**IOT and Communication Protocols** Sensor Networks, Machine-to-Machine Communications	02
7.	**Interoperability in IoT** Introduction to Arduino Programming	02
8.	**Interoperability in IoT** Introduction to Python programming	02
9	**Interoperability in IoT** Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.	02
10.	**Industrial IoT** Introduction to IIOT,AWS-IOT	02

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11.	**Industrial IoT** Introduction to Lora-wan, Node MCU IOT Platform.	02
12	**Case Study** Agriculture, Health care, Smart city, Activity Monitoring, Energy, Environment	02
13	**Hands on session on IOT using Tinker Cad**	02

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1		1											1	
CO2	2	2	3										2	
CO3		3	2		3								2	1

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on End-Semester examination (ESE) of 100 marks. ESE shall be on all modules with nearly equal weightage on all modules.

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Course Information	
Course Code	1VA0030
Course Name	Application of IOT
Desired Requisites:	Basic Programming Skills

Teaching Scheme		Examination Scheme (Marks)			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	1 Hrs/week	**Credits: 2**			

Course Objectives	
1	To share in-depth knowledge of Internet of Things.
2	To deliver hand-on experience in the field.
3	To inculcate interest in different domain areas.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	To apply the knowledge gained for solving different problems.	Understand
CO2	To Demonstrate basics of IOT	Apply
CO3	To analyse and evaluate the solution and compare them	Analyze

Module	Module Contents	Hours	
		I	**P**
1.	**Arduino basics and Introduction to Python programming.**	1	2
2.	**Study of Raspberry pi.**	1	2
3.	**Implementation of IOT with Raspberry pi.**	1	2
4.	**Blink an LED with an Arduino in Tinkrcad.**	1	2
5.	**Smart gate system using Tinkercad.**	1	2
6.	**Traffic light system using Tinkercad**	1	2
7.	**Study of IOT cloud platforms such as Think Speak AWS IOT core, Microsoft Azure IOT Hub, Cisco IOT cloud connect**	1	2
8.	**Study Amazon web services-IOT**	1	2
9	**Implementation of Amazon S3 Amazon DB, AWS Lambda, Amazon SNS**	1	2
10.	**Study of Node MCU IOT Platform.**	1	2
11.	**Introduction to Lora-Wan**	1	2
12	**Mini project implementation using concepts of IOT**	1	2

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13	**Mini project implementation using concepts of IOT**	1	2
14	**Activity(Project)**	1	2

	Programme Outcomes (PO)												**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1		1											1	
CO2	2	2	3										2	
CO3		3	2		3								2	1

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	After completion of first four Modules	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	After completion of 5-8 Modules	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	After completion of whole syllabus.	40

Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per thenature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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