SHIVAJI UNIVERSITY, KOLHAPUR - 416 004,
MAHARASHTRA
PHONE : EPABX – 2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४, महाराष्ट्र
दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी विभाग ०२३१–२६०९०९३/९४
Estd. 1962
"A++" Accredited by NAAC(2021)
With CGPA 3.52

SU/BOS/Sci & Tech/519 **Date: 13/07/2023**

To,

The Principal/ Director,
All affiliated Engineering Colleges/ Institute,
Shivaji University, Kolhapur.

Subject: Regarding revised syllabus of **B. Tech. Programme (Branch) Part III (Sem V-VI) Computer Science & Engineering (Artificial Intelligence and Machine Learning)** under the Faculty of Science & Technology

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabus and Structure of **B. Tech. Programme (Branch) Part III (Sem V-VI) Computer Science & Engineering (Artificial Intelligence and Machine Learning)** under the Faculty of Science & Technology.

This revised syllabus and equivalence shall be implemented with effect from the academic year 2023-2024 (i.e. from June 2023) onwards. A soft copy containing syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in. (Online Syllabus).

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dr. S. M. Kubal
Dy. Registrar

Copy to:

1	The I/c Dean, Faculty of Science & Technology	6	Appointment Section
2	The Chairman, Respective Board of Studies	7	Affiliation Section (T.1)
3	Director, Examination and Evaluation	8	Affiliation Section (T.2)
4	Eligibility Section	9	P.G.Admission Section
5	O.E. – 4	10	P.G Seminar Section

SHIVAJI UNIVERSITY KOLHAPUR

SYLLABUS

THIRD YEAR B.Tech (CBCS)

BACHELOR OF TECHNOLOGY

IN

Computer Science and Engineering (Artificial Intelligence & Machine Learning)

To be introduced from the academic year 2023-24

(w.e.f. June 2023 onwards)

	THIRD YEAR CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) - CBCS PATTERN																
	SEMESTER - V																
		TEACHING SCHEME							EXAMINATION SCHEME								
Sr. No.	Course Subject / Title	THEORY			TUTORIAL		PRACTICAL		THEORY				ORAL / PRACTICAL		TERMWORK		
		Credits	No. of Lectures	Hours	Credits	No. of Hours	Credits	No. of Hours	mode	marks	Total Marks	MIN.	MAX	MIN.	MAX	MIN.	
1	PCC-AIML501 Internet of Things	3	3	3	1	1			CIE	30	100	40			25	10	
									ESE	70							
2	PCC-AIML502 Computer Algorithm	4	4	4	1	1			CIE	30	100	40			25	10	
									ESE	70							
3	PCC-AIML503 Cloud Computing	3	3	3			1	2	CIE	30	100	40	25	10	25	10	
									ESE	70							
4	PCC-AIML504 Project Management	3	3	3	1	1			CIE	30	100	40			25	10	
									ESE	70							
5	OEC-AIML505 1.Information Security 2.E-Commerce and Digital Marketing	3	3	3					CIE	30	100	40					
									ESE	70							
6	PCC-AIML506 Java Programming	3	3	3			1	2					50	20	50	10	
7	HM-AIML507 Business English				1	2							50	20	25	10	
	Total (SEM-V)	***19***	***19***	***19***	***4***	***5***	***2***	***4***			***500***		***125***		***175***		

	THIRD YEAR CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) - CBCS PATTERN																
	SEMESTER - VI																
		TEACHING SCHEME							EXAMINATION SCHEME								
Sr. No.	Course Subject / Title	THEORY			TUTORIAL		PRACTICAL		THEORY				ORAL / PRACTICAL		TERMWORK		
		Credits	No. of Lectures	No. of Hours	Credits	No. of Hours	Credits	No. of Hours	mode	marks	Total Marks	MIN.	MAX	MIN.	MAX	MIN.	
1	PCC-AIML601 Introduction to Machine Learning	3	3	3			1	2	CIE ESE	30 70	100	40			25	10	
2	PCC-AIML602 Feature Engineering	3	3	3	1	1			CIE ESE	30 70	100	40			25	10	
3	PCC-AIML603 Database Engineering	4	4	4			1	2	CIE ESE	30 70	100	40	50	20	25	10	
4	PCC-AIML604 System Programming and Compiler Construction	3	3	3	1	1			CIE ESE	30 70	100	40			25	10	
5	OEC-AIML605 1.Cyber Security 2.Human Computer Interaction	3	3	3					CIE ESE	30 70	100	40					
6	PCC-AIML606 R Programming	3	3	3			1	2					50	20	25	10	
7	PW-AIML607 Domain specific Mini Project						1	2					50	20	25	10	
	Total (SEM-VI)	***19***	***19***	***19***	***2***	***2***	***4***	***8***			***500***		***150***		***150***		
	Total	**38**	**38**	**38**	**6**	**7**	**6**	**12**			**1000**		**275**		**325**		

CIE- Continuous Internal Evaluation

ESE – End Semester Examination

• Theory and Practical Lectures : 60 Minutes Each	• Total Marks for T.Y. Sem V & VI : **800 + 800 = 1600**
• Total Credits for T.Y. Sem V & VI: **50 (SEM-V: 25 + SEM-VI:25)**	
• In theory examination, there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **PCC-AIML**: Professional Core Course – CSE (AIML) are compulsory
2. **HM-AIML**: Humanities and Management- CSE (AIML) are compulsory
3. **PW-AIML**: Project Work-– CSE (AIML) are compulsory
4. **OEC-AIML**: Open Elective Course – To be offered to Inter departmental students

Third Year B. Tech CSE (AIML) Sem – V

1. Internet of Things (PCC-AIML501)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE: 70 Marks CIE : 30 Marks
Tutorial : 1 Hr/Week	**Term work:** 25 Marks
Practical : -	**Practical :** --

Pre-requisites: Fundamentals of Computer Network and Internet, Basics of C / C++ Programming language

Course Objectives

1. To learn Internet of Things Technology and basics of RFID, Sensor technologies
2. To know the basics of IoT systems like Raspberry Pi, Arduino, and Banana Pi
3. To aware students about wireless communication technologies and IoT applications

Course Outcomes

After completion of this course students will be able to:

1. Understand basic concepts of IoT
2. Describe fundamental mechanisms of Internet of Things
3. Learn and implement RFID technology in various applications
4. Write programs for basic applications using raspberry pi
5. Understand and implement different communication technologies in IoT systems
6. Analyze the components needed to prototyping of various IoT application

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction:** IoT, Objects / Things, IoT definitions, IoT frame work, Identification technologies, Internet in IoTs	4
2	**Fundamental of IoT mechanisms:** Identification of IoT objects and services, Traffic characteristics, scalability and interoperability, security and privacy, Communication capabilities, Mobility support and device power, Sensor technology, RFID technology and satellite technology	6
3	**Radio Frequency Identification Technology:** RFID, IoT objects and services, principles of RFID, Components of an RFID system, RFID reader, Tags, middleware, Sensor nodes, connecting nodes, networking nodes	6
4	**IoT systems:** Hardware and Software: Introduction to Raspberry Pi, Familiar with Raspberry Pi hardware, study of I/O ports, Programming with Raspberry Pi: Study of operating system, simple programs in C / C++, Introduction with Python programming	8
5	**Communication Technologies:** WPAN Technologies: Introduction to IEEE 802.15.4 standard, Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, IEEE 802.11 WLAN, Cellular and mobile technologies	6
6	**IoT Application Examples:** Smart Metering, advanced metering infrastructure, e-health / Body Area Network, City Automation (Smart City), Automotive Application, Environmental Applications, Home Automation, Control Applications	6

Term Work

- Minimum of 10 tutorials to be given to students based on above topics

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	The Internet of Things - Connecting objects to the web	Hakima Chaouchi	Wiley Publications 1st Edition	1,3
2	Building the Internet of Things	Daniel Minoli	Wiley Publications	2
3	Raspberi Pi Beginner's Guide	Gareth Halfacree	Raspberi Press 1st Edition	4
4	Introduction to Wireless Telecommunications systems and Networks	Gary J. Mulett	Cengage Learning (India Edition).	5,6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Raspberry Pi for Dummies	Sean McManus, Mike Cook	A Wiley Brand
2	Architecting the Internet of Things	Bernd Scholz, Reiter	Springer

Third Year B. Tech CSE (AIML) Sem – V

2. Computer Algorithm (PCC-AIML502)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 4 Hrs/Week	**Theory :** ESE : 70 Marks CIE : 30 Marks
Tutorial : 1 Hr/Week	**Term work :** 25 Marks
Practical : - -	**Practical :** - -

Pre-requisites: Data Structures, Discrete Mathematics, Engineering Mathematics, Programming Concepts

Course Objectives

1. To introduce algorithm design methods / techniques with analysis
2. To devise algorithm for given problem statement
3. Introducing parallel algorithms

Course Outcomes

After completion of this course students will be able to:

1. Understand and demonstrate algorithm design methods with analysis.
2. Analyze algorithm space and time complexity by using recurrence relation
3. Devise algorithm for given problem statement using various methods
4. Create solution using search and traversal techniques
5. Categorize the problem to determine polynomial and non-polynomial based on its nature
6. Understand and demonstrate basic concepts of parallel algorithms

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Divide and Conquer:** What is algorithm, Algorithm Specification, Recurrence relations, Performance Analysis, Randomized Algorithms Divide and Conquer: The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Strassen's matrix multiplication	10
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
3	**Dynamic Programming:** The general method, Multistage graphs, All pair shortest paths, 0/1 knapsack, Reliability design, Traveling Sales person problem.	7
4	**Basic Traversal and Search Techniques and Backtracking:** 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. Backtracking - The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle, and Graph Coloring.	10
5	**NP Hard and NP Complete Problems:** Basic Concepts, Cook's Theorem, Introduction to NP Hard Graph Problems, NP Hard Scheduling Problems	7
6	**Introduction to Parallel Algorithm:** Computational Model and Fundamental Techniques and Algorithms – PRAM, MESH and HYPERCUBE	7

Term Work

It should consist of minimum 10-12 tutorials based on following guidelines

1. A batch of students will be assigned different algorithms and expected to analyze the algorithms in terms of time and space complexity
2. Solve different exercise problems in text book mentioned in syllabus

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Fundamentals of Computer Algorithms	Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran	Universities Press, Second Edition	All Units

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Fundamentals of Algorithmics	Gilles Brassard, Paul Bratley	Pearson Education

Third Year B. Tech CSE (AIML) Sem – V

3. Cloud Computing (PCC-AIML503)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE :70 Marks CIE : 30 Marks
Tutorial :--	**Term work:** 25 Marks
Practical :- 2 Hrs/Week	**Practical :** OE (25 Marks)

Pre-requisites: Operating Systems, Fundamentals of Computer Networks

Course Objectives

1. To be familiar with Cloud Computing and its application
2. To learn basics of virtualization and its importance
3. To evaluate in-depth analysis of Cloud Computing capabilities

Course Outcomes

After completion of this course students will be able to:

1. Understand the concepts of cloud computing
2. Illustrate architecture and programming in cloud
3. Study the virtualization of cloud computing services
4. Illustrate Data-Intensive Computations in Cloud Computing
5. To evaluate in-depth analysis of Service in Cloud Computing capabilities
6. Define the platforms for development of cloud applications.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Overview of computing paradigm**: Recent trends in Computing - Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Evolution of cloud computing - Business driver for adopting cloud computing. **Introduction to Cloud Computing**: Cloud Computing -Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers. Properties, Characteristics& Disadvantages - Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing. Role of Open Standards	6
2	**Cloud Computing Architecture:** Cloud computing stack - Comparison with traditional computing architecture (client/server),Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services. Service Models (XaaS) - Infrastructure as a Service (IaaS),Platform as a Service (PaaS), Software as a Service (SaaS).Deployment Models, Public cloud, Private cloud, Hybrid cloud, Community cloud	6
3	**Virtualization:** Introduction and benefits, Implementation Levels of Virtualization, Virtualization at the OS Level, Virtualization Structure, Virtualization Mechanism, Open-Source Virtualization Technology, Xen Virtualization Architecture, Binary Translation with Full Virtualization, Paravirtualization, Virtualization of CPU, Memory and I/O Devices	6
4	**Infrastructure as a Service (IaaS):** Introduction to IaaS - IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine (VM). Resource Virtualization - Server, Storage, Network. Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing (storage as a service). Renting, EC2 Compute Unit, Platform and Storage, pricing, customers. **Platform as a Service (PaaS):** Introduction to PaaS - What is PaaS, Service Oriented Architecture (SOA). Cloud Platform and Management computation, storage **Software as a Service (SaaS):** Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS	6
5	**Service Management in Cloud Computing**: Service Level Agreements (SLAs), Billing& Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data - Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing **Cloud Security:** Infrastructure Security - Network level security, Host level security, Application-level security. Data security and Storage - Data privacy and security Issues, Jurisdictional issues raised by Data location: Identity & Access Management, Access	6

	Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	
6	**Case study on Open Source and Commercial Clouds** – Amazon EC2, Google Compute Engine, Microsoft Azure, Cloud foundry, OpenStack	6

Term Work

- Minimum of 10 Experiments to be performed from the list given below.

Experiment List

1. Working and Implementation of Infrastructure as a service, Software as a service
2. Working and Implementation of Platform as a services
3. Installing a private cloud
4. Installing OS on a Virtual Machine Monitor
5. Live migration of virtual OS
6. Assignment to install and configure Google App Engine
7. Hands on virtualization using Xen Server
8. Deployment and Configuration options in Amazon (AWS)
9. Deployment and Configuration options in Google Cloud
10. Deployment and Configuration options in Microsoft Azure
11. Building and Deploy
12. 'HelloWorld' app for the cloud
13. Case study on Amazon EC2 to learn about Amazon EC2, Amazon Elastic Compute Cloud is a central part of Amazon.com's cloud computing platform, Amazon Web Services. How EC2 allows users torrent virtual computers on which to run their own computer applications

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Cloud Computing for Dummies	Judith Hurwitz, R. Bloor, M.Kanfman, F.Halper	Wiley India Edition	1,2,4,5
2	Cloud Computing Black Book	Jayaswal, Kallakurchi, Houde, Shah	Dreamtech Press	3
3	Cloud Security	Ronald Krutz and Russell Dean Vines	Wiley-India	5
4	Enterprise Cloud Computing	Gautam Shroff	Cambridge	6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Cloud Computing Bible	Barrie Sosinsky	Wiley India
2	Cloud Computing: A Practical Approach	Anthony T.Velte, et.al	McGraw Hill
3	Cloud Security & Privacy	Tim Mather, S.Kumaraswammy, S.Latif	SPD, O'REILLY
4	Cloud Computing: Principles and Paradigms	Rajkumar Buyya, James Broberg, Andrzej Goscinsk	Wiley India
5	Google Apps	Scott Granneman	Pearson

Third Year B. Tech CSE (AIML) Sem – V

4. Project Management (PCC-AIML504)

TEACHING SCHEME	EXAMINATIONS CHEME
Theory: 3 Hrs/Week	**Theory:** ESE:70Marks CIE: 30Marks
Tutorial: 1 Hrs/Week	**Termwork:** 25 Marks
Practical:	**Practical :–**

Pre-requisites: Software Engineering Concepts

Course Objectives

1. Provide students with a basic understanding of project management principles and practices
2. Demonstrate competency in the creation and management of a project plan
3. Understanding the software quality metrics and quality assurance

Course Outcomes

After completion of this course students will be able to:

1. Understand project characteristics and various stages of a project
2. Understand the conceptual clarity about project organization and feasibility analyses
3. Analyze the learning and understand techniques for Project planning, project risk, scheduling and Execution
4. Resolve IT related crises using project management
5. Manage the phases and infrastructure people of IT projects
6. Understand risk monitoring and control

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction to Project Management:** Project and Project Management(PM),Role of project Manager, System view of PM, Organization, Stake holders, Project phases and life cycle, Context of IT projects, process groups, mapping groups to Knowledge areas	5
2	**Project Integration Management:** Strategic planning and project selection, Developing a Project Management Plan, Directing and Managing Project Work, Monitoring and Controlling Project Work, Performing Integrated Change Control, Closing Projects or Phases	6
3	**Project Scope, Time and Cost management:** Planning Scope Management, Collecting Requirements, Defining Scope, Creating the Work Breakdown Structure, Validating Scope, Controlling Scope Planning Schedule Management, Defining Activities, Sequencing and Estimating Activity, Resources &Duration, Developing & Controlling Schedule Basic Principles of Cost Management, Planning Cost Management, Estimating Costs, Determining the Budget, Controlling Costs	9
4	**Quality Management:** Importance, Planning Quality Management, Performing Quality Assurance, Controlling Quality, Tools and Techniques for Quality Control,	5
5	**Human Resource management:** Importance, keys to managing people, human resource planning, acquiring, developing and managing project	5
6	**Risk management:** Importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control.	6

Term Work

It should consist of 10–12 tutorials based on the above topics

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Information Technology Project Management	Kathy Schwalbe	Cengage Learning 7E	All Units

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Effective Project Management	Robert K.Wysocki	Wiley India 7 Edition
2	Project Management Core Textbook	Mantel Jr.,Meredith, Shafer, Sutton, Gopalan	Wiley India Edition
3	IT Project Management	Joseph Phillips 3E	McGraw Hill Edu.

Third Year B. Tech CSE (AIML) Sem – V

5_1. Information Security (OEC-AIML505)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE : 70 Marks CIE : 30Marks
Tutorial : -	**Term work: -**
Practical : -	**Practical :** -

Pre-requisites: Computer Network, Modular Arithmetic &Number Theory, C / C++

Course Objectives

1. To introduce the principles of Crypto-Systems
2. To expose students to various security services and mechanisms used
3. To make the students aware of the security features of PGP, S/MIME, Digital Signatures, IPSec & SSL & to explore non-cryptographic and software vulnerabilities

Course Outcomes

After completion of this course students will be able to:

1. Learn classical encryption techniques
2. Understand principles of Crypto-systems
3. Compare and analyze various security services and mechanisms
4. Apply and use the features of PGP, S/MIME, DSA, IPSec, SSL in their profession
5. Take precautions of their personal computing system from possible threats and attacks
6. Explore newer vulnerabilities and provide the solutions to them

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Classical Encryption Techniques and DES**: The OSI Security Architecture, Symmetric Cipher Models: Substitution Techniques, Transposition Techniques, Block Cipher Principles, The Data Encryption Standard.	6
2	**Public-Key Cryptosystems, Key Management and Authentication :** Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Authentication requirements, Authentication functions, MAC and Hash functions and their requirements	7
3	**Digital Signatures and Authentication Applications**: Digital Signature, Digital Signature Standard, Authentication applications - Kerberos, X.509 Authentication service	5
4	**Electronic mail and IP security:** Email Security - PGP, S/MIME, IP Security-IP Security Architecture, Authentication Header and Encapsulating Security Payload	5
5	**Web and System Security:** Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, Intruders, Intruder Detection, Password Management, Firewall Design Principles, Trusted Systems.	6
6	**Non-Cryptographic Protocol Vulnerabilities**: DoS and DDoS, Session Hijacking and Spoofing, Pharming attacks. Software Vulnerabilities - Phishing, Buffer Overflow, Format String attacks, SQL Injection	7

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Cryptography and Network security principles and practices	Williams Stallings	Pearson Education (LPE), Seventh Edition	1 To 5
2	Cryptography and network security	Atul Kahate (TMGH)	Second	6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Handbook of Applied Cryptography	- Menezes, A. J., P. C. Van Oorschot, and S. A. Vanston	--

Third Year B. Tech CSE (AIML) Sem – V

5_2. E-Commerce & Digital Marketing (OEC-AIML505)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE : 70 Marks CIE : 30 Marks
Tutorial :-------	**Term work:** -------
Practical : - ----	**Practical :** ------

Course Objectives

1. To get the knowledge about business advantages of the e-commerce and digital marketing and its importance
2. To develop a digital marketing plan and to make SWOT analysis
3. To get introduced with various digital channels, business tools in social networking

Course Outcomes

After completion of this course students will be able to:

1. Identify the importance of the e-commerce and digital marketing for business success
2. Learn basics of B2C, B2B with process model
3. Create a digital marketing plan, starting from the SWOT analysis and defining a target group
4. Identifying digital channels, business tools used in social networking
5. Create E-business web site and E-commerce website
6. Demonstrate the optimization of web site using business tools

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction to E-commerce, frameworks & architectures Introduction**: The term "E-Commerce", Business models related to E-Commerce, Technical and economic challenges Frameworks and architectures: Actors and stakeholders, Fundamental sales process, Technological elements	5
2	**B2C business, B2B business**: The process model and its variants, The pricing challenge, The fulfillment challenge, The payment challenge, B2Cbusiness and CRM, B2C software systems B2B business: The process model and its variants, B2B software systems Basic of marketing: Digital Marketing, Mobile Marketing, Email Marketing, Content Marketing	6
3	**Introduction to Digital Marketing** How digital technologies transformed marketing?, Definitions digital marketing and multichannel marketing- Paid, owned and earned media, the growing range of digital marketing platform, digital marketing strategy-key features of digital marketing strategy, applications of digital marketing, benefits of digital marketing, alternative digital business models, difference between e-commerce and e-business, challenges in developing and managing digital marketing strategy	7
4	**Online market place analysis & macro environment Introduction**: situation analysis for digital marketing, the digital marketing environment, understanding customer journeys, online consumer behavior and implications for marketing, business models for e-commerce **Online macro environment**: Technological forces, economic forces, political forces, Legal forces, social forces and cultural forces	7
5	**Digital Marketing Strategy and relationship marketing Digital Marketing strategy development**: how to structure digital marketing strategy, strategy implementation **Relationship marketing using digital platforms**: Introduction, the challenge of customer engagement, customer lifecycle management	6
6	**Marketing Communications** **Marketing Communications using digital media channels**: Introduction, search engine marketing, online public relations, email marketing and mobile text messaging, social media and viral marketing, offline promotion techniques.	5

Assignment List may be given on following topics within group of 4-5 students

1. Define a target group (working in groups)
2. Creating web sites, MS Expression (working in groups)
3. Writing the SEO content (working in groups)
4. Google Ad Words (working in groups)
5. CRM strategy (working in groups)
6. Cases in Digital marketing (Case Study)
7. E-Business and E-Commerce management strategy implementation and practice (Case study)

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Introduction to E-commerce: Combining Business & Information Technology,	Martin Kutz	bookboon.com 1 Edition	Unit 1 & 2
2	Digital Marketing: Strategy, Implementation and Practice	Dave Chaffey, Fiona Ellis-Chadwik	Pearson Education. 6 Edition	Unit 3 ,4,5,6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	The Beginner's Guide to Digital Marketing (2015).	Pulizzi, J.(2014)	Epic Content Marketing, McGraw Hill Education.
2	“Electronic Commerce”	Jeffrey F Rayport and Bharat Bhasker	Tata McGraw Hill
3	Basic of Marketing (2016)	Raj Sexena	McGraw Hill Education (India)

Third Year B. Tech CSE (AIML) Sem – V

6. Java Programming (PCC-AIML506)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :-**
Tutorial :- -	**Term work:** 50 Marks
Practical :- 2 Hrs/Week	**Practical :** POE (50 Marks)

Pre-requisites: Basic knowledge of C programming and object-oriented programming

Course Objectives

1. To expose the students with the JAVA concepts using inheritance, interface, package
2. To learn how to implement reliable and secure application using exception handling and the ability to write program to perform file operations
3. To understand how to design components with java Swing API, Multithreading and Collection framework

Course Outcomes

After completion of this course students will be able to:

1. Articulate the principle of object-oriented problem solving & programming
2. Illustrate code reusability, security and abstraction using inheritance, package and interface
3. Develop reliable and user-friendly applications using exception handling and file handling
4. Create desktop apps using SWING and event handling
5. Use and also illustrate multithreading concepts & collection framework
6. Apply network programming concept & will be able to use JDBC for database connectivity

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Unit 1: Fundamental Programming in Java:** The Java Buzzwords, The Java Programming Environment- JVM, JIT Compiler, Byte Code Concept, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, exploring the string class, Input and Output, Big Numbers, Arrays, use of command line arguments **Objects and Classes:** Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Access control, Static Fields and Methods, this keyword	5
2	**Unit 2: Inheritance, Interface and Package:** **Inheritance:** Definition, Super classes, and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword, Final Classes and Methods, Abstract Classes and Methods, Inner Classes, garbage collection**.** **Interfaces:** Defining an Interface, implementing an Interface **Packages:** Class importing, creating a Package, naming a Package, Using Package Members, Managing Source and Class Files.	6
3	**Unit 3: Exception and I/O Streams** **Exception:** Definition, dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, finally clause. **I/O Streams:** Byte Stream – Input Stream, Output Stream, Data Input Stream, Data Output Stream, File Input Stream, File Output Stream, Character Streams, Buffered Stream, Scanner class options, Catching Multiple Exceptions, Re-throwing and Chaining	5
4	**Unit 4: Graphical User Interfaces using AWT and Swing** **Introduction to AWT components**, Frame, Applet, Introduction to the Swing, Swing components. **Layout Management:** Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout **Event Handling:** Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types	6
5	**Unit 5: Multithreading, Collections** **Multithreading:** Processes and Threads, Runnable Interface and Thread Class, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Thread States, Thread Properties **Collections:** Collection Interfaces, Concrete Collections-List, Queue, Set, Map, the Collections Framework	7
6	**Unit 6: Database Programming and Networking** **Database Programming:** The Design of JDBC, The Structured Query Language, Basic JDBC Programming Concepts, Query Execution. **Networking:** Overview of Networking, Networking Basics, Sockets, reading from and Writing to a Socket, Writing the Server Side of a Socket	7

Term Work:

- 25 marks for performance in practical and experiments as a part of continuous evaluation.
- Minimum of 10 to 12 Experiments to be performed from the list given below.

Experiment List

1. Write a program to develop class employee with constructor to initialize instance variables. Provide Set method and Get method for instance variables. Also provide a method to raise salary of each employee by 10%.
2. Create class SavingsAccount. Use a static variable annualInterestRate to store the annual interest rate for all account holders. Each object of the class contains a private instance variable savingsBalance indicating the amount the saver currently has on deposit. Provide method calculateMonthlyInterest to calculate the monthly interest by multiplying the savingsBalance by annualInterestRate divided by 12this interest should be added to savingsBalance. Provide a static method modifyInterestRate that sets the annualInterestRate to a new value. Write a program to test class SavingsAccount. Instantiate two savingsAccount objects, saver1 and saver2, with balances of Rs 2000.00 and Rs 3000.00, respectively. Set annualInterestRate to 4%, then calculate the monthly interest and print the new balances for both savers. Then set the annualInterestRate to 5%, calculate the next month's interest and print the new balances for both savers.
3. Create abstract class Shape which has instance variables side, area and perimeter And methods calculateArea(), calculatePerimeter() as abstract methods and display() as concrete method. Write subclasses which extend Shape class like Triangle, Rectangle, Circle, Cube and Square and override abstract methods and display methods in subclass take instance variable if needed as per the formula. And use parameterized constructor to initialize instance variables using “this” reference variable. Write Test class and Create a reference variable of Shape which will hold the objects of all the sub classes and calculate respective area, perimeter and display the results.
4. Write a program to develop class student having instance variable rn and method getno and putno. Create class Test derived from Student having instance variable as part1, part2 and method getmarks and putmarks. Define an Interface Sport having constant variable sportwt and method putwt. Derive Class Result from Test which implements this interface having data members as total. Display the result.
5. Write a program to implement mathematical package for arithmetic, statistical and trigonometric operations.
6. Write a class having two integer data members. Provide facility to add, subtract, multiply and divide these numbers. If addition goes above 1000, it generates TooLongAddition exception. If subtraction is below 0, it generates Negative Answer exception. If multiplication is above 5000, it generates TooLongMultiplication exception.
7. Write a program to accept a file name from user and perform read, write/append operations on it
8. Take Employee information such as name, employee id, department, designation, age, city, phone from user and store it in the file using DataOutputStream and FileOutputStream and Retrive data using DataInputStream and FileInputStream and display the result.
9. Write a GUI based program to create a student registration and Login.
10. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
11. Write a program to demonstrate collection and generics.
12. Implementation of different database operations using JDBC

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Core Java- Volume I	Core Java- Volume I	Core Java- Volume I	Unit 1 to Unit 4
2	Core Java- Volume II	Core Java- Volume II	Core Java- Volume II	Unit 5 and Unit 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	JAVA-The Complete Reference	Herbert Schildt	McGraw Hill, Oracle Press Ninth edition
2	Head First Java	Eric Freeman Elisabeth Robson Bert Bates Kathy Sierra	O'Reilly Publication 3rd edition

Third Year B. Tech CSE (AIML) Sem – V

7. Business English (HM-AIML507)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : -	**Theory :** --
Tutorial :- 2 Hrs/week	**Term work:** 25 Marks
Practical :-	**Practical:** OE (50 Marks)

Pre-requisites: Soft Skills

Course Objectives

1. Develop basic skills to deal with people in business situations
2. Write and read basic business reports, letters, e-mails etc.
3. Develop confidence to deal with people and basic issues in the business world

Course Outcomes

After completion of this course students will be able to:

1. Learn to communicate with others in practical, business oriented situations
2. Learn to express themselves in English with greater fluency, accuracy and confidence
3. Learn to handle themselves in English in a variety of business contexts, from negotiating, to using the telephone, to making presentations, to socialising
4. Enhance the skills of listening, speaking, pronunciation skills, as well as business vocabulary
5. Acquire the communicative competencies crucial for appropriate workplace behaviour
6. Learn group discussion skills as well as dealing with complains

UNIT NO.	UNIT NAME & DETAILS
1	**Getting acquainted with professional culture:** • First day at work • Induction program • Company hierarchy • Behaviour pruning
2	**Vocabulary building and Reading comprehension:** • Reading techniques and comprehension skills • Synonyms and antonyms • One-word substitution • Prefixes and Suffixes • Idioms and phrases • Homonyms and homographs • Irregular verbs like (write, wrote, written) • Situational vocabulary
3	**Effective vocal Communication:** • Effective Meetings • Video Conferencing • Effective Telephonic Communication • Breaking Bad news
4	**Effective written Communication:** • Business letters • Resume Writing • E-mail writing • Report writing • Minutes of meeting • Memo writing
5	**Public speaking and Presentation Skills:** • Preparing and conducting presentation • Body language • Overcoming stage fear • Best practices • Interviewing and being interviewed
6	**Miscellaneous:** • Group Discussion • Handling Complains • Negotiation Skills • Business Etiquettes

Term Work

- Individual Performance or Presentation to be Evaluated Continuously
- Group Activity Performance to be Evaluated in the Batch
- Tutorials or Write up

Tutorials List

1. Case study of organizational hierarchy
2. Match the following on antonyms & synonyms
3. Irregular verb list (like choose, chose, chosen)
4. Word building by using prefixes suffixes (e.g. ir-regular, im-possible)
5. Minutes of Meeting – writing
6. Report writing (any report)
7. Comprehension/paragraph writing
8. Business letter / resume writing / email writing
9. PPT presentation on any non-technical topic. PPT handout should be attached
10. Do's & Don'ts of group discussion & Business etiquettes

Text Books / Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Technical Communication	Ashraf Rizvi	Tata McGraw Hill, 2005	1, 2, 3, 4, 6
2	Effective Business Communication	M. V Rodriques	Concept Publishing Company Pvt. Ltd. 2013	1, 2, 3, 4, 6
3	English for Technical Communication	K. R. Laxminarayan	SCITECH 2nd Edition 2014	2, 4, 3
4	Technical English	Dr. M. Hemamalini	Wiley, 2014	2, 3, 4, 5

Third Year B. Tech CSE (AIML) Sem – VI

1. Introduction to Machine Learning (PCC-AIML601)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70 Marks **:** CIE 30 Marks
Tutorial : -----	**Term work:** 25 marks
Practical : 2 Hrs/Week	**Practical :** -----

Pre-requisites: Linear Algebra, Statistics, Probability Theory

Course Objectives

1. To understand Machine Learning Aspects
2. To understand primitives in learning process by Computer
3. To understand nature of problems solved with Machine Learning

Course Outcomes

After completion of this course students will be able to:

1. Explain Machine Learning concepts
2. Analyze the Machine Learning model
3. Design solution using Classification and Decision trees algorithm
4. Explain supervised machine learning algorithm for classification problems
5. Describe unsupervised learning techniques
6. Explain neural network useful for machine learning

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction to Machine Learning:** **Machine Learning:** Definition, Terminology, Types of learning, Machine Learning Problem categories, Machine learning architecture, process, Lifecycle, Performance measures, tools and framework, data visualization, **Regularization:** Over fitting &Under fitting, cost function, Regularized Linear Regression, Regularized Logistic Regression,	6
2	**Regression:** **Simple regression:** Hypothesis, cost function, parameter learning with gradient descent, learning rate, Gradient Descent for linear regression. **Multivariate Linear Regression**: Multiple features, hypothesis functions, Gradient Descent for multiple variables, Feature scaling, polynomial regression,	6
3	**Classification- logistic regression and Decision trees** **Logistic Regression** – Definition, Hypothesis representation, decision boundary, cost function, Gradient Descent for Logistic Regression. Multiclass Classification, **Decision trees**: definition, terminology, the need, advantages, and limitations. Constructing and understanding Decision trees, common problems with Decision trees, Decision tree algorithms, random forest, examples,	7
4	**Classification: Naïve Bayes and Support Vector Machine** Naïve Bayes Classifier. Instance-based classifier – K- Nearest Neighbor Classifier, Bayesian Network, Hidden Markov Model. Support Vector Machine: What is SVM, Kernel Trick, Cost Function, and Decision Trees vs. Support Vector Machine,	7
5	**Unsupervised learning:** Clustering, K Means clustering, Hierarchical clustering, Association Rule mining,	4
6	**Neural Networks**: Neuron representation and model, Hypothesis for neuron, cost function, solution of a problem using single neuron. Gradient descent for a neuron. Neural network, Multiclass classification with neural network. Learning in neural network-back propagation algorithm,	6

Term Work

- It should consist of minimum 10-12 experiments based on the above topics

Experiment List

1. Study and installation of python
2. Study and implementation of Simple Linear Regression
3. Write a program to implement Multiple Linear Regression
4. Write a program to implement Logistic Regression
5. Write a program to implement Multi-class Classification
6. Write a program to implement Neural Network
7. Write a program to implement Back propagation algorithm of Neural Network
8. Write a program to implement K-means Clustering
9. Write a program to implement association rule mining
10. Write a simple program to identify next point of time series analysis
11. Write a program to build naïve bay's classifier for text data
12. Demonstrate simple recommendation system

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Machine Learning with Python- an approach to applied ML	Abhishek Vijayvargia	BPB Publications	All Units
2	Practical Machine Learning	Sunila Gollapudi	Packt Publishing Ltd	1,2
3	Machine Learning	Tom M. Mitchell	McGraw Hill Education; First Edition	1,2,3,4,5

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Machine Learning for dummies	John Paul Muller	Willey Publication
2	Introduction to Machine Learning	Ethem Alpaydin	PHI 2nd Edition-2013

Third Year B. Tech CSE (AIML) Sem – VI

2. Feature Engineering (PCC-AIML602)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70 Marks : CIE 30 Marks
Tutorial : 1 Hr/Week	**Term work :** 25 Marks
Practical : -----	**Practical :** -----

Pre-requisites: Basics of Computer

Course Objectives

1.To know basics of feature engineering

2. To know basics of feature representation

3. To understand feature selection transformation process

Course Outcomes

After completion of this course students will be able to:

1. Explain basics of feature engineering

2. Explain representation and generation of feature engineering

3. Describe Features of Text and Categorical Data

4. Explain Feature Selection

5. Explain Feature Transformations

6. Explain Feature Learning

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction to Feature Engineering:** Motivating example – AI powered communications, Importance of feature engineering, introduction of feature engineering, Evaluation of machine learning algorithms and feature engineering procedures, Feature understanding, Feature improvement – cleaning datasets, Feature selection – removing bad attributes, Feature construction, Feature transformation	6
2	**Basics of Feature Representation:** Scalars, Vectors, and Spaces, Dealing with Counts, Binarization, Quantization or Binning, Log Transformation, Feature Scaling or Normalization, Min-Max Scaling, Standardization (Variance Scaling), ℓ2 Normalization, Feature Selection	5
3	**Features of Text and Categorical Data:** Bag-of-X: Turning Natural Text into Flat Vectors, Filtering for Cleaner Features, Atoms of Meaning: From Words to n-Grams to Phrases, Tf-Idf: A Simple Twist on Bag-of-Words, Putting It to the Test, Deep Dive, Encoding Categorical Variables	7
4	**Feature Selection:** Importance of Feature Selection in Machine Learning, Goals of Feature Selection, Classes of Feature Selection Methodologies, Effect of Irrelevant Feature, Overfitting to Predictors and External Validation, Greedy Search Methods- Simple Filters, Recursive Feature Elimination, Stepwise Selection	6
5	**Feature Transformations:** Intuition, Derivation, Linear Projection, Variance and Empirical Variance-Vector Formulation, General Solution of the Principal Components, Transforming Features	6
6	**Feature Learning:** Parametric assumptions of data, Non-parametric fallacy, feature learning algorithms, Reconstructing the data, The Bernoulli RBM, Extracting PCA components from MNIST, Extracting RBM components from MNIST, Using RBMs in a machine learning pipeline	6

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Feature Engineering Made Easy	Sinan Ozdemir, Divya Susarla	Packt Publishing	Unit 1 & 6
2	Feature Engineering for Machine Learning: Principles and Techniques for data scientist	Alice Zheng & Amanda Casari	Oreilly	Unit 2, 3, 4 & 5

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Feature Engineering and Selection: A Practical Approach for Predictive Models	Feature Engineering and Selection: A Practical Approach for Predictive Models	1st Edition ISBN 13-978-1-138-07922-9

Third Year B. Tech CSE (AIML) Sem – VI

3. Database Engineering (PCC-AIML603)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 4 Hrs/ Week	**Theory** ESE: 70 Marks CIE : 30 Marks
Tutorial : -	**Term work:** 25 Marks
Practical : -2 Hrs/ Week	**Practical :** POE (50 Marks)

Pre-requisites: Set Theory, Operating System, Data Structures

Course Objectives

1. To understand fundamental concepts of database systems
2. To gain familiarity with SQL and DBMS
3. To understand indexing, transaction management, recovery and security techniques

Course Outcomes

After completion of this course students will be able to:

1. Understand fundamental concepts of database systems and E-R Diagrams
2. Study and apply SQL queries to manage database
3. Analyze & construct good database design
4. Know data storage and indexing technique
5. Understand transaction concepts and concurrency control techniques
6. Learn concept of failures in database, appropriate recovery and security techniques

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction to databases and E-R model:** **Introduction**: Purpose of Database Systems, View of data, Database architecture, Database users and administrator. **E-R Model**: Entity sets, Entity types, attributes, Notations, Relationship set, Relationship types, Keys- Super keys, candidate key, primary key, Extended features of ER Model- Generalization, Specialization and aggregation	8
2	**Relational Model and SQL:** **Relational Model:** Structure of relational database, Reduction of ER model into Relational schemas, Schema-instance distinction, Referential integrity and foreign keys, Relational Algebra and Example queries. **SQL:** Introduction to SQL, Data definition statements with constraints, Insert, Update, Delete, Set Operations, Aggregate functions group by and having clauses, Nested Queries, Views, Complex queries, Joins **PLSQL:** Triggers, Stored Procedures, PL/SQL Processing with Cursors, PL/SQL Stored Functions	10
3	**Functional Dependency and Normalization:** Importance of good schema design, Motivation for normal form, Atomic domains and 1NF, Dependency Theory: Functional dependencies, Closure of set of FD's, Properties of them, Multivalued dependencies and 4NF, Join dependencies and 5NF, Temporal functional dependencies	8
4	**Data Storage and Indexing:** File organization, organization of records in files, Data Dictionary, Database Buffer **Indexing**: Concept, Ordered Indices-Primary, Secondary, Multilevel, B+ Tree index, Hashing, Hash Indices, Dynamic hashing, Multiple Key access, Bitmap Indices	8
5	**Transaction Management and Concurrency Control** **Transaction Processing**: Concept, ACID properties, Transaction states, Storage structure, Implementations of atomicity, isolation and durability, Serializability, Testing of Serializability. **Concurrency Control:** Lock based protocols, Timestamp based Protocols, Validation based Protocols, Multiple Granularities, Deadlock handling	8
6	**Recovery System** Failure Classification, Storage structure, Implementation of stable storage, Recovery and Atomicity, Log based recovery, Checkpoints, Shadow Paging, buffer Management in crash recovery	6

Term Work

- Minimum of 10-12 Experiments to be performed from the list given below

Experiment List

1. Draw an E-R Diagram of any organization
2. Converting E-R Diagram into Relational Table
3. Installation and Demonstration of DBMS Oracle/MySQL/SQL Server/PostgreSQL etc.
4. Study and Implementation of Data Definition Language(DDL) Queries (e.g. create, alter and drop tables)
5. Study and Implementation of Data Manipulation Language(DML) Queries. (e.g. Insert, delete, update and select statements)
6. Study and Im
7. Implementation of Basic SQL SELECT statement for displaying/Extracting data from single multiple tables
8. Implementation of SQL constructs for aggregating data, use of group by, having clause.
9. Implementation of nested sub queries, complex sub queries
10. Display the results of Join Operations like cross join, self-join, inner join, natural join, left outer join, right outer join and full outer join
11. Create & Update views for any created table
12. Write a program of Database connectivity with any object oriented language
13. Study and Implementation of Triggers
14. Study and Implementation of functions and Stored Procedures

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Database System Concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	6th Edition, McGraw Hill Education.	1,2,3,4,5,6
2	Database Systems - A practical approach to Design, Implementation and Management	Thomos Connolly, Carolyn Beg	3rd Edition, Pearson Education	1,3

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Database Systems – Design, Implementation and Management	Rob & Coronel	5th Edition Thomson Course Technology
2	Fundamentals of Database Systems	Ramez Elmasri, Shamkant B. Navathe	4th Edition, Pearson Education

Third Year B. Tech CSE (AIML) Sem – VI

4. System Programming and Compiler Construction (PCC-AIML604)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory** ESE: 70 Marks CIE : 30 Marks
Tutorial : 1 Hr/Week	**Term work :** 25 Marks
Practical : -------	**Practical :** -------

Pre-requisites: C, Data structures, Automata Theory

Course Objectives

1. To expose the students to the fundamentals of languages and processing
2. To introduce the fundamentals of compilers and their phases.
3. To expose the students to various compiler construction tools.

Course Outcomes

After completion of this course students will be able to:

1. Understand the basics of system programs, Assemblers, Macros, Linkers, Loaders.
2. Understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
3. Understand the compiler phases and compiler construction tools
4. Understand Lexical analysis and various parsing techniques.
5. Apply Syntax directed translations and Syntax Directed definitions to generate intermediate code.
6. Understand code optimizing techniques

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Language Processors**: Introduction, Language processing activities, Fundamentals of language Processing, Language processor development tools: LEX and YACC. Compiler construction tools, cousins of the compiler.	5
2	**Assemblers**: Elements of assembly language programming, A simple assembly scheme, pass structure of assemblers, and Design of a two-pass assembler.	5
3	**Compilers:** Phases of a compiler, Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications.	5
4	**Syntax Analysis:** Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers	7
5	**Syntax Directed Translation and Intermediate Code Generation:** Syntax directed definitions, construction of syntax tree, S-attributed definitions, L-attributed definitions, Intermediate languages, assignment statements, back patching.	6
6	**Code Optimization & Code Generation:** Principle sources of optimization, optimization of Basic Blocks, loops in flow graphs, Peephole optimization, Issues in design of a code generator and target machine, Basic blocks and flow graphs, Next use information and simple code generator, code generation from DAGs.	8

Term Work

Minimum of 10 to 12 tutorials should be given based on the above mentioned topics

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	System Programming and operating systems	D. M. Dhamdhere	2ndEdition (TMGH)	1,2
2	Compilers -Principles, Techniques and Tools	A. V. Aho, R .Shethi and J. D. Ullman	Pearson Education	3,4,5,6
3	Lex & YACC Publisher	Doug Brown, John Levine, Tony Mason	2nd Edition O'Reilly Media	For Practicals

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Compiler construction	D.M. Dhamdhere	Mc-Millan

Third Year B. Tech CSE (AIML) Sem – VI

5_1. Cyber Security (OEC-AIML605)

TEACHING SCHEME	EXAMINATION SCHEME
Theory: 3Hrs/Week	**Theory** : ESE 70 Marks : CIE 30 Marks
Tutorial:--	**Termwork:--**
Practical:--	**Practical :–**

Pre-requisites: Computer Networks

Course Objectives

1. To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks
2. To examine secure software development practice
3. To understand key terms and concepts in I.T. ACT

Course Outcomes

After completion of this course students will be able to:

1. Explain the cyber security concepts
2. Describe the cyber security vulnerabilities and prevention techniques
3. Understand techniques used by hackers
4. Understand computer security Technology
5. Explain the different rules and regulations under I.T. ACT
6. Explain the concepts of digital forensics & incident management

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Computer and Network Security:** Introduction to Computer Security - Introduction, How Seriously Should You Take Threats to Network Security?, Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches, Online Security Resources Networks and the Internet : Introduction, Network Basics, How the Internet Works, Basic Network Utilities, Advanced Network Communications Topics	5
2	**Cyber Frauds, DoS, Viruses:** Cyber Stalking, Fraud and Abuse: Introduction, How Internet Fraud Works, Identity Theft, Cyber Stalking, Protecting Yourself Against Cyber Crime. Denial of Service Attacks: Introduction, DoS, Illustrating an Attack, Malware: Introduction, Viruses, Trojan Horses, The Buffer-Overflow Attack. The Sassier Virus/Buffer Overflow, Spyware, Other Forms of Malware, Detecting and Eliminating Viruses and Spyware	7
3	**Techniques Used by Hackers:** Introduction, Basic Terminology, The Reconnaissance Phase,Actual Attacks, Malware Creation, Penetration Testing	6
4	**Computer Security Technology:** Introduction, Virus Scanners, Firewalls, Antispyware, IDS, Digital Certificates, SSL/TLS, Virtual Private Networks, Wi-Fi Security	5
5	**I.T.ACT:** Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyber space, I.T. Act	6
6	**Introduction to Forensics:** Introduction, General Guidelines, Finding Evidence on the PC, Finding Evidence in System Logs, Getting Back Deleted Files, Operating System Utilities, Operating System Utilities, Mobile Forensics: Cell Phone Concepts	7

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Computer Security Fundamentals	Chuck Easttom	Pearson, Third edition	1 to 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Incident Response & Computer Forensics	Jason Luttgens, Matthew Pepe, Kevin Mandia	McGraw-HillOsborneMedia,3rdedition,2014
2	Real Digital Forensics: Computer Security and Incident Response	Keith J.Jones, Richard Bejtlich, Curtis W.Rose	Paperback–Import,2005
3	The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics	John Sammons	Paperback,February24,2012
4	Hacking Exposed: Network Security Secrets & Solutions	Stuart Mc Clure, Joel Scambray, George Kurtz	McGraw-Hill,2005
5	Ethical Hacking	Thomas Mathew	OSBPublisher,2003
6	Virtualization Security: Protecting Virtualized Environments	Dave Shackle ford	JohnWiley&Sons,2012
7	Network Security: The Complete Reference	BRAGG	McGraw Hill Professional, 2012

Third Year B. Tech CSE (AIML) Sem – VI

5_2. Human Computer Interaction (OEC-AIML605)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory** ESE : 70 Marks CIE : 30 Marks
Tutorial : - --	**Term work:** - -
Practical : - -	**Practical** : - -

Pre-requisites: software, computer systems, programming languages, algorithms, graphics, user experience (UX**)**

Course Objectives

1. To study Human Computer Interaction and human computer interface design.
2. To learn Screen designing techniques
3. To learn Design and Development of Mobile Applications

Course Outcomes

After completion of this course students will be able to:

1. Explain the capabilities of both humans and computers from the viewpoint of human information processing
2. Explain principles of User Interface
3. Apply an interactive design process and universal design principles for designing HCI systems
4. Describe and use HCI design principles, standards and guidelines
5. Apply windows based UI interfaces
6. Analyze and identify user models, user support, socio-organizational issues and stakeholder requirement of HCI systems

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introduction**: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession. Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories	6
2	**User Interface and Screen Design:** Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays.	5
3	**Command and Natural Languages:** Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing, Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large	6
4	**Quality of Service:** Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences. Balancing Function and Fashion: Introduction, Error Messages, Non anthropomorphic Design, Display Design, Web Page Design, Window Design, Color	6
5	**Mobile Applications and Information Architecture** Mobile application medium types – SMS, Mobile Websites, Mobile Web Widgets, Mobile Web Applications, Native Applications, Games, Mobile Application Media Matrix, Application Context, Utility Context, Locale Context, Informative Applications, Productivity Application Context, Immersive Full-Screen Applications, Application Context Matrix Information Architecture Introduction, Mobile Information Architecture	7
6	**User Documentation and Online Help** Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process	6

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	The essential guide to user interface design	Wilbert O Galitz	2nd Edition; Wiley DreamTech, 2002.	2,3,4
2	Designing the User Interface	Ben Shneidermann	3rd Edition; Pearson Education, 2009	1,6
3	Mobile Design and Development	Brian Fling	O'Reilly	5

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Human - Computer Interaction	Alan Dix	3rd Edition; Pearson Education, 2003
2	Interaction Design	Prece, Rogers and Sharps	3rd Edition; Wiley DreamTech, 2011
3	User Interface Design	Soren Lauesen	Pearson Education, 2005
4	Human -Computer Interaction	D. R. Olsen	1st Edition; Cengage Learning, 2009

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6. R Programming (PCC-AIML606)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** NA
Tutorial : ----	**Term work:** 25 Marks
Practical : 2 Hrs/Week	**Practical :** POE (50 Marks)

Pre-requisites: Basic knowledge of programming in C, C++, and Python

Course Objectives

2. To understand the basics in R programming in terms of constructs, control statements, string functions
3. To learn to apply R programming for Text processing and Big Data analytics
4. To able to appreciate and apply the R programming from a statistical perspective

Course Outcomes

After completion of this course students will be able to:

1. Write more efficient code using parallel R and vectorization
2. Create artful graphs to visualize complex data sets and functions
3. Find new packages for text analysis, image manipulation, and perform statistical analysis of the same
4. Interface R with C/C++ and Python for increased speed or functionality
5. Develop interfacing of R to other Language
6. Understand Correlation, Regression and implement important statistical terminologies using R

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1	**Introducing R:** Exploring basic features of R, exploring RGUI, exploring RStudio, handling basic expressions in R, variables in R,ROperators, working with vectors, storing, and calculating values in R, creating, and using objects, interacting with users, handling data in R workspace, executing scripts, creating plots, accessing help and documentation in R.	6
2	**Manipulating and Processing Data in R:** R data structures: Vectors, Lists, Matrices, Arrays, Data Frames, Factors, Creating and merging datasets in R, sorting data, putting data into shape, managing data in R using matrices and data frames. R - Decision making and loops.	6
3	**Working with Functions and Packages in R:** Using functions instead of scripts, using arguments in functions, built-in functions in R, introducing packages, working with packages.	6
4	**Data Visualization:** Need for data visualization, Using plots, plotting with base graphics, R Charts & Graphs, Pie Charts, Bar Charts, Boxplots, Histograms, Line Graphs, Scatterplots, plotting and coloring in R, saving graphs to external files, advanced features of R.Creating GUIs in R with gWidgets.	4
5	**R Data Interfaces:** Using c() and scan() command, Reading multiple data values from large files, reading data from RStudio and R, Exporting Data from scripts in R Programming, R interfacing with CSV Files, Excel Files, Binary Files, XML Files, JSON Files, Web Data, R – Database.	4
6	**Statistical Applications Using R Programming:** Basics, the R environment, probability, and distributions, descriptive statistics and graphics, one- and two-sample tests, regression and correlation, analysis of variance and the Kruskal–Wallis test, tabular data, power and the computation of sample size, advanced data handling, multiple regression, linear models, logistic regression, survival analysis, rates, and Poisson regression, nonlinear curve fitting, Supervised and Unsupervised Learning in R Programming.	10

Term Work

- Minimum of 10 Experiments to be performed from the list given below.
- Practical should include the implementation and use of the above mechanisms/Algorithms/Tools /Techniques.
- Implementation should be in R Programming Language.

Experiment List

1. Installation of R and RStudio on Windows and Ubuntu.
2. R interpreter, Introduction to major R data structures like vectors, matrices, arrays, list and data frames.
3. Flow control and loops, looping over list and array, user-defined functions.
4. Installing, loading different packages for file handling.
5. Reading and writing files of different formats using inbuilt packages.
6. Using inbuilt packages for data cleaning.
7. Transformation of data for statistical analysis.
8. Exploring and summarizing data using statistical methods: mean, median, mode
9. Exploring and summarizing data using statistical methods: quantiles, Building contingency table.
10. Data visualization using Scatter Plot, line graph, histogram, bar chart, boxplot.
11. Designing GUI. Continuing with creating GUI for application, building package.
12. Using inbuilt packages for database connectivity and building complete application with GUI and database connectivity.
13. Demonstrate Statistics Examples using R. (Part-1)

i) Linear Regression ii) Multiple Regression
iii) Logistic Regression iv) Normal Distribution v) Binomial Distribution

14. Demonstrate Statistics Examples using R. (Part-2)

i) Poisson Regression ii) Analysis of Covariance iii) Time Series Analysis

15. Case study: Setting up Environment for Machine Learning with R Programming and demonstration of ML supervised (classification) and unsupervised (clustering) algorithm using R.

Textbooks

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Big Data (Black Book)	DT Editorial Services	Dreamtech Press	1 to 5
2	R for Everyone: Advanced Analytics and Graphics (Second edition)	Jared P. Lander	Addison-Wesley Data & Analytics Series	6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	The Art of R Programming	Norman Matloff	William Pollock
2	The Book of R	Tilman M. Davies	William Pollock
3	Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R	Robert Knell,	Amazon Digital South Asia Services Inc, 2013
4	Beginning R – The Statistical Programming Language	Mark Gardener	Wiley, 2013
5	Probability & Statistics with R for Engineers and Scientists	Michael Akritas	2nd Edition on, CRC Press, 2016

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7. Domain Specific Mini Project (PCC-AIML607)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : ----	**Theory :** ----
Tutorial : ----	**Term work:** 25 Marks
Practical : 2 Hrs/Week	**Practical :** POE (50 Marks)

Pre-requisites: Software Engineering Concepts, Object Oriented Concepts

Course Objectives

1. To use analytically engineering approach to solve domain specific real time problem
2. To use the appropriate and newer technologies while developing the project
3. To learn the skills of team building and team work

Course Outcomes

After completion of this course students will be able to:

1. To identify and analyze the problem in detail to define its scope with problem specific data
2. To know various techniques to be implemented for selected problem
3. To analyze the problem and prepare SRS and design document
4. To write code and carry out testing
5. To write a report covering details of the project and give presentation on a project
6. To include professional and ethical behavior

Contents

The students should form group of 4-5 students and every group is supposed to choose a specific domain for the mini project. Further the group should identify the relevant problem in the selected domain and propose the solution, which can be implemented as a mini-project using suitable technology. The synopsis for the same should be submitted by students to their respective guide. The mini-project work should be evaluated by a team of teachers appointed by the department. The evaluation and marking should include Continuous assessment during which the group should give presentation and demonstration of their work done. The Project Report should be submitted by students as a part of Term Work.