DIPLOMA CURRICULUM OF
COMPUTER SCIENCE AND ENGINEERING
(THIRD YEAR)
(5th Semester)

(To be implemented from 2026-27)

Prepared by;

National Institute of Technical Teachers' Training & Research Kolkata
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Vetted by:
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Table of Contents

PROGRAMME TITLE: COMPUTER SCIENCE AND ENGINEERING

SEMESTER – V

SL. No	Category of Course	Code No	Course Title	Study Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	**Program Core**	CSEPC 301 TH1	Internet of Things (IoT)		3	0	0	70	30	-	-	100	3
2		CSEPC 303 TH2	Web Technologies		3	0	0	70	30	-	-	100	3
3		CSEPC 305 PR1	Internet of Things (IoT) Lab		0	0	4	-	-	15	35	50	2
4		CSEPC 307 PR2	Web Technologies Lab		0	0	4	-	-	15	35	50	2
5	**Program Elective**	CSEPE 301 Any One TH3	(A) Programming with Java (B) Data Science: Data Warehousing and Data Mining (C) Advanced Computer Networks		3	0	0	70	30	-	-	100	3
6		CSEPE 303 Any One TH4	(A) Mobile Computing (B) Software Testing (C) Network Forensics		3	0	0	70	30	-	-	100	3
7		CSEPE 305 Any One PR3	(A) Programming with Java Lab (B) Data Science: Data Warehousing and Data Mining Lab (C) Advanced Computer Networks Lab		0	0	4	-	-	15	35	50	2
8	**Open Elective**	OE 301 Any One TH5	**Open Elective – I** (A)Universal Human Values (B)Leadership and Management skills (C)Professional Skills		3	0	0	70	30	-	-	100	3
9	**Summer Internship**	SI 301	Summer Internship-II*		0	0	0	-	-	15	35	50	2
10	**Major Project**	PR 301 PR4	Major Project		0	0	4	-	-	15	35	50	2
TOTAL					**15**	**0**	**16**	**350**	**150**	**75**	**175**	**750**	**25**

***4-week internship after 4th Semester**

SEMESTER - V COURSES

TH1- INTERNET OF THINGS

L	T	P		Course Code: CSEPC 301	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45Hrs		End Term Exam	: 70
				Progressive Assessment	: 30
Pre Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PC

RATIONALE:

The Internet of Things (IoT) is revolutionizing the way devices communicate, interact, and function, creating a connected world that bridges physical and digital spaces. With industries embracing smart solutions in areas like healthcare, agriculture, manufacturing, transportation, and home automation, there is a growing demand for skilled professionals who can design, implement, and manage IoT systems.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Explain Core IoT Concepts, including architecture, components, and communication models.
- Identify IoT Ecosystem Elements, such as sensors, actuators, microcontrollers, communication protocols, and cloud platforms.
- Integrate Hardware Components like Arduino, Raspberry Pi, sensors, and actuators for IoT projects.
- Analyze Sensor Data from IoT devices.
- Identify Common Security Threats in IoT ecosystems, including data breaches, device hijacking, and network vulnerabilities.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Internet of Things (IoT) -** Overview of IoT - Definition and significance of IoT, Historical evolution and future prospects, Applications across various industries, IoT Architecture and Components, Basic architecture - sensors, actuators, connectivity, and data processing, Hardware components: microcontrollers (e.g., Arduino, Raspberry Pi), Software components: operating systems and middleware.	8
II	**Sensors, Actuators, and Data Acquisition:** Sensors and Actuators, Types of sensors: temperature, humidity, motion, etc., Actuators: motors, relays, and control mechanisms, Interfacing sensors and actuators with	10

	microcontrollers, Data Acquisition and Processing - Analog and digital data acquisition methods, Signal conditioning and filtering techniques, Introduction to data processing and storage.	
III	**Communication Protocols and Networking -** IoT Communication Protocols, Overview of protocols: MQTT, CoAP, HTTP, etc., Wireless communication: Wi-Fi, Bluetooth, Zigbee, Lora WAN., Wired communication: Ethernet, Serial communication, Networking Fundamentals - IP addressing and subnetting, Network topologies and architectures, Introduction to IPv6 and its relevance to IoT.	10
IV	**IoT Platforms and Cloud Integration -** IoT Platforms, Overview of popular IoT platforms (e.g., AWS IoT, Google Cloud IoT), Data analytics and visualization tools, Edge computing concepts, Cloud Computing for IoT, Introduction to cloud services: IaaS, PaaS, SaaS, Integration of IoT devices with cloud platforms, Data storage, processing, and management in cloud.	10
V	**IoT Security and Privacy -** Security Challenges in IoT, Common vulnerabilities and threats, Authentication and authorization mechanisms, Data encryption and secure communication, Privacy Considerations - Data privacy laws and regulations, User consent and data ownership, Best Practices for ensuring privacy in IoT applications.	7

REFERENCES:

1.	Internet of Things by Jeeva Jose
2.	Internet of Things by Raj Kamal
3.	Internet of Things (IoT) by Dr. Kamlesh Lakhwani, Dr. Hemant Kumar Gainey, Joseph Kofi Wireko, and Kamal Kant Hiran
4.	Internet of Things: From research and innovation to market deployment by Dr. Ovidiu Vermesan and Dr. Peter Friess
5.	The Internet of Things in the Cloud: A Middleware Perspective by Honbo Zhou
6.	Internet of Things: Architectures, Protocols and Standards by Simone Cirani, Gianluigi Ferrari, Marco Picone, and Luca Veltri
7.	Internet of Things (IoT): Concepts and Applications edited by Dr. Jamil Y. Khan and Dr. Mehmet R. Yuce

TH2- WEB TECHNOLOGIES

L	T	P		Course Code: CSEPC 303	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45 Hrs		End Term Exam	: 70
				Progressive Assessment	: 30
Pre Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PC

RATIONALE:

This course provides a comprehensive understanding of web technologies, covering both client-side and server-side development. Students will learn web architecture, scripting languages like JavaScript and PHP, and database integration to build dynamic and interactive web applications. By the end of the course, they will be equipped with the skills to develop secure, scalable, and efficient web-based systems.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Identify key web development protocols, technologies, and architectures.
- Explain the role of client-side and server-side scripting in dynamic web applications.
- Develop interactive web pages using HTML, CSS, JavaScript, and PHP.
- Compare different web application architectures and evaluate their scalability and security.
- Develop a functional, database-driven web application using modern web development tools.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to www:** Protocols and programs, secure connections, application and development tools, the web browser, what is server, setting up UNIX and LINUX web servers, Logging users, dynamic IP Web Design: Website design principles, planning the site and navigation	8
II	**Web Systems Architecture:** Architecture of Web based systems-client/server (2-tier) architecture, 3-Tier architecture, Building blocks of fast and scalable data access Concepts - Caches-Proxies- Indexes-Load Balancers- Queues, Web Application architecture (WAA)	8
III	**JavaScript:** Client-side scripting, what is JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.	8

IV	**Advance scripting:** JavaScript and objects, JavaScript own objects, DOM and web browser environments, forms and validations, DHTML: Combining HTML, CSS and JavaScript, events and buttons, controlling your browser, Ajax: Introduction advantages & disadvantages, Ajax based web application, alternatives of Ajax, XML, XSL and XSLT: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, XML with application, XSL and XSLT. Introduction to Web Services	8
V	**PHP:** Server-side scripting, Arrays, function and forms, advance PHP Databases - Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting Database, deleting data and tables, PHP my admin and database bugs.	8
VI	**Introduction to Modern Frameworks:** React, Angular, Node JS, Bootstrap, Tailwind CSS.	5

REFERENCES:

1.	"Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson
2.	"Internet & World Wide Web How to Program", Deitel, Deitel, Goldberg, Pearson Education
3.	"Web programming- Building Internet Application", Chris Bales
4.	Web Applications: Concepts and Real-World Design, Knuckles.

PR1- INTERNET OF THINGS LAB

L	T	P	Total Marks: 50	Course Code: CSEPC 305	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60 Hrs		End Term Exam	: 15
				Progressive Assessment	: 35
Pre-Requisite		**: Nil**			
Credit		**: 2**		Category of Course	: PC

RATIONALE:

The Internet of Things (IoT) Lab course provides hands-on experience in designing and implementing IoT-based systems using microcontrollers, sensors, and communication protocols. Students will learn how to collect, process, and transmit data securely using industry-standard tools and cloud platforms. The course emphasizes practical applications of IoT, covering automation, real-time data processing, and secure data communication.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Identify various IoT components, including microcontrollers, sensors, and communication protocols.
- Explain the working principles of IoT devices and protocols like MQTT, HTTP, and Wi-Fi communication.
- Interface sensors and actuators with Arduino and Raspberry Pi for data collection and automation.
- Process real-time sensor data and visualize insights using Python and cloud-based platforms.
- Implement security mechanisms like data encryption to ensure secure IoT communication.
- Develop a functional IoT application, such as a smart home automation system, integrating multiple IoT technologies.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Setting up Arduino and Raspberry Pi boards. Running a basic LED blink program.	6
II	Connecting a temperature and humidity sensor (DHT11) to Arduino. Displaying sensor readings on the Serial Monitor.	6
III	Connecting a PIR motion sensor and LDR (Light Dependent Resistor). Displaying motion and light intensity values.	6

IV	Interfacing a relay module with Arduino. Turning an LED or motor ON/OFF based on sensor input.	6
V	Installing an MQTT broker (e.g., Mosquitto). Sending and receiving messages using MQTT.	6
VI	Connecting an ESP8266 module to a Wi-Fi network. Sending sensor data to a cloud platform (ThingSpeak).	6
VII	Collecting and processing real-time sensor data. Implementing basic edge computing using Python.	6
VIII	Storing IoT sensor data in a CSV file. Visualizing the data using Matplotlib in Python.	6
IX	Encrypting sensor data before transmission. Implementing simple AES encryption using Python.	6
X	Controlling home appliances using a web interface. Turning devices ON/OFF using HTTP requests.	6

REFERENCES:

1.	Pethuru R., Buyya R., Internet of Things: Principles and Paradigms, 1st Edition, Morgan Kaufmann, Cambridge, 2016.
2.	Madisetti V., Bahga A., Internet of Things: A Hands-on Approach, 1st Edition, VPT, Atlanta, 2014.
3.	Hersent O., Boswarthick D., Elloumi O., The Internet of Things: Key Applications and Protocols, 2nd Edition, Wiley, London, 2012.
4.	Pujolle G., Security in IoT: Challenges and Solutions, 1st Edition, Springer, Cham, 2020.
5.	Dalmasso E., Programming the Internet of Things (IoT): Using JavaScript and Node.js, 1st Edition, Apress, New York, 2021.

PR2- WEB TECHNOLOGIES LAB

L	T	P	Total Marks: 50	Course Code: CSEPC 307	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60 Hrs		End Term Exam	: 15
				Progressive Assessment	: 35
Pre-Requisite		**: Nil**			
Credit		**: 2**		Category of Course	: PC

RATIONALE:

This course provides hands-on experience in full-stack web development, covering both frontend and backend technologies. Students will build dynamic web applications using HTML, CSS, JavaScript, PHP, and MySQL while understanding client-server interactions. By the end of the course, they will be able to develop and deploy a fully functional web service application.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Use LAMP Stack (or XAMPP) for web applications.
- Write simple applications with Technologies like HTML, JavaScript, PHP, CSS.
- Connect to Database and get results.
- Develop a fully functional web service application.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Coding Server Client Programs	4
II	Developing Web Application using HTML, JavaScript	6
III	Developing Advanced Web Application Programs using CSS	10
IV	Practicing PHP: Basics	10
V	Practicing PHP: Web Application Development	10
VI	Practicing PHP: MySql - tiered Applications	10
VII	Developing a fully functional Web Service Application using all the Technologies learned in this course.	10

REFERENCES:

1.	"Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,
2.	"Internet & World Wide Web How to Program", Deitel, Deitel, Goldberg, Pearson Education
3.	"Web programming- Building Internet Application", Chris Bales
4.	Web Applications: Concepts and Real World Design, Knuckles

TH3A- PROGRAMMING WITH JAVA

L	T	P		Course Code: CSEPE 301A	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45 Hrs		End Term Exam	: 70
				Progressive Assessment	: 30
Pre-Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PE

RATIONALE:

This course provides a comprehensive introduction to Java programming, covering its history, evolution, and core concepts. Students will learn object-oriented programming (OOP) principles, including classes, inheritance, and interfaces, along with essential topics like exception handling, multithreading, and collections framework.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Explain the history, evolution, and core concepts of Java.
- Use datatypes, variables, arrays, operators, and control statements effectively.
- Implement classes, methods, inheritance, packages, and interfaces.
- Implement exception handling to ensure robust and error-free programs.
- Create and manage multiple threads for concurrent programming

DETAILED COURSE CONTENT:

UNITNO.	TOPIC/SUB-TOPIC	ALLOTED TIME (HRS.)
I.	**Introduction to Java** • History and features of Java • Setting up the Java Development Kit (JDK) • Understanding the Java Virtual Machine (JVM) • Basic Java syntax: data types, variables, operators, control flow statements (if-else, switch, loops) • Input/Output operations (using Scanner and System.out) • Writing a Simple Program • Compiling and executing • Create Packaged class	**6**

II.	Introduction To Object Oriented Programming • Basic concepts of OOPs: objects, classes, data encapsulation, inheritance, Polymorphism etc. • Fundamentals of Class & Object, • New Keyword, reference variable, Members methods of a class, • Access modifiers: public, private, protected, default. • Encapsulation: Hiding data through access modifiers. • Access Control • Static Methods, Static Variables, Static Block • Constructor, Overloading methods, Overloading constructors • Using of final keyword, Finalize method	**9**
III.	**Inheritance** • Basics of Inheritance, members accessibility in inheritance • Types of inheritance: Single, multilevel, hierarchical. • Super keyword. • Method overriding. • Final keyword (for classes, methods, and variables). • Dynamic Method Dispatch, Abstract class, Preventing Overriding, Preventing Inheritance • Interfaces: Defining and implementing interfaces.	**6**
IV.	Interfaces • Purpose of interface • Defining an interface • implementing interfaces • Interface reference variables • Interface with variables • Extending interfaces	**5**
V.	**Arrays and Strings** • Arrays: declaring and initializing arrays, accessing array elements • Multidimensional arrays • String manipulation: creating strings, string methods (length, concat, substring, etc.) • Wrapper classes: Integer, Float, Double, etc.	**6**
VI.	**Exception Handling and File Handling** • Exceptions: types of exceptions, try-catch blocks, finally block • Throwing exceptions • Custom exceptions • File input/output: reading from and writing to files • Using File Input Stream, File Output Stream, Buffered Reader, Buffered Writer	**7**

VII.	**Multithreaded programming** • Basics of threads, • Java threaded model, • defining threads using Runnable interface, • defining threads using Thread superclass, • Multiple threads, Thread Priority values, • Thread Synchronization Using synchronized blocks	**6**
	Total	**45**

REFERENCES:

1.	Programming with Java–E.Balagurusamy, Mc Graw Hill Education, India,2021
2.	Core Java: An Integrated Approach–R. Nageswara Rao, Dream tech Press, India,2018
3.	Java Programming–Poornachandra Sarang,Mc Graw Hill Education, India,2019
4.	Object-Oriented Programming with Java–M.T. Savaliya, BPB Publications, India, 2020
5.	"Advanced Java Programming"–K. Somasundaram, McGraw Hill Education, India, 2017

TH3B- DATA SCIENCE: DATA WAREHOUSING AND DATA MINING

L	T	P		Course Code: CSEPE 301B	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45 Hrs		End Term Exam	: 70
				Progressive Assessment	: 30
Pre Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PE

RATIONALE:

The Data Science: Data Warehousing and Data Mining course introduces students to fundamental concepts in data storage, retrieval, and knowledge discovery. It equips learners with skills to design data warehouses, apply data mining techniques, and extract meaningful insights for decision-making. Through hands-on practice, students will gain expertise in data preprocessing, pattern recognition, and predictive modeling.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Explain the principles of data warehousing and data mining techniques.
- Apply ETL (Extract, Transform, Load) processes to build and manage data warehouses.
- Analyze large datasets to identify patterns, trends, and correlations.
- Evaluate different data mining algorithms for classification, clustering, and association rule mining.
- Analyze real-world data science solutions using data mining tools and techniques.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Data Science and Data Warehousing:** Introduction to Data Science, Importance of Data Warehousing and Data Mining in AI & ML, Overview of Data Warehousing Architecture, ETL Process: Extraction, Transformation, and Loading, Introduction to OLTP vs OLAP, Data Warehouse Schemas (Star Schema, Snowflake Schema), Data Marts and Data Lakes, Introduction to Data Integration & Data Cleaning	9
II	**Data Warehousing Techniques and Tools:** Dimensional Modeling Concepts, Fact and Dimension Tables, Introduction to Data Cube and Data Aggregation, Indexing and Query Optimization, Data Loading and Querying in a Warehouse	9

III	**Introduction to Data Mining:** Basics of Data Mining, Data Preprocessing and Data Cleaning Techniques, Data Reduction and Feature Selection, Handling Noisy and Incomplete Data, Introduction to Classification and Clustering, Popular Data Mining Algorithms, Supervised vs Unsupervised Learning	9
IV	**Data Mining Techniques and Applications:** Association Rule Mining (Apriori Algorithm), Decision Trees and Rule-Based Classification, K-Means Clustering & Hierarchical Clustering, Anomaly Detection and Outlier Analysis, Mining Text and Web Data	9
V	**Advanced Topics in Data Mining:** Introduction to Big Data Mining, Mining Streaming Data, introduction to Deep Learning for Data Mining, Ethical Considerations and Privacy in Data Mining	9

REFERENCES:

1.	Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, 4th Edition, Morgan Kaufmann Publishers, San Francisco, 2022.
2.	Ralph Kimball, Margy Ross, The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, 3rd Edition, Wiley, New Jersey, 2013.
3.	Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson, Boston, 2018.
4.	Paulraj Ponniah, Data Warehousing Fundamentals for IT Professionals, 2nd Edition, Wiley, New Jersey, 2010.
5.	Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Introducing Data Science, 1st Edition, Manning Publications, New York, 2016.

TH:3(c)- ADVANCED COMPUTER NETWORKS

L	T	P	Total Marks: 100	Course Code: CSEPE 301C	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs		End Term Exam	: 70
				Progressive Assessment	: 30
Pre-Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PE

RATIONALE:

Advanced Computer Networks provide in-depth knowledge of modern networking technologies, protocols, and security mechanisms essential for designing and managing efficient communication systems. This course covers topics like switching, routing, wireless networks, SDN, cloud networking, and security to equip students with practical skills. Understanding these concepts enables students to build scalable, secure, and high- performance networks for real-world applications.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Describe the fundamental concepts of advanced networking, including OSI and TCP/IP models, routing protocols, and security mechanisms.
- Explain the working of wireless networks, mobile communications, and software-defined networking (SDN).
- Implement network configurations, VLANs, and routing techniques using simulation tools and real-world scenarios.
- Evaluate different network protocols, security mechanisms, and cloud-based networking architectures.
- Assess network performance, troubleshoot issues, and propose solutions for optimizing network efficiency and security.
- Develop secure and scalable network architectures using modern networking concepts like IoT, SDN, and 5G.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Advanced Computer Networks:** Overview of Computer Networks and Evolution, Network Architectures: Client Server vs. Peer-to-Peer, OSI and TCP/IP Models: Detailed Study, Addressing Mechanisms: IPv4, IPv6, Subnetting and Supernetting	9
II	**Switching and Routing Concepts:** Switching Techniques, Circuit, Packet, and Virtual Circuit Switching, Network Routing Algorithms:	9

	Distance Vector, Link State, Static vs. Dynamic Routing, Routing Protocols: RIP, OSPF	
III	**Wireless and Mobile Networks:** Basics of Wireless Communication, Wi-Fi, Bluetooth, and Cellular Networks (2G, 3G, 4G, 5G), Wireless LANs: IEEE 802.11 Standards, Mobile IP and Handoff Mechanisms	9
IV	**Network Security and Cryptography:** Security Challenges in Modern Networks, Symmetric and Asymmetric Cryptography, Network Authentication Mechanisms, Firewalls, VPNs, and IDS/IPS	9
V	**Software-Defined Networking (SDN) and Cloud Networking:** Introduction to SDN: Concepts and Benefits, OpenFlow and SDN Controllers, Virtualization in Networking (NFV), Cloud Computing and Network Virtualization, Edge and Fog Computing	9

REFERENCES:

1.	Andrew S. Tanenbaum, Computer Networks, 5th Edition, Pearson, New Delhi, 2019.
2.	William Stallings, Data and Computer Communications, 10th Edition, Pearson, New Delhi, 2017.
3.	Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, McGraw-Hill, New York, 2013.
4.	Douglas E. Comer, Internetworking with TCP/IP, 6th Edition, Pearson, Boston, 2014.

TH:4(a)- MOBILE COMPUTING

L	T	P		Course Code: CSEPE 303A	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45 Hrs	**Total Marks: 100**	End Term Exam	: 70
				Progressive Assessment	: 30
Pre-Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PE

RATIONALE:

In the present scenario, many applications have already migrated from the desktop / laptop to mobile and hand-held devices. In the endeavor to remain connected anytime and anywhere with ubiquitous computing environment, mobile device and handheld gadgets plays a vital role. At the same time these devices work in the wireless environment, their security is a major challenge. This course enlightens students in the understanding of mobile computing.

LEARNING OUTCOMES: After completing this course, student will be able to:

- Explain mobile and wireless network,
- Demonstrate the working principles of infrared, cellular and wireless networks,
- Explain various type of multiplexing schemes,
- Explain voice and data compression,
- Explain Global System for Mobile architecture,
- Explain connectivity technologies like Bluetooth, Wi.Fi.

DETAILED COURSE CONTENT:

UNIT NO.	TOPIC / SUB-TOPIC	ALLOTED TIME (HRS.)
1	**Introduction to Wireless and Mobile Network:** Historic background, Cellular Industry, advantages & disadvantages of Mobile systems, Cell concepts, Wireless Network	5
2	**Basics of Wireless & Mobile System:** Wire based and wireless systems, Infrared systems, cellular radio, Concepts of wireless LANS, voice signals-its characteristics, Frequency spectrum, digital signal, Broadband and base band signals	7

3	**Cellular Systems:** Cell layout, path-loss, propagation delay, fading, size and shape of cell, Concepts of frequency reuse, spectrum efficiency, Cell capacity to handle calls, Call demand in a cell, channel requirement, cell splitting, cell sectoring concept	**6**
4	**Channel Utilization Schemes:** Concepts of Multiplexing: FDM, FDMA, TDD, TDM, TDMA, CDMA, Concepts of spread spectrum and frequency hopping. Introductory idea on AMPS; Compression operations - voice compression and data compression, V.42, fax compression-introductory idea.	**10**
5	**Global System for Mobile Communication (GSM):** Historical background, SIM and GSM, Overview of GSM operations-Registration, Call Establishment, Roaming, GSM channel and operations	**8**
6	**Blue tooth and Wireless LANS:** Need of compatibility, Bluetooth concepts, Comparison with IR system, Architecture, potential applications, IEEE802.11x Wireless LAN standard-basic configuration and architecture, concepts of wireless home networking	**5**
7	**Security and Privacy:** Introduction, frequency hopping spread spectrum, Encryption concepts, Public Key Encryption, Authentication Model, Smart Card, Biometric Authentication	**4**
Total:		**45**

REFERENCE BOOKS:

1. Mobile Communications by Jochen H Schiller, Pearson Education
2. Mobile and Wireless Networks by Uyless D Black, Prentice Hall
3. Data over Wireless Networks- Blue tooth, WAP & Wireless by Gil Held, TMH
4. The TCP/IP Guide: A Comprehensive, Illustrated Internet Protocols Reference by Charles M. Kozierok, No Strach Press

TH:4(b)- SOFTWARE TESTING

L	T	P		Course Code: CSEPE 303B	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45 Hrs	**Total Marks: 100**	End Term Exam	: 70
				Progressive Assessment	: 30
Pre Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PE

RATIONALE:

Software Testing is a crucial phase in software development that ensures the reliability, functionality, and security of applications. This course equips students with fundamental testing methodologies, manual and automated testing techniques, and defect management strategies. By mastering these concepts, students will be prepared to enhance software quality and pursue careers in software testing and quality assurance.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Describe the fundamentals of software testing, including various testing types, levels, and strategies.
- Develop test cases, execute test plans, and track defects using industry-standard tools.
- Implement automation testing techniques using Selenium and JMeter for functional and performance testing.
- Apply Agile and DevOps methodologies to continuous testing and integration processes.
- Analyze software quality metrics in order to test the real world applications.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Software Testing:** Basics of Software Testing: Definition, Scope, Need, Software Development Life Cycle (SDLC) vs. Software Testing Life Cycle (STLC), Principles of Software Testing, Types of Software Testing: Manual vs. Automated, White Box, Black Box, and Grey Box Testing, Static and Dynamic Testing, Verification vs. Validation, Levels of Testing: Unit, Integration, System, and Acceptance Testing	9

II	**Testing Strategies and Techniques:** Functional vs. Non-functional Testing, Equivalence Partitioning and Boundary Value Analysis, Decision Table Testing and State Transition Testing, Exploratory Testing and Ad- hoc Testing, Performance Testing (Load, Stress, Scalability), Security Testing and Usability Testing	9
III	**Test Management and Defect Tracking:** Test Plan, Test Case, and Test Scenario Preparation, Traceability Matrix and Test Data Management, Test Execution and Test Reporting, Bug Lifecycle and Defect Management, Bug Tracking Tools: JIRA, Bugzilla, Root Cause Analysis and Test Metrics	9
IV	**Automation Testing:** Introduction to Test Automation, Benefits and Challenges, Basics of Selenium: WebDriver, TestNG, Page Object Model, Writing Test Scripts using Selenium, Basics of API Testing with Postman, Introduction to Performance Testing Tools (JMeter)	9
V	**Advanced Testing Concepts:** Agile Testing Methodologies (Scrum, Kanban), Continuous Integration & Testing in DevOps, Testing in Cloud and Mobile Applications, AI and Machine Learning in Software Testing, Future Trends in Software Testing	9

REFERENCES:

1.	Srinivasan Desikan, Gopalaswamy Ramesh, Software Testing: Principles and Practices, 2nd Edition, Pearson, New Delhi, 2017.
2.	Ron Patton, Software Testing, 2nd Edition, Pearson, New Delhi, 2005.
3.	Paul C. Jorgensen, Software Testing: A Craftsman's Approach, 4th Edition, CRC Press, Florida, 2013.

TH:4(c)- NETWORK FORENSICS

L	T	P	Total Marks: 100	Course Code: CSEPE 303C	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45 Hrs		End Term Exam	: 70
				Progressive Assessment	: 30
Pre Requisite		**: Nil**			
Credit		**: 3**		Category of Course	: PE

RATIONALE:

Network Forensics is essential for detecting, analyzing, and mitigating cyber threats by investigating malicious network activities. This course equips students with practical skills in network traffic analysis, forensic tools, and cyber incident response. By mastering these techniques, students will be prepared for careers in cybersecurity and digital forensics.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Explain the fundamentals of network forensics, including its role in cybersecurity.
- Analyze network traffic using forensic tools like Wireshark and Tcpdump.
- Investigate cyber threats such as DDoS, malware, and unauthorized access.
- Perform forensic analysis of logs, IDS/IPS alerts, and wireless network traffic.
- Describe legal and ethical considerations in handling digital evidence.
- Simulate forensic investigation and document findings in a professional report.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Network Forensics:** Definition and scope of network forensics, Role of network forensics in cybersecurity, Network forensic process and methodologies, Challenges in network forensics.	7
II	**Networking Basics for Forensics:** OSI and TCP/IP models, Network protocols: HTTP, HTTPS, FTP, SMTP, DNS, Packet structure and data transmission, Network sniffing and traffic analysis.	7
III	**Tools and Techniques in Network Forensics:** Packet capturing tools: Wireshark, Tcpdump, Log analysis tools: Splunk, ELK Stack, Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS), Firewall and router logs for forensic analysis	7

IV	**Capturing and Analyzing Network Traffic:** Methods of network traffic capture, Live traffic analysis vs. stored traffic analysis, Identifying anomalies and suspicious activities	8
V	**Malware and Attack Investigations:** Common network-based attacks - DDoS, MITM, SQL Injection, Malware propagation and botnets, tracking attackers using network artifacts, Investigating phishing and social engineering attacks	8
VI	**Legal and Ethical Aspects of Network Forensics:** Cyber laws and digital evidence handling, Compliance and regulatory requirements (GDPR, HIPAA, ISO 27001), Privacy concerns in network forensics	8

REFERENCES:

1.	Davidoff, Sherri, Network Forensics: Tracking Hackers through Cyberspace, 1st Edition, Pearson Education, New Jersey, 2012.
2.	Casey, Eoghan, Digital Evidence and Computer Crime: Forensic Science, Computers and the Internet, 3rd Edition, Academic Press, Massachusetts, 2011.
3.	Nelson, Bill, Phillips, Amelia, & Steuart, Christopher, Guide to Computer Forensics and Investigations, 5th Edition, Cengage Learning, Boston, 2018.

PR:3(a)- PROGRAMMING WITH JAVA LAB

L	T	P	Total Marks: 50	Course Code: CSEPE 305A	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60 Hrs		End Term Exam	: 15
				Progressive Assessment	: 35
Pre-Requisite		**: Nil**			
Credit		**: 2**		Category of Course	: PE

RATIONALE:

This lab series is designed to provide hands-on experience aligned with core Java programming concepts. Each exercise reinforces theoretical understanding through practical implementation. The structured progression ensures learners build a strong foundation from basics to advanced topics like file input output and frameworks.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Explain the core concepts and syntax of Java programming, including data types, control structures, and operators.
- Apply object-oriented programming principles such as encapsulation, inheritance to create java applications.
- Apply object-oriented programming principles like polymorphism, and abstraction to build modular and reusable code.
- Implement exception handling and multithreading techniques to create robust and concurrent Java applications.
- Implement/utilize Java's standard libraries and frameworks for effective input/output operations, data manipulation, and utility functions.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Setting Up Java and Writing First Program:** Install Java JDK and configure environment variables. Write, compile, and run a basic "Hello World" program. Demonstrate the use of variables, arrays, and different data types.	6
II	**Expressions and Operators:** Create a program using arithmetic, relational, and logical operators. Practice operator precedence and mixed-type expressions.	6
III	**Control Flow & Looping:** Write programs using if-else, switch, while, do-while, and for loops. Implement examples with break, continue, and nested loops.	6

IV	**Classes, Objects & Constructors:** Define a class with fields and methods. Use constructors (default, parameterized) and method overloading. Demonstrate the use of this and new keyword.	6
V	**Static, Final and Access Control:** Implement static variables, static methods, and static blocks. Use access modifiers (public, private, Protected) and final keyword.	6
VI	**Inheritance and Method Overriding:** Create a class hierarchy demonstrating multilevel inheritance. Use super keyword and show constructor execution sequence. Override methods and implement dynamic method dispatch.	6
VII	**Abstract Classes and Preventing Overriding:** Create an abstract class and implement its abstract methods in a subclass. Use final to prevent Method overriding or class inheritance. Create a packaged class.	6
VIII	**Handling Exceptions:** Write programs using try-catch-finally blocks. Create user-defined exceptions. Demonstrate throw, throws, and nested exception handling.	6
IX	**Working with Interfaces:** Define and implement interfaces. Use interface reference variables and interface inheritance.	6
X	**Using Java Standard Libraries:** Use String, StringBuilder, Math, and Date classes. Practice with Java Collections (Array List, HashMap, etc.). Perform file input/output operations.	6

REFERENCES:

1.	Programming with Java – E. Balagurusamy, McGraw Hill Education, India, 2021
2.	Core Java: An Integrated Approach – R. Nageswara Rao, Dream tech Press, India, 2018
3.	Java Programming– Poornachandra Sarang, McGraw Hill Education, India, 2019
4.	Object-Oriented Programming with Java– M.T. Savaliya, BPB Publications, India, 2020
5.	"Advanced Java Programming" – K. Somasundaram, McGraw Hill Education, India, 2017

PR:3(b)-DATA SCIENCE: DATA WAREHOUSING AND DATA MINING LAB

L	T	P	Total Marks: 50	Course Code: CSEPE 305B	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60 Hrs		End Term Exam	: 15
				Progressive Assessment	: 35
Pre-Requisite		**: Nil**			
Credit		**: 2**		Category of Course	: PE

RATIONALE:

This lab course provides hands-on experience in core concepts of Data Warehousing and Data Mining, essential for modern data-driven applications. Students will explore data preprocessing, schema design, ETL processes, and mining algorithms using real-world datasets and tools. The practical exposure aims to build foundational skills for AI, ML, and data analytics roles.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Demonstrate the ability to design and simulate a basic data warehouse architecture, including components such as ETL processes, OLTP and OLAP systems using open- source tools.
- Apply data extraction, transformation, and loading (ETL) techniques to integrate.
- Execute analytical queries using SQL, indexing, and query planning strategies to improve data retrieval performance.
- Perform data preprocessing and cleaning using Python libraries to handle missing values, normalize data.
- Implement basic machine learning models for classification and clustering.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Exploring Data Warehousing Architecture:** Simulate a basic data warehouse architecture using open-source tools like Talend or Apache Nifi. Identify components of ETL, OLTP vs OLAP with practical examples.	4
II	**Data Extraction and Transformation:** Perform data extraction from CSV/SQL sources. Apply transformation operations like filtering, aggregation, and normalization.	6

III	**Data Loading and Querying:** Load data into warehouse tables using SQL scripts. Run OLAP-style queries for slicing, dicing, roll-up, and drill-down.	10
IV	**Query Optimization:** Analyze query performance using indexing. Use EXPLAIN plans to identify bottlenecks and improve query execution.	10
V	**Data Preprocessing and Cleaning:** Perform handling of missing values, normalization, encoding, and outlier detection using Python.	10
VI	**Feature Selection and Dimensionality Reduction:** Apply PCA and correlation-based feature selection on a sample dataset. Evaluate feature importance using Random Forest or Decision Trees.	10
VII	**Classification and Clustering:** Build and evaluate a Decision Tree classifier. Apply K-Means and Hierarchical Clustering on a sample dataset using Scikit-learn.	10

REFERENCES:

1.	Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, 4th Edition, Morgan Kaufmann Publishers, San Francisco, 2022.
2.	Ralph Kimball, Margy Ross, The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, 3rd Edition, Wiley, New Jersey, 2013.
3.	Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson, Boston, 2018.
4.	Paulraj Ponniah, Data Warehousing Fundamentals for IT Professionals, 2nd Edition, Wiley, New Jersey, 2010.
5.	Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Introducing Data Science, 1st Edition, Manning Publications, New York, 2016.

PR:3(c)- ADVANCED COMPUTER NETWORKS LAB

L	T	P	Total Marks: 50	Course Code: CSEPE 305C	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60 Hrs		End Term Exam	: 15
				Progressive Assessment	: 35
Pre-Requisite		**: Nil**			
Credit		**: 2**		Category of Course	: PE

RATIONALE:

This lab series equips students with practical skills in advanced computer networking concepts, bridging foundational theory with real-world applications. It covers key areas like routing, switching, wireless communication, network security, and emerging technologies such as SDN and cloud networking. These labs are designed to prepare students for industry demands and advanced research in the field of networking.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Demonstrate a clear understanding of network architectures and communication models by simulating data flow through OSI and TCP/IP layers using real-time tools.
- Apply IP addressing techniques including subnetting and supernetting to design efficient network topologies and validate them using simulation tools.
- Evaluate different switching techniques such as circuit, packet, and virtual circuit switching through hands-on simulations.
- Analyze static and dynamic routing protocols to understand packet forwarding, route propagation, and routing table updates.
- Design secure wireless networks by implementing encryption standards and monitoring traffic using packet analysis tools.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Exploring OSI and TCP/IP Models:** Simulate and analyze data flow across OSI layers using packet analyzer tools. Map real-time traffic to the OSI/TCP-IP layers.	10
II	**IP Addressing, Subnetting & Supernetting:** Design subnets and calculate subnet masks using CIDR notation. Use a subnet calculator tool and validate configurations using a network simulator.	10
III	**Switching Techniques Simulation:** Simulate circuit switching, packet	10

	switching, and virtual circuit switching.	
IV	**Static and Dynamic Routing Configuration:** Configure static and dynamic routes using Cisco Packet Tracer. Observe route propagation and packet delivery.	10
V	**Implementing Routing Algorithms:** Simulate Distance Vector (RIP) and Link State (OSPF) routing protocols using Cisco Packet Tracer. Analyze route convergence and hop count changes.	10
VI	**Wireless Network Setup and Security:** Set up a wireless LAN using routers and simulate connection from clients. Enable WPA2/WPA3 security and analyze traffic using Wireshark.	10

REFERENCES:

1.	Andrew S. Tanenbaum, Computer Networks, 5th Edition, Pearson, New Delhi, 2019.
2.	William Stallings, Data and Computer Communications, 10th Edition, Pearson, New Delhi, 2017.
3.	Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, McGraw-Hill, New York, 2013.
4.	Douglas E. Comer, Internetworking with TCP/IP, 6th Edition, Pearson, Boston, 2014.

SUMMER INTERNSHIP - II

L	T	P		
0	0	0		**Course Code: SI 301**
Total Contact Hours				**Practical Assessment**
Practical		: 45Hrs	**Total Marks: 50**	End Term Exam : 15
				Progressive Assessment : 35
Pre-Requisite		**: Nil**		
Credit		**: 2**		Category of Course : SI

Duration: 4 weeks during summer vacation after 4th Semester

RATIONALE:

The Summer Internship course includes activities for promoting industrial interaction at the diploma level in technical institutes. The main aim is to enhance employability skills of the students passing out from Technical Institutions. It allows students to gain direct experience, which cannot be simulated in the classroom environment. Hence, this course aims to create competent professionals for the industry. The internship experience will augment outcome-based learning process and inculcate various attributes in a student in line with the graduate attributes defined by the NBA. Students can also use internships to test their interest in and aptitude for different career areas. This enables students to find out where they might fit best in a professional environment.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Integrate theory and practice of current technological developments relevant to the subject area.
- Assess interests and abilities in their field of study for exploring career alternatives.
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the job interview process.
- Identify social, economic and administrative considerations that influence the working environment of industrial organizations.

DETAILED COURSE CONTENTS

SUGGESTED ACTIVITIES:

Activity Heads: Industrial/Govt./ NGO/MSME/ Rural Internship/ Innovation / Entrepreneurship.

During the summer vacation after 4th semester, students are ready for industrial experience. They may choose to undergo Internship / Innovation / Entrepreneurship related activities. Students may either choose to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry. In case student want to

pursue their family business and do not want to undergo internship, a declaration by the parents to be submitted directly to the TPO.

As per guidelines of AICTE, assessment to be done based on the following major activity heads:

I. Innovation / IPR / Entrepreneurship

- Participation in innovation related completions for eg. Hackathons etc. to be evaluated by Faculty Mentor
- Development of new product/ Business Plan/ registration of start-up to be evaluated by Program Head.
- Participation in all the activities of Institute's Innovation Council (ICC) for eg: IPR workshop/ Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc., evaluated by President/ Convener of ICC.
- Work experience at family business – to be evaluated by TPO

II. Internship

- Internship with Industry/ Govt. / NGO/ PSU/ Any Micro/ Small/ Medium enterprise/ Online Internship to be evaluated by Faculty Mentor/ TPO/ Industry supervisor

PR:4- MAJOR PROJECT

L	T	P		
0	0	4		**Course Code: PR 301**
Total Contact Hours				**Practical Assessment**
Practical		: 60 Hrs	**Total Marks: 50**	End Term Exam : 15
				Progressive Assessment : 35
Pre Requisite		**: Nil**		
Credit		**: 2**		Category of Course : Project

RATIONALE:

The project work is a part of teaching learning process. In this course, the role of teachers is a facilitator or coordinator and the students will select the topic, perform design work, place the indent, procure or purchase the material either from departmental store or from the local market. The leadership quality, co-ordination of job and maintaining good communal harmony is an important factor of this type of activity. Project Work is a learning experience, which aims to provide students with the opportunity to synthesize knowledge from various areas of learning, and critically and creatively apply it to real life situations. This process, which enhances student's knowledge and enables them to acquire skills like collaboration, communication and independent learning, prepares them for lifelong learning and the challenges ahead. The success of the project is not the ultimate goal. The group, who is successful in obtaining the good output, should definitely be credited but they must be evaluated for the other components of the activity.

LEARNING OUTCOMES:

After the completion of this course, the students will be able to:

- Select suitable topic, problem and plan of action
- Apply theory and practices to investigate and solve industry / society related problems
- Maintain good relation among the peer groups
- Demonstrate leadership quality
- Estimate cost involvement
- Develop plan for effective utilization of time

GUIDELINES FOR MAJOR PROJECT

- The project work may involve the designing a model or upgrading an existing system. The design is to be implemented into a working model.
- A project work may be carried out by a team of 3 to 5 students with a well-defined role of each student within the team. The group will select a project with approval of team of teachers & the guide.
- Each group must prepare project proposal that includes project title, group members, sponsor details (if any), detailed problem definition, area, abstract, details of existing similar systems if any, scope of the project and software-hardware requirements.

- Major projects should be based on real/ live problems of the Industry/ Govt./ NGO/ MSME/Rural Sector or an innovative idea having the potential of a Start-up. Main objective of the major project is to provide the students with an opportunity to develop a complete project.

- The major project is distributed in two consecutive semesters, students can get ample time to realize a complete project with documentation or transform their ideas of start-ups into reality. The requirement analysis and designing part of the project may be completed in the 5th semester.

- A project report including all necessary documents such as Requirement Analysis, Design specifications, Project Plan, Design Modelling, test plan etc. need to be prepared and submitted for progressive assessment.

- For assessment, following components may be considered:
  - Synopsis and Project Title selection
  - Initiative in Performing Project tasks
  - Sense of responsibility and punctuality
  - Outcome of the completed stages of the Project
  - Communication and presentation skills
  - Interpersonal skills
  - Report writing skills
  - Viva voce

Organization of Project Report

1. Cover page:

It should contain the following (in order)

i. Title of the Project

ii. Submitted in partial fulfilment of the requirements for the Diploma in <Branch Name>

iii. By Name of the Student(s)

iv. Logo of the Institution

v. Branch Name/Depart Name and Institution Name with Address

vi. Academic Year

2. 1st Inner page

Certificate:

It should contain he following

" This is to certify that the work in this Project Report entitled <Project Title> by <Name of the Student (s)> has/have been carried out under my supervision in partial fulfilment of the requirements for the Diploma in <Branch Name> during session <session> in <Branch/Department Name> of <Institute Name> and this work is the original work of the above student(s)."

Seal and signature of the Supervisor/Guide with date

3. 2nd Inner Page Declaration by the Student(s)

"I declare that this project entitled <Name of the Project> is my own work, except where indicated through the proper use of citations and references, and has not been submitted in any form for another degree or diploma at any other institute. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given."

Signature of the Student with date

4. 3rd Inner Page Acknowledgement by the Student(s)
5. Contents.
6. Chapter wise arrangement of Reports
7. Last Chapter: Conclusion

It should contain

i. Conclusion
ii. Limitations
iii. Scope for further Improvement

8. References

OPEN ELECTIVES

TH:5(a)- UNIVERSAL HUMAN VALUES

L	T	P		Course Code: OE 301A	
3	0	0			
Total Contact Hours			**Total Marks: 100**	End Term Exam	70
Theory		: 45Hrs		Progressive Assessment	30
Pre-Requisite		**: Nil**			
Credit		**3**		Category of Course: OE	

RATIONALE:

The Universal Human Values (UHV) course aims to help diploma students develop a strong ethical foundation, nurturing responsible individuals who contribute positively to society. In an era driven by rapid technological advancements, it is crucial for students not only to gain technical expertise but also to cultivate values that promote harmony, respect, and sustainability.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Identify fundamental human aspirations such as happiness and prosperity.
- Differentiate between the self and the body and understand their respective needs.
- Practice self-reflection to improve decision-making, emotional balance, and personal growth.
- Develop respectful and trustworthy relationships within family, friends, and society.
- Explain the role of values like trust, respect, and love in building strong social bonds.
- Promote cooperation and harmony within communities through ethical practices.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Value Education and Human Values -** Concept and Need for Value Education - Understanding the importance of value education in personal and professional life, Differentiating between values and skills. Basic Human Aspirations - Exploring fundamental human aspirations: happiness and prosperity, Methods to achieve these aspirations through right understanding and relationships.	8
II	**Harmony in the Human Being -** Understanding the Self - Differentiating between the 'Self' (I) and the Body, Understanding the needs of the Self and the Body, Harmony of the Self with the Body - Ensuring the harmony of 'I' with the Body, Practices for mental and physical well-being.	8
III	**Harmony in the Family and Society -** Family as the Basic Unit of Society - Understanding values in human relationships, Trust and respect as the foundational values in relationships, Harmony in Society - The concept of an undivided society, Universal human order and world family.	8

IV	**Harmony in Nature and Existence -** Interconnectedness in Nature -Understanding the four orders of nature: material, plant, animal, and human, Mutual fulfillment among these orders, Co-existence in Existence - Holistic perception of harmony in existence, Role of human beings in maintaining environmental balance.	8
V	**Professional Ethics -** Ethical Human Conduct - Integrating values into professional life, Concept of professional ethics and accountability, Case Studies in Professional Ethics - Analyzing real-life scenarios to understand ethical dilemmas, Developing solutions based on universal human values.	8
VI	**Personal Development and Social Responsibility -** Self-Reflection and Self-Exploration - Techniques for self-assessment and personal growth, Setting personal goals aligned with universal values, Social Responsibility - Understanding one's role in society, Participating in community service and social initiatives.	5

REFERENCES:

1.	R. R. Gaur, R. Asthana, G. P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
2.	R. R. Gaur, R. Asthana, G. P. Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
3.	A. Nagraj, JeevanVidya: EkParichaya, Amarkantak, 1999.
4.	A. N. Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004.
5.	Moral Thinking: An Introduction To Values And Ethics, Vineet Sahu, IIT Kanpur: https://onlinecourses.nptel.ac.in/noc23_hs89/preview

TH:5(b)- LEADERSHIP AND MANAGEMENT SKILLS

L	T	P		Course Code: OE301B	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course: OE	

RATIONALE:

This course/subject on Leadership and Management Skills for students undergoing Diploma programme is an exploration in leading and managing people, majorly in education based on sound and acceptable principles and theories for effective leadership. The leadership skills will enable them to take initiative, guide team efforts, motivate peers, and ensure effective collaboration. They'll learn how to delegate tasks, resolve conflicts, and foster a positive team environment. The management skills will help them in organizing tasks, setting timelines, and ensuring efficient workflow within a team. It is expected that the students will be able to handle projects with better project outcomes and a earn a more productive learning experience. This will benefit their academic journey, future careers, and overall professional development.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain the principles of management
- Collaborate across cultures for effective team work
- Communicate with people for a positive work culture
- Demonstrate personal dispositions, skills & abilities of a leader
- Undertake the process of change management
- Design training for staff development
- Adapt suitable leadership style for improved work efficiency.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Leadership & Management, concept, principles.** • Definition of leadership, management • Leadership theories • Leadership characteristics • Principles of management • Managerial functions • Leader v/s Manager, Leader/Manager traits and character • Leadership Styles	10

II	**Human Resource Management in Organizations** • Human Resource Management: Meaning, Nature, Objectives, Scope • Job & Job analysis. • Staff Development: Need and Objectives of Staff Development, Approaches • Training & development • Organizational Development: Components of OD process. • Learning organization	10
III	**Personal disposition, skills & abilities of leaders** • Self-awareness • Leadership characteristics, traits • Leadership skills & abilities • Emotional intelligence & its components, importance in leadership • Communication skills for effective leadership, barriers to effective communication, Active Listening, Mindful listening. • Leading & Mentorship – Influencing & mentoring	09
IV	**Leader's role in Motivating, Inspiring and Transformative leadership, nurturing team-work** • Goal setting & leadership • Transformative Leadership, vision & envisioning • Motivational role of leader in people management • Group & team • Team dynamics • Conflict management, strategies in managing conflicts	08
V	**Change Management & Leadership** • Models of change • Forces driving change • Change Management – process, goal, importance • The process of change happening in an organization • Key aspects of leadership in change management – responsibilities of a change leader.	08

SUGGESTED ACTIVITIES:

- Group/individual presentation on the basic principles of leadership and management, Discussion on readings - Individual or group presentation of assigned topics in class on leadership and management principles and theories.
- Activities on Envisioning, Goal setting
- ACTION PLAN to be prepared

REFERENCES:

1.	Theories of Educational Leadership and Management (3rd ed.), by Bush, Tony (2003). SAGE Publications, Ltd.
2.	The inspiring leader: unlocking the secrets of how extraordinary leaders motivate. By Zenger, John, Joseph Folkman, and Scott Edinger (2009). New York: McGraw Hill Press.
3.	Knowing yourself. On becoming a leader: the leadership classic. By Bennis, Warren (2009). New York: Basic Books.
4.	Leading Change. By P. Kotter, Harvard Business, 2012.
5.	The Fifth Discipline. By Peter M. Senge, Crwon Currency, 2006.
6.	The Leadership Sutra: An Indian Approach to Power. By Devdutt Pattanaik, – Penguin Random House, 2017.
7.	Leadership and Management. By Dr. A. Chandra Mohan. Himalaya Publishing House, 2010.

TH:5(c)- PROFESSIONAL SKILLS

L	T	P		Course Code: OE301C	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course: OE	

RATIONALE:

The term, "Professional skills" carries significant weight in the job market and career development. This open elective course explores various types of professional skills, their significance, and how they can be cultivated and harnessed for career progression. By understanding the landscape of professional skills, student can better position himself or herself for success in the competitive job market. It is crucial to continuously update and adapt the professional skills to stay ahead in a rapidly changing work environment. By investing in professional development, one can enhance employability and open doors to new opportunities.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Demonstrate Self-competency and Confidence
- Practice Emotional Competency
- Work in a team work or in collaboration
- Demonstrate problem solving and decision-making skills
- Apply time management strategies and techniques effectively
- Apply professional ethics and integrity in professional and personal life.

DETAILED COURSE CONTENT:

UNIT NO.	CONTENT	ALLOTTED TIME (HOURS)
I Communication Skills:	• Active listening • Verbal and non-verbal communication • Written communication • Presentation skills • Conflict resolution	08
II Teamwork and Collaboration:	• Building trust within a team • Effective collaboration strategies • Role delegation and responsibility sharing • Conflict resolution within a team	08
III Problem-Solving:	• Identifying root causes of issues • Generating solutions and evaluating options	08

	• Decision-making under pressure • Critical thinking skills • Triple constraint issues	
IV Time Management:	• Prioritization and task management • Setting realistic deadlines • Effective time planning and organization	07
V Emotional Intelligence:	• Self-awareness and emotional regulation • Empathy and understanding others' emotions • Managing interpersonal relationships • Motivation • Social skills • Emotional Intelligence (EQ) • Stress management	08
VI Professional Ethics and Integrity:	• Workplace ethics and code of conduct • Confidentiality and data privacy • Professional accountability- • Important Considerations:	06

REFERENCES:

1. Dr. Vitthal Gore: Professional Skills for 21st Century: A Key to Success: Blue Rose- ACADEMIC
2. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: PEARSON
3. The essence of Leadership: S. Manikutty: Bloomsbury