ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24

COMPUTER SCIENCE AND BUSINESS SYSTEMS

SEMESTER VI

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1.	PCC	**23CB601T**	Computer Networks	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
2.	PCC	**23CB601P**	Computer Networks Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
3.	PCC	**23CB602T**	Information Security	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
4.	PCC	**23CB603T**	Financial & Cost Accounting	**2**	**-**	**-**	**2**	**7.5**	**7.5**	**35**	**50**	**1.5**
5.	PCC	**23CB604T**	Business Communication & Value Science – IV	**2**	**-**	**-**	**2**	**7.5**	**7.5**	**35**	**50**	**1.5**
6.	PEC	**23CB605T**	Program Elective – III	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
7.	PEC	**23CB605P**	Program Elective – III Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
8.	PEC	**23CB606T**	Program Elective – IV	**2**	**-**	**-**	**2**	**7.5**	**7.5**	**35**	**50**	**1.5**
9.	PEC	**23CB606P**	Program Elective – IV Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
10.	MDM	**23CB631M**	Multidisciplinary Minor – IV	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
			Total	**18**	**0**	**6**	**21**	**82.5**	**157.5**	**460**	**700**	

23CB605T	Program Elective III
23CB605T(i)	PE-III Robotics and Embedded Systems
23CB605T(ii)	PE-III Modern Web Applications
23CB605T(iii)	PE-III Data Mining and Analytics

23CB605P	Program Elective III
23CB605P(i)	PE-III Robotics and Embedded Systems Lab
23CB605P(ii)	PE-III Modern Web Applications Lab
23CB605P(iii)	PE-III Data Mining and Analytics Lab

23CB606T	Program Elective IV
23CB606T(i)	PE-IV Enterprise Systems
23CB606T(ii)	PE-IV Advance Finance
23CB606T(iii)	PE-IV Image Processing and Pattern Recognition

23CB606P	Program Elective IV
23CB606P(i)	PE-IV Enterprise Systems Lab
23CB606P(ii)	PE-IV Advance Finance Lab
23CB606P(iii)	PE-IV Image Processing and Pattern Recognition Lab

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COMPUTER SCIENCE AND BUSINESS SYSTEMS

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CB601T	Computer Networks	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
1. To introduce the fundamentals of computer networks, their classification, and the layered architecture to understand network communication. **2.** To familiarize students with the working principles of local area networks (LAN) and techniques for bandwidth utilization in communication. **3.** To provide a comprehensive understanding of error detection, correction methods, and medium access control protocols at the Data Link Layer. **4.** To analyze the roles and responsibilities of the Network and Transport Layers in data transmission, routing, addressing, and quality of service. **5.** To explore application-layer services and ensure a foundation in network security and cryptography concepts.	Upon completion of this course, students will be able to: **1. Explain** the fundamentals of data communication, network components, protocol architectures, and reference models such as OSI and TCP/IP. **2. Analyze** the performance parameters, transmission modes, multiplexing techniques, and characteristics of guided and unguided transmission media in the physical layer. **3. Apply** error detection/correction techniques and flow/error control mechanisms, and **compare** various medium access protocols for reliable data link communication. **4. Demonstrate** the functions of the network and transport layers by explaining addressing schemes, routing concepts, congestion control, and QoS techniques. **5. Describe and evaluate** various application layer protocols and basic network security concepts including firewalls and cryptographic fundamentals.

Unit I Introduction to Computer Networks and Data Communication	**[9 Hrs]**
Data communications, Components, Data Representation, Data Flow , **NETWORKS:** Network Criteria, Physical Structures, **Network Types**: Local Area Network, Wide Area Network, Switching , **Protocol Software**: Protocol hierarchies, Design Issues for the layer. **Reference Model**: The OSL Reference Model, TCP/IP protocol suite, A Comparison of the OSI and TCP/IP Reference Models.	
Unit II Physical layer	**[9 Hrs]**
PERFORMANCE: Bandwidth, Throughput, Latency (Delay), Bandwidth-Delay Product , Jitter, **Transmission Modes**: Parallel Transmission, Serial Transmission, **Multiplexing**: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Time-Division Multiplexing, Transmission Media: GUIDED MEDIA , Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable, UNGUIDED MEDIA: WIRELESS, Radio Waves, Microwaves, Infrared, Switching: Circuit Switching and Packet Switching	
Unit III Data Link Layer and Medium Access Control	**[9 Hrs]**
Error Detection and Correction: Fundamentals of error detection and correction, Block coding, Hamming Distance, CRC. **Flow Control and Error Control Protocols**: Stop and Wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking. **Medium Access Protocols**: Random Access - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.	
Unit IV Network and Transport Layers	**[9 Hrs]**
Network Layer: Switching, Logical Addressing - IPv4, IPv6; Address Mapping - ARP, RARP, BOOTP, DHCP; Delivery and Forwarding; Unicast Routing Protocols. **Transport Layer**: Process-to-Process Communication, UDP, TCP, SCTP; Congestion Control, QoS, QoS Improvement Techniques - Leaky Bucket, Token Bucket.	
Unit V Application Layer and Network Security	**[9 Hrs]**
Application Layer: DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth. **Network Security**: Firewalls, electronic mail, directory services, network management. **Cryptography**: Basic concepts of cryptography.	

Text Books

S.N	Title	Authors	Edition	Publisher
01	Computer Networks	Andrew Tanenbaum	Fifth	Pearson Education
02	Data and Computer Communications	William Stallings	Nineth	Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
01	Network Security: Private Communication in a Public World	Charlie Kaufman ,Radia Perlman	Second	Prentice Hall
02	UNIX Network Programming, Vol. 1,2 & 3, W. Richard Stevens	Bill Fenner W. Stevens , Andrew Rudoff	Third	Addison-Wesley

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CB601P	Computer Networks Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To understand the various network devices and cables, and gain hands-on experience with basic network commands and configurations. 2. To learn how to create a network using star topology, integrate devices, and understand packet transmission across the network. 3. To acquire the skills needed for configuring VLANs (Virtual Local Area Networks) and segregating network traffic. 4. To develop expertise in configuring routers with static routing protocols and managing communication between different networks. 5. To learn to configure and manage DHCP (Dynamic Host Configuration Protocol), Web servers, and DNS (Domain Name System) servers for efficient network management.	1. **Network Configuration:** Students will be able to identify and configure network devices and cables, and effectively use basic network and network configuration commands. 2. **Network Topology and Packet Transmission:** Students will create a network using star topology, integrate devices, and monitor packet transmission between hosts. 3. **VLAN and Network Segmentation:** Students will configure and manage VLANs using CISCO Packet Tracer to segment network traffic and improve network efficiency. 4. **Routing Protocols:** Students will configure static routing on routers, facilitating packet transmission between different networks. 5. **Server Configuration and Traffic Monitoring:** Students will configure DHCP, Web, and DNS servers, and use Wireshark to monitor and analyze network traffic.

Expt. No.	Title of the experiment
1	Study of Network Devices and Network cables. Study of basic network command and Network configuration commands.
2	Create two Networks using star topology and add a resource (printer) to the network using CISCO Packet Tracer. Also show the transmission of packets from one host to another.
3	Configuring VLAN in a network using CISCO Packet Tracer.
4	Configure routers in a network using Static routing protocol in Cisco Packet Tracer and show transmission of packet from one network to another.
5	Configure DHCP and Web server using CISCO Packet Tracer.
6	Configure DNS server using CISCO Packet Tracer.
7	Use traffic monitoring tool Wire shark to observe network traffic with packet detail.
8	Introduction to NS2: Basic Wired Topology Simulation and Simulation of Star Topology in NS2.

Text Books

S.N	Title	Authors	Edition	Publisher
01	Computer Networks	Andrew Tanenbaum	Fifth	Pearson Education
02	Data and Computer Communications	William Stallings	Ninth	Pearson Education

Reference Books

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COMPUTER SCIENCE AND BUSINESS SYSTEMS

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CB602T	Information Security	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
1. Understanding Core Concepts 2. Learning Security Technologies and Tools 3. Identifying and Mitigating Threats 4. Implementing Security Policies and Practices 5. Enhancing Cyber security Awareness	1. Explain the fundamental concepts, principles, and terminology of information security. 2. Analyze security risks and evaluate appropriate risk management strategies in an organizational environment. 3. Apply suitable security tools and techniques to implement effective security solutions for protecting information systems. 4. Interpret and apply relevant security policies, standards, and regulatory frameworks to ensure organizational compliance. 5. Execute incident response procedures and analyze security incidents to minimize impact and ensure recovery.

Unit I Overview of Security Parameters **[9Hrs]**

Overview of Security Parameters: Confidentiality, integrity and availability; Security violation and threats; Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle.

Unit II Access Control Models & Security policies **[10Hrs]**

Access Control Models: Discretionary, mandatory, roll-based and task-based models, unified models, access control algebra, temporal and spatio-temporal models. **Security Policies:** Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards. Information Rights management.

Unit III Systems Design **[9Hrs]**

Systems Design: Design principles, representing identity, control of access and information flow, confinement problem. Assurance: Building systems with assurance, formal methods, evaluating systems.

Unit IV Logic based System **[10Hrs]**

Logic-based System: Malicious logic, vulnerability analysis, auditing, intrusion detection. Applications: Network security, operating system security, user security, program security. Special Topics: Data privacy, introduction to digital forensics, enterprise security specification. Introduction to Cryptography.

Unit V Operating Systems Security & Database Security **[7Hrs]**

Operating Systems Security: Security Architecture, Analysis of Security in Linux/Windows.
Database Security: Security Architecture, Enterprise security, Database auditing.

Text Books

S.N	Title	Authors	Edition	Publisher
1	*Security Engineering*,	Ross Anderson		
2	*Computer Security: Art and Science*	M. Bishop,		Pearson Education.
3	*Information Security: Principles and Practice*	M. Stamp		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	*Security in Computing*	C.P. Pfleeger, S.L. Pfleeger, J. Margulies		
2	*Secure Programming HOWTO*	David Wheeler.		
3	*Browser Security Handbook*	Michael Zalewski		

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
23CB602T	Information Security	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
1. Understanding Core Concepts 2. Learning Security Technologies and Tools 3. Identifying and Mitigating Threats 4. Implementing Security Policies and Practices 5. Enhancing Cyber security Awareness	1. Explain the fundamental concepts, principles, and terminology of information security. 2. Analyze security risks and evaluate appropriate risk management strategies in an organizational environment. 3. Apply suitable security tools and techniques to implement effective security solutions for protecting information systems. 4. Interpret and apply relevant security policies, standards, and regulatory frameworks to ensure organizational compliance. 5. Execute incident response procedures and analyze security incidents to minimize impact and ensure recovery.

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3	*Information Security: Principles and Practice*	M. Stamp		

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2	*Secure Programming HOWTO*	David Wheeler.		
3	*Browser Security Handbook*	Michael Zalewski		

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Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
23CB603T	Financial & Cost Accounting	2	-	-	2	7.5	7.5	35	50

Course Objectives	Course Outcomes
1. To develop an understanding of fundamental accounting concepts and processes and create awareness about their managerial applications. 2. To provide knowledge of financial statements, accounting standards, and interpretation techniques for informed financial decision-making. 3. To introduce cost accounting systems and various costing methods to build awareness about cost control and effective cost management.	**1.** To provide an understanding of fundamental accounting concepts, techniques, and processes essential for preparing and interpreting financial statements. **2.** To develop the ability to analyze financial statements and understand cash flow and fund flow techniques for effective financial decision-making. **3.** To introduce costing systems and annual reporting practices to enable effective cost control and understanding of corporate financial disclosures.

Unit I -Accounting Concept and Accounting Process **[10Hrs]**

Accounting Concept: Introduction, Techniques and Conventions, Financial Statements- Understanding & Interpreting Financial Statements. Introduction to Accounting Software -Tally,
Accounting Process: Book Keeping and Record Maintenance, Fundamental Principles and Double Entry, Journal, Ledger, Trial Balance, Balance Sheet, Final Accounts, Cash Book and Subsidiary Books, Rectification of Errors.

Unit II- Financial Statements, Cash Flow and Fund Flow Techniques **[10Hrs]**

Financial Statements: Form and Contents of Financial Statements, Analyzing and Interpreting Financial Statements, Accounting Standards, Ratio Analysis. case (**Nifty-listed company's** cash flow statement) *Class Discussion: Corporate Accounting Fraud- A Case Study of Satyam.*
Cash Flow and Fund Flow Techniques: Introduction, How to prepare, Difference between Cash Flow and Fund Flow Techniques

Unit III- Costing Systems, Company Accounts and Annual Reports **[10Hrs]**

Costing Systems: Elements of Cost, Cost Behavior, Cost Allocation, OH Allocation, Unit Costing, Process Costing, Job Costing Absorption Costing, Marginal Costing, Cost Volume Profit Analysis, Budgets, ABC Analysis, Activity-Based Management (ABM). *Class Discussion: Application of costing concepts in the Service Sector*
Company Accounts and Annual Reports: Audit Reports and Statutory Requirements, Directors Report, Notes to Accounts, Pitfalls ESG & Sustainability reporting.

Text Books

S.N	Title	Authors	Edition	Publisher
1	*Accounting: Texts and Cases*	Robert N Anthony, David Hawkins, Kenneth Marchant		McGraw-Hill
2	"Financial Accounting: Tools for Business Decision Making"	Paul D. Kimmel, Jerry J. Weygandt, and Donald E. Kieso	9th Edition	Wiley
3	"Management Accounting: Text, Problems and Cases"	Khan & Jain	5th Edition	McGraw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	"Cost Accounting: A Managerial Emphasis"	Charles T. Horngren, Srikant M. Datar, and Madhav V. Rajan,	16th Edition	Pearson
2	"Accounting Principles"	Jerry J. Weygandt, Paul D. Kimmel, and Donald E. Kieso,	14th Edition	Wiley
3	"Fundamentals of Financial Accounting"	by Fred Phillips, Robert Libby, and Patricia A. Libby,	6th Edition	McGraw Hill

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Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
23CB604T	Business Communication & Value Science – IV	2	-	-	2	7.5	7.5	35	50

Course Objectives	Course Outcomes
1. Enable students to develop modern web application by leveraging latest technologies. 2. Recognize the best practices of communicative writing 3. Apply emotional intelligence in real life scenarios.	1. **Explain** workplace diversity and its impact on organizational culture and performance. 2. **Apply** emotional intelligence and effective communicative writing in professional situations. 3. **Describe** CSR practices, **illustrate** organizational contributions to society, and **recognize** the need for effective time management.

UNIT I WORKPLACE ENVIRONMENT AND BUSINESS WRITING	**[10Hrs]**
Emotional Intelligence – Public Speaking at workplace and real life scenarios – Role Play – Formal and Business letters – Building Professionalism in Work Place	
UNIT II ETHICS &SOCIAL RESPONSIBILITY	**[10Hrs]**
Importance of Corporate Social Responsibility (CSR) – Professional Ethics – Organizational Structure in Workplace – Developing Leadership Qualities **FEEDBACK AND CUSTOMER RELATIONS**-Best practices to share and receive feedback – Addressing the Grievances of Customer – Practices to Maintain Customer Satisfaction – Customer Survey	
UNIT III HR MANAGEMENT	**[10Hrs]**
Features of JavaScript, extension of JavaScript, Syntax of JavaScript: data types, operators, variables, tag, Document Object Model (DOM) with JavaScript, Selection Statement using if and Switch, Iterative statement: for, for/in, while, do while, break and continue **ADVANCED BUSINESS VOCABULARY-** Business Idioms and Phrases – Greetings at a Business Setting – Digital Communication – Using Web as a source of knowledge Sharing – Statement of purpose – Listening to Dialogues – Business interviews – Life lessons	

Text Books

S.N	Title	Authors	Edition	Publisher

Reference Books

S.N	Title	Authors	Edition	Publisher
1	"Emotional Intelligence: Why it Can Matter More Than IQ by Daniel Goleman			
2	Putting Emotional Intelligence To Work by Ryback David			

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CB605T(i)	PE-III Robotics and Embedded Systems	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
This course is intended : 1. Understand the fundamental concepts of robotics and embedded systems, including robot types, components, and system architecture. 2. Learn about sensors, actuators, and interfacing techniques essential for building robotic and embedded applications. 3. Develop foundational programming and hardware skills using microcontrollers and embedded C. 4. Explore basic motion planning, control algorithms, and system integration used in autonomous robotic systems. 5. Apply embedded and IoT-based concepts to design simple robotic projects and real-world automation solutions.	Students will be able to 1. Explain the basics of robotics and embedded systems, including robot classification, components, and functionality. 2. Identify and interface sensors, actuators, and controllers to perform basic hardware interactions and control. 3. Write simple embedded C programs and implement basic I/O operations in microcontroller-based systems. 4. Apply kinematics, PID control, and motion planning concepts to analyze the behavior of simple robotic systems. 5. Design and demonstrate mini-projects integrating embedded hardware, sensors, and basic IoT concepts.

Unit I :	**[9 Hrs]**
Introduction to Robotics : Definition, scope, and applications of robotics,Classification of robots – mobile, industrial, service, humanoid ,Robot anatomy – links, joints, actuators, DOF,Fundamentals of motion: position, velocity, acceleration, Sensors used in robotics: proximity, ultrasonic, infrared, IMU, vision sensors,Overview of robot kinematics and control,Case studies of robots in healthcare, manufacturing, agriculture.	
Unit II :	[9 Hrs]
Embedded Systems Fundamentals:Definition, characteristics, and architecture of embedded systems,Embedded hardware components, Microcontrollers vs. microprocessors, Memory types, communication interfaces,ARM-based microcontrollers (Basics of ARM Cortex series),Introduction to Real-Time Systems,Embedded C programming basics,Input/Output handling and interrupt mechanisms,Power management in embedded systems.	
Unit III :	[9 Hrs]
Sensors, Actuators, and Interfacing: Types of sensors used in embedded and robotic systems,Temperature, pressure, gas, light, motion,Sensor interfacing with microcontrollers (ADC, I2C, SPI, UART),Actuators: DC motors, servo motors, stepper motors, solenoids,Motor control techniques: PWM, H-bridge, motor drivers,Interfacing peripherals: LCD, keypad, Bluetooth/WiFi modules,Hands-on examples using Arduino/ESP32/Raspberry Pi, Case study: Building a sensor-based smart IoT device	
Unit IV :	[9 Hrs]
Robotics Motion Planning & Control : Forward and inverse kinematics concepts,Trajectory planning for robots,Localization and Mapping (SLAM basics),Path planning algorithms,Dijkstra, A*, RRT, Bug algorithm,Robot Operating System (ROS) introduction,Control systems in robotics: PID, feedback loops,Use cases: Autonomous mobile robots, robotic arms.	
Unit V :	[9 Hrs]
Embedded Robotics, IoT & Applications: Embedded robotics architecture,Integrated system design: hardware + software,Real-time OS (RTOS) fundamentals for robotics,IoT-enabled robotic systems,Cloud & edge computing in robotics,Security in embedded & robotic systems,Mini-Project Themes:Line-following robot,Home automation system,Obstacle avoidance robot,Smart surveillance bot with IoT,Recent trends: AI-powered robots, collaborative robots (cobots), autonomous drones	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Robotics and Control	R.K. Mittal, I.J. Nagrath		McGraw Hill
2.	Embedded Systems: Architecture, Programming and Design	Raj Kamal	3rd Edition	McGraw Hill
3.	Microcontrollers and Embedded Systems Using Assembly and C	Muhammad Ali Mazidi, Rolin McKinlay, Janice Mazidi	2nd Edition	Pearson
4.	Real-Time Systems	Jane W. S. Liu	-	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Autonomous Mobile Robots	Roland Siegwart, Illah Nourbakhsh	2nd Edition	MIT Press
2	Beginning Arduino	Michael McRoberts	-	Apress

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CB605P(i)	PE-III Robotics and Embedded Systems Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
By the end of this course, students will be able to: 1. Learn the fundamental concepts, structure, and classification of robotic systems along with their real-world applications. 2. Understand embedded system architecture, microcontroller fundamentals, and basic embedded C programming techniques. 3. Explore sensors, actuators, and interfacing mechanisms essential for building embedded and robotic applications. 4. Study basic motion planning, kinematics, and control algorithms used in autonomous robotic systems. 5. Develop foundational skills to design simple embedded and IoT-enabled robotic solutions.	After successful completion of the course, students will be able to: 1. Explain key concepts of robotics and embedded systems, including robot anatomy, components, and functionality. 2. Identify, interface, and operate essential sensors, actuators, and microcontroller peripherals. 3. Write and execute basic embedded C programs for performing I/O operations and hardware interaction. 4. Apply kinematics, motion planning, and control algorithms to analyze simple robotic behaviors. 5. Design and demonstrate basic embedded or IoT-based robotic mini-projects integrating hardware and software.

Expt. No.	Title of the experiment
1	Study of Basic Components of a Robot
2	Introduction to Arduino/ESP32 – Basic LED Program
3	Sensor Reading Practical – Temperature / Light Sensor
4	Motor Control Basics (DC Motor using PWM)
5	Interfacing LCD or Serial Print Display
6	Interfacing Bluetooth Module (HC-05) / Simple IoT Command
7	Simple Line Detection or Obstacle Detection Logic
8	Mini-Project Demonstration

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Robotics and Control	R.K. Mittal, I.J. Nagrath	----	McGraw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Autonomous Mobile Robots	Roland Siegwart, Illah Nourbakhsh	2nd Edition	MIT Press

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						MSE	ESE	Total
23CB605P(iii)	PE – III Data Mining and Analytics Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. Gain familiarity with the mathematical foundations underlying data mining techniques and tools. 2. Understand and implement classical models and algorithms used in data warehousing and data mining. 3. Identify and describe various patterns discovered through association rule mining, classification, and clustering. 4. Recognize how data mining supports business operations by enabling informed decision-making, fraud detection, risk assessment, and efficient analysis of large datasets.	1. Explain the fundamental concepts, techniques, and applications of Data Mining. 2. Use data mining software tools to solve practical real-world data problems. 3. Describe key statistical analysis techniques such as regression, ANOVA, and data reduction. 4. Apply and analyze statistical techniques including regression, ANOVA, and data reduction for data interpretation. 5. Apply ARMA estimation models for time-series analysis.

a d credit risks and analyze large amounts of data quickly.

Expt. No.	Title of the Experiment
1	**Demonstration of preprocessing on dataset student.arff**
2	**Demonstration of preprocessing on dataset labor.arff**
3	**Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm**
4	**Demonstration of Association rule process on dataset test.arff using apriori algorithm**
5	**Demonstration of classification rule process on dataset student.arff using j48 Algorithm**
6	**Demonstration of classification rule process on dataset employee.arff using j48 algorithm**
7	**Demonstration of classification rule process on dataset employee.arff using id3 algorithm**
8	**Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm**

Text Books

S.N	Title	Authors	Edition	Publisher
1	Data Mining: Concepts and Techniques	Jiawei Han and Micheline Kamber	3rd ed, 2010.	Morgan-Kaufmann Publishers

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Data Mining and Knowledge Discovery Handbook	Lior Rokach and Oded Maimon	2nd edition, 2010	Springer
2	Applied Regression Analysis	Draper, N. R. and Smith	Third Edition, 1998	John Wiley

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ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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B. Tech. Scheme of Examination & Syllabus 2023-24

COMPUTER SCIENCE AND BUSINESS SYSTEMS

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
23CB605T(iii)	PE – III Data Mining and Analytics	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
This course ensures that the students understand how: 1. Be familiar with mathematical foundations of data mining tools. 2. Understand and implement classical models and algorithms in data warehouses and data mining 3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering. 4. Data mining can help businesses make operational and production adjustments, detect fraud and credit risks, and analyze large amounts of data quickly.	1. **Explain** the fundamental concepts, techniques, and applications of Data Mining. 2. **Use** data mining software tools to **solve** practical data-related problems. 3. **Describe** statistical analysis techniques such as regression, ANOVA, and data reduction. 4. **Select** and **apply** appropriate data mining algorithms to develop analytical solutions. 5. **Explain** the concepts, issues, and challenges in mining data streams and time-series data.

Unit I: Introduction to Data Mining: **[5 Hrs]**

What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications

Unit II: **[10 Hrs]**

Data preprocessing: Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization

Data mining knowledge representation: Task relevant data, Background knowledge, Representing input data and output knowledge, Visualization techniques

Unit III: Data mining algorithms **[10 Hrs]**

Data mining algorithms - Association rules: Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis

Data mining algorithms - **Classification:** Basic learning/mining tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees and algorithm.

Unit IV: **[10 Hrs]**

Data mining algorithms – **Prediction:** The prediction task, Naive Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), linear models

Descriptive analytics: Data Modeling, Trend Analysis, Simple Linear Regression Analysis

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods–Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

Unit V: **[10 Hrs]**

Time Series Analysis, **Prescriptive Analytics**,

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining–Mining the World Wide Web

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Data Mining: Concepts and Techniques	Jiawei Han and Micheline Kamber,	3rd ed, 2010	Morgan Kaufmann Publishers
2.	Data Mining and Knowledge Discovery Handbook	Lior Rokach and Oded Maimon	2nd edition, 2010	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Applied Logistic Regression	Draper, N. R. and Smith	Third Edition	John Wiley

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CB603T	Financial & Cost Accounting	2	-	-	2	15	15	35	50

Course Objectives	Course Outcomes
1. To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications. 2. To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements. 3. To create awareness about cost accounting, different types of costing and cost management.	1. Explain fundamental accounting concepts, techniques, and processes required for preparing and interpreting financial statements. 2. Analyze financial statements and evaluate cash flow and fund flow techniques to support effective financial decision-making. 3. **Apply** basic costing systems and **interpret** annual corporate reporting practices for effective cost control and understanding of financial disclosures

Unit I -Accounting Concept and Accounting Process **[10Hrs]**

Accounting Concept: Introduction, Techniques and Conventions, Financial Statements- Understanding & Interpreting Financial Statements

Accounting Process: Book Keeping and Record Maintenance, Fundamental Principles and Double Entry, Journal, Ledger, Trial Balance, Balance Sheet, Final Accounts, Cash Book and Subsidiary Books, Rectification of Errors.

Unit II- Financial Statements, Cash Flow and Fund Flow Techniques **[10Hrs]**

Financial Statements: Form and Contents of Financial Statements, Analyzing and Interpreting Financial Statements, Accounting Standards. *Class Discussion: Corporate Accounting Fraud- A Case Study of Satyam.*

Cash Flow and Fund Flow Techniques: Introduction, How to prepare, Difference between Cash Flow and Fund Flow Techniques

Unit III- Costing Systems, Company Accounts and Annual Reports **[10Hrs]**

Costing Systems: Elements of Cost, Cost Behavior, Cost Allocation, OH Allocation, Unit Costing, Process Costing, Job Costing, Absorption Costing, Marginal Costing, Cost Volume Profit Analysis, Budgets, ABC Analysis. *Class Discussion: Application of costing concepts in the Service Sector*

Company Accounts and Annual Reports: Audit Reports and Statutory Requirements, Directors Report, Notes to Accounts, Pitfalls.

Text Books

S.N	Title	Authors	Edition	Publisher
1	*Accounting: Texts and Cases*	Robert N Anthony, David Hawkins, Kenneth Marchant		McGraw-Hill
2	"Financial Accounting: Tools for Business Decision Making"	Paul D. Kimmel, Jerry J. Weygandt, and Donald E. Kieso	9th Edition	Wiley
3	"Management Accounting: Text, Problems and Cases"	Khan & Jain	5th Edition	McGraw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	"Cost Accounting: A Managerial Emphasis"	Charles T. Horngren, Srikant M. Datar, and Madhav V. Rajan,	16th Edition	Pearson
2	"Accounting Principles"	Jerry J. Weygandt, Paul D. Kimmel, and Donald E. Kieso,	14th Edition	Wiley
3	"Fundamentals of Financial Accounting"	by Fred Phillips, Robert Libby, and Patricia A. Libby,	6th Edition	McGraw Hill

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COMPUTER SCIENCE & BUSINESS SYSTEMS

SIXTH SEMESTER

Course	Course Name	Th	Tu	Pr	Credit		Evaluation		
23CB606T(iii)	PE-IV Image Processing and Pattern Recognition	2	-	-	2	MSE 7.5	CA 7.5	ESE 35	Tota 50

Course Objectives	Course Outcomes
1.To introduce the fundamental concepts of digital image formation 2.To develop skills in image segmentation and in extracting meaningful image interpretation. 3. To provide knowledge of advanced techniques, and morphological filtering for real-world imaging applications.	1. Explain and apply the fundamentals of image formation and spatial filtering for basic image enhancement. 2. Perform image segmentation and extract key features and structural descriptors for image analysis. 3. Able to Apply advanced methods and morphological filtering to analyze and interpret images in diverse application domains.

Unit I Fundamentals of Image Processing **[10 Hrs]**

Introduction: Image processing systems and its applications. Basic image file formats

Image formation: Geometric and photometric models; Digitization - sampling, quantization; Image definition and its representation, neighborhood metrics.

Intensity transformations and spatial filtering: Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.

Unit II Segmentation and Feature Extraction **[10 Hrs]**

Segmentation: Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform.

Image/Object features extraction: Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull; Distance transform, medial axis transform, skeletonization/thinning, shape properties.

Unit III Advanced Image Processing Techniques **[10 Hrs]**

Registration: Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.

Colour image processing: Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation.

Morphological Filtering Basics: Dilation and Erosion Operators, Top Hat Filters

Text Books

S.N	Title	Authors	Edition	Publisher
1	Digital Image Processing.	R. C. Gonzalez and R. E. Woods		Prentice Hall.
2	Fundamental of Image Processing	Anil K.Jain,		Prentice Hall.
3	Pattern Classification	R.O. Duda, P.E. Hart and D.G. Stork	Second Edition	John Wiley, 2006

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Image Processing: The Fundamentals.	Maria Petrou and Panagiota		John Wiley & Sons, Ltd.
2	Digital Image Processing	K. R. Castleman:,		Prentice Hall, Englewood Cliffs
3	Visual Reconstruction.	A. Blake and A. Zisserman.		MIT Press, Cambridge.
4	Digital Pictures	A. N. Netravali and B. G. Haskell,		Plenum Press.
5	Digital Images and Human Vision	A. B. Watson		MIT Press, Cambridge.

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SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CB606P(iii)	PE-IV Image Processing and Pattern Recognition Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1 Students should be able to understand digital image processing and advanced concepts. 2 Students should be able to properly implement algorithms and present the results. 3 To study fundamentals of color Image Processing.	1. To explain the digital image processing and digital image formation 2. To illustrate different mathematical preliminaries to deal with digital image processing 3. To explain the concept of Image restoration and image segmentation. 4. To apply the concept of patter recognition and its different phases

Expt. No.	Title of the experiment
1	Write a code that reads a gray scale image and generates the flipped image of original image.
2	To enhance contrast using Histogram Equalization
3	Write a program for image enhancement.
4	Write a program for image compression
5	Write a program for Edge detection
6	Write a program for image segmentation
7	Write a program for image morphology
8	Illustrate and discuss use of various method of pattern recognition.
9	Write a program for face detection in MATLAB.

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