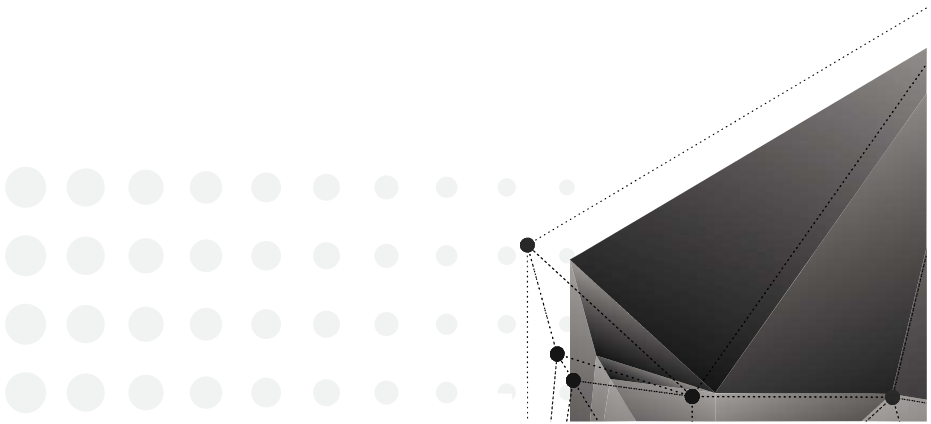


FIFTH SEMESTER
'COMMUNICATION
&
COMPUTER NETWORKING'



MOBILE & WIRELESS COMMUNICATION

Course Code:	475001
Course Title	Mobile & Wireless Communication
No. of Credits	10 (TH:6,T:0,P:8)

COURSE OUTCOMES: After completing this course the student must demonstrate the knowledge and ability to:

1. Understand the basic concepts of wireless communications.
2. Apply the cellular concepts to evaluate the signal reception performance in a cellular network.
3. Describe and differentiate four generations of wireless standard for cellular networks including Rayleigh fading, multi antenna maximal ratio combiner.
4. Analyze Multiuser Systems, CDMA, WCDMA network planning and OFDM Concepts.
5. Design wireless communication systems with key 3G and 4G technologies.
6. Develop technical and listening skills for effective communication.

COURSE CONTENTS

Unit - I : Overview of Cellular Systems

- **Evolution-** 2G/3G/4G/5G.
- **Cellular Concepts** – Cell, Cell Structure, Cluster, Frequency reuse, Channel Assignment strategies.
- **Hand-off Strategies-** Concept of hand-off, Types of Hand-off- Hard, Soft.
- **Interference & System Capacity** - Co - channel Interference and Adjacent channel Interference.
- **Improving Coverage & Capacity in Cellular System-** Cell splitting, Sectoring, Microcell zone concept, Repeaters for range extension.

Unit - II : Wireless Propagation

- Link budget, Free-space path loss, Multipath fading, Fading margin.

Unit- III : Wireless Network Technologies-

- **Bluetooth Technology** - Features, architecture, frequency band, IEEE 802.15.1 and other wireless protocols, applications.
- **RFID-** Concept, Frequency band, classification of RFID tags, applications.
- **WLAN Technology-** IEEE 802.11, WLAN System Architecture, Radio Spectrum.

Unit - IV : Advancement in Communication Technology

- Overview of CDMA, OFDM and LTE, VoLTE, 5G.

PRACTICAL OUTCOMES: After completion of this course the students are able to:

1. Find the Co-Channel cells for a particular cell.
2. Find the Path loss.
3. Understand concept of Fading.
4. Implement the bluetooth & wireless communication protocols for communication.

List of Practicals:

1. Perform a comparative study of Cellular Communication evolution from 2G to 5G.
2. To Study the features, specification and working of cellular Telephone system.
3. To observe waveforms at various stages of basic GSM trainer/demonstrator.
4. Fault finding on a basic GSM trainer/demonstrator.
5. To study the IEEE standards designated for Bluetooth communication & demonstrate the establishment of bluetooth link between two devices using these standards.
6. To study the IEEE standards designated for Wireless communication & demonstrate the establishment of wireless link between two devices using these standards.
7. Visit of BTS in order to get familiarize with the process.
8. Visit of nearby Mobile Switching Centre with a live demonstration of 'Frequency Reuse/Channel Allocation methods.

Suggested Learning Resources:

1. Wireless Communications – Principles and Practice T. S. Rappaport, (2nd edition) Pearson ISBN 9788131731864
2. Modern Wireless Communications Haykin & Moher Pearson 2011 (Indian Edition) ISBN : 978-8131704431

SYSTEM ADMINISTRATION

Course Code:	475002
Course Title	System Administration
No. of Credits	10 (TH:6,T:0,P:8)

COURSE OUTCOME : After completion of this course the students are able to:

1. Acquire Core System Administration Skills.
2. Grasp Virtualization Concepts and Practices.
3. Master Windows and Linux Server Administration.
4. Implement Security Measures and Basic Monitoring.
5. Attain Proficiency in Linux Environments.

COURSE CONTENTS

1. Fundamentals of System Administration:

- Introduction to System Administration.
- Installation of Windows Server and Linux Server.
- User Account Management and Group Administration.
- Basics of File Permissions.

2. Principles of Virtualization

- Conceptual Overview of Virtualization.
- Creating and Configuring Virtual Machines.
- Enhancing VMs with Guest Additions.
- Fundamentals of Virtual Networking and Security.

3. Windows Server Administration Essentials

- Understanding Active Directory and Organizational Units.
- DNS and DHCP Server Configuration.
- Introduction to Remote Desktop Services.
- Network Security Principles and Basic Group Policies.

4. Server Security and Monitoring

- Implementing Fundamental Security Practices.
- Password Policies and Access Control.
- Network Protection through Firewalls.
- Introduction to System Monitoring Techniques.

5. Introduction to Linux Systems

- Historical Background and Advantages of Linux.
- Overview of Different Linux Distributions.
- Installation of a Linux Distribution (e.g., CentOS or Debian).
- Basics of Linux Utilities and Essential Commands.

6. Linux System Management

- Establishing Network Connectivity on Linux.
- Introduction to DNS and DHCP Services.
- Basics of Apache Web Server Configuration.
- Fundamental File Management on Linux.

7. Navigation of Linux Environments

- User Account Administration and Essential Tasks.
- Understanding Graphical User Interfaces (GUI).
- Exploration of the Linux File System and Directories.
- Introduction to Linux Shell and Basic Commands.

8. Simplified Management of Linux Applications

- Software Installation Procedures on Linux.
- Utilizing Basic Text Editors on Linux.
- Running Applications Designed for Linux.

PRACTICAL OUTCOMES: After completion of this course the students are able to:

1. Explain system administration.
2. Install, Maintain and configure different server.
3. Install, Maintain and configure procedures for virtual machine, virtual network and security.
4. Install, Maintain and configure windows.
5. Install, Maintain and configure of Linux networking.
6. Installation of software from different platform.

LIST OF PRACTICALS

1. Installation & configuration of Windows Server OS
2. Installation & configuration of RedHat/CentOS
3. Installing & configuring a Virtual Machine.
4. Using various Linux networking commands
5. Managing the User's Shell Environment
6. Installing Software from Tarballs, RPM and YUM.
7. Using the mount Command to Mount & Unmount the Disks, Devices.
8. Managing the GRUB Boot Loader, The GRUB Configuration File, Installing GRUB
9. Setting up SSH and Telnet.
10. Setting up FTP Server.
11. Configuring Apache Web Server.
12. Configuring an NFS Server & Client
13. Configuring the Samba Server and Client Access
14. Installing and configuring Bind DNS Server.
15. Installing and configuring DHCP.
16. Firewall and security configuration.
17. Installing dockers & containers

Recommended Books

1. Steve Silva, Web Server Administration, Course Technology.
2. Byron Wright, Hands-on Microsoft Windows Server 2003 Networking, CourseTechnology.
3. Mark Minasi Mastering Windows Server 2008 Wiley India
4. Hassell Windows Server 2008 : definitive guide Oreilly
5. Doug Lowe Networking for Dummies Wiley India
6. Richard Burke Network Management Concepts and practice. Pearson
7. Microsoft Press MCSE Training Kit Tata Mc graw Hill
8. George Reese: Cloud Application architectures Oreilly
9. e-books/e-tools/relevant software to be used as recommended by AICTE / UBTER / NITTTR, Chandigarh.

**‘Elective Course 1-1’
ELECTRONIC EQUIPMENT MAINTENANCE**

Course Code:	475003
Course Title	Electronic Equipment Maintenance
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: After completion of this course, student will be able to:

1. Gain proficiency in reading and interpreting various drawings and diagrams used in electronic equipment.
2. Develop skills in disassembling and reassembling electronic equipment.
3. Acquire knowledge of equipment failures and their causes, and understand the nature of faults.
4. Learn fault location procedures and utilize various troubleshooting aids such as service manuals, measuring instruments, and special tools.
5. Master testing techniques for passive components like resistors, capacitors, and inductors.
6. Develop expertise in testing and diagnosing semiconductor devices, including diodes, transistors, and operational amplifiers.

COURSE CONTENTS

Unit 1 : Fundamental Troubleshooting Procedures

Reading Drawings & Diagrams –Circuit Diagram, Wiring Diagram; Dis-assembly and re-assembly of equipment, Equipment Failures and Fault finding aids – Service and maintenance manuals and instruction manuals, Test and Measuring instruments, special tools Troubleshooting techniques.

Unit 2 : Passive Components and Their Testing

Passive Components- Resistors, Capacitors, Inductors, Failures in fixed resistors, testing of resistors, variable resistors, variable resistors as potentiometers, failures in potentiometers, testing of potentiometers, LDRs and Thermistors Types of capacitors and their performance; Failures in capacitors, testing of capacitors and precautions therein, variable capacitor types; Testing of inductors and inductance measurement.

Unit 3: Testing of Semiconductor Devices

Causes of failure in Semiconductor Devices, Types of failure, Test procedures for Diodes, special Diodes, Bipolar Junction Transistors, Field Effect Transistors, Thyristors Operational Amplifiers, Fault diagnosis in op-amp circuits.

Unit 4: Logic IC families

Packages in Digital ICs, IC identification, Digital troubleshooting methods – typical faults, testing digital ICs with pulse generators, Logic clip, Logic Probe, Logic Pulser, Logic Comparator Special consideration for fault diagnosis in digital circuits.

Unit 5: Rework & Repair of Surface Mount Assemblies

Surface Mount Technology and surface mount devices, Surface Mount Semiconductor packages –Flatpacks and Quad Packs, Cylindrical Diode Packages, Packaging of Passive Components as SMDs Repairing Surface Mount PCBs, Rework Stations.

Reference Books :

1. Modern Electronic Equipment : Troubleshooting, Repair and Maintenance, Khandpur, TMH 2006
2. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting, R.G Gupta, Tata McGraw Hill Edition, 2001
3. Student Reference Manual for Electronic Instrumentation Laboratories, David L. Terrel, Butterworth-Heinemann
4. Electronic Testing and Fault Diagnosis, G.C. Loveday, A.H., Wheeler Publication

**‘Elective 1-2’
DATA SCIENCES : DATA WAREHOUSING
AND DATA MINING**

Course Code:	435005
Course Title	Data Sciences:Data Warehousing and Data Mining
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: By the end of this course, the student will be able to:

1. Understand the fundamental concepts, motivation, and importance of data mining.
2. Apply data preprocessing techniques, including data quality assessment, reduction, transformation, cleaning, and integration.
3. Design and implement data warehouses, utilizing data cube modeling and computation for online analytical processing.
4. Analyze patterns, associations, and correlations in data, utilizing efficient mining methods and evaluating their applications.
5. Develop classification models using various techniques, such as decision tree induction, Bayesian methods, and rule-based classification.
6. Apply cluster analysis to identify structures in data, employing different clustering approaches and outlier detection techniques.

COURSE CONTENTS

1. Introduction

Importance, Basic Definitions, Data Types, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining, Concept of Data Visualization, Major Tasks in Data Preprocessing, Data Transformation, Data Cleaning and Data Integration

2. Data Warehousing & On-line Analytical Processing (Overview Only)

Data Warehouse basic concepts, Data Warehouse Design and Usage, Data Warehouse Implementation.

3. Patterns, Associations And Correlations

Mining Frequent Patterns, Basic Concepts of Association, Applications of frequent pattern and associations.

4. Classification

Basic Concepts, Brief Introduction of various classification methods, Basic Idea of Techniques used to Improve Classification Accuracy,

5. Cluster Analysis

Basic Concept of Cluster Analysis, Clustering Structures, Basic concept of web mining.

Reference Books :

1. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. AmiteshSinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

**‘Elective 2-1’
TOTAL QUALITY MANAGEMENT**

Course Code:	455005
Course Title	Total Quality Management
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES : After completion of this course the students are able to:

1. Develop an understanding on quality management philosophies and frameworks
2. Develop in-depth knowledge on various tools and techniques of quality management
3. Learn the applications of quality tools and techniques in both manufacturing and service industry
4. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implement able solutions to those.
5. Emerging concepts for quality and Taguchi optimization technique for off-line

COURSE CONTENTS

Unit - I : Introduction :

Definition of quality, dimensions of quality, quality planning, quality costs, basic concepts of total quality management, historical review, principles of TQM, Role of senior management, quality statements.

Unit - II : Total Quality Management Principles

Customer satisfaction – customer perception of quality, customer complaints, service quality, customer retention, employee involvement – motivation, empowerment, teams, recognition and reward, performance appraisal, benefits, continuous process improvement – Juran trilogy, PDSA cycle, 5s, kaizen.

Unit - III : Total Quality Management Tools

Bench marking – reasons to benchmark, bench marking process, Basic idea of Quality Function Deployment (QFD).

Unit - IV : Quality Systems

Quality Auditing - Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Requirements and Benefits.

Unit - V : Statistical Process Control (SPC)

The seven tools of quality, overview of central tendency and dispersion, population and sample, process capability, concept of six sigma.

Text & Reference Books:

1. Total Quality Management, M.P. Poonia & S.C. Sharma, Khanna Publishing House, 2018.
2. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
3. Quality Control and Applications by Housen & Ghose
4. Industrial Engineering Management by O.P. Khanna.

**‘Elective 2-2’
MULTIMEDIA TECHNOLOGIES**

Course Code:	435006
Course Title	Multimedia Technologies
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES : At the end of the course, the student will be able to:

1. Understand the foundation and concepts of multimedia, including hardware, software, operating systems, and communication systems.
2. Apply compression techniques to reduce the file size of multimedia content while maintaining acceptable quality.
3. Utilize desktop publishing tools and software to create visually appealing multimedia content.
4. Create multimedia animations and special effects using 2D and 3D animation techniques.
5. Apply digital imaging techniques within the context of multimedia production to enhance visual elements.
6. Develop multimedia applications using programming languages and frameworks to create interactive and engaging multimedia experiences.

COURSE CONTENTS

Unit - 1 : Introduction to Multimedia

Multimedia Foundation and Concepts: Multimedia Hardware, Multimedia Software, Multimedia operating systems, Multimedia communication system

Unit - 2 : Basic Compression Techniques Video and Audio Data Compression Techniques –

Lossy and Lossless. Example algorithms/standards: Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265

Unit - 3 : Content Development and Distribution (Basic Idea Only)

Desktop publishing Software (Coral Draw, Photoshop, Page maker) Multimedia Animation & Special effects (2D/3D animation, Flash)

Unit - 4 : Introduction to Digital Imaging

Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia

Unit - 5 : Introduction to Multimedia Programming and Applications

Note :- The faculty is advised to give the basic idea of any one of the following softwares: Coral Draw, Photoshop, Page maker.

Reference Books:

1. An Introduction to Multimedia Authoring, A. Eliens
2. Fundamentals of Multimedia, Prentice Hall/Pearson, Zenian Li & Mark S. Drew.
3. Multimedia and Animation, V.K. Jain, Khanna Publishing House, Edition 2018
4. Fundamentals of Multimedia, Ramesh Bangia, Khanna Book Publishing Co., N. Delhi (2007)

**‘Open Elective 1-1’
INTERNET OF THINGS**

Course Code:	435002
Course Title	Internet of Things
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES: By the end of this course, students will be able to:

1. Understand the fundamental concepts and principles of the Internet of Things (IoT) and its applications.
2. Design and develop IoT architectures, considering scalability, security, and interoperability.
3. Implement IoT solutions using relevant hardware platforms, software frameworks, and programming languages.
4. Apply data collection and analytics techniques to extract insights from IoT systems.
5. Analyze and evaluate the challenges and ethical considerations related to privacy, security, and data governance in IoT deployments.
6. Explore emerging trends and applications of IoT, such as smart cities, industrial IoT, healthcare, and agriculture.

COURSE CONTENTS

Unit 1:

- 1.1 Introduction to IoT
- 1.2 Sensing elements
- 1.3 Actuation methods

Unit - 2 :

- 2.1 Basics of IoT Networking
- 2.2 Communication Protocols
- 2.3 Sensor networks

Unit - 3 :

- 3.1 Introduction to Basic Arduino programming
- 3.2 Integration of Sensors/Actuators to Arduino

Unit - 4 :

- 4.1 Implementation of IoT with Raspberry Pi (Overview Only)
- 4.2 Data Handling Analytics

Unit - 5 :

- 5.1 Case Studies of IoT applications (any one example) in the field of :
 - 5.1.1 Agriculture
 - 5.1.2 Healthcare
 - 5.1.3 Activity Monitoring

References:

1. "Internet of Things (A Hands-on Approach)" by Arshdeep Bahga and Vijay Madisetti.
2. "IoT Solutions in Microsoft's Azure IoT Suite" by Scott Klein and Paolo Patierno.
3. "Raspberry Pi IoT Projects: Prototyping Experiments for Makers" by John C. Shovic and Jeff Chang.
4. "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things" by David Hanes and Gonzalo Salgueiro.
5. "Practical Internet of Things with MQTT and RabbitMQ" by Anand Vemuri.
6. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22
7. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
8. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)
9. Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill

**‘Open Elective 1-2’
SMART SYSTEMS**

Course Code:	435007
Course Title	Smart Systems
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES: After completion of this course students are able to:

- Identify and understand the working of sensors.
- Understand the concept of interfacing different sensors with MCU.
- Explain control techniques and standard for data transfer over the internet.
- Select packaging technology.

COURSE CONTENTS

1. Introduction to Sensor Devices

Basic idea of various sensor devices: Piezoresistive pressure sensor, Accelerometer, Capacitive Sensors, Microphone, Resonant Sensor and Vibratory Gyroscope, Low-Power, Low Voltage Sensors, Nano Sensors.

2. Interfacing Sensor Information and MCU

Amplification and Signal Conditioning, Integrated Signal Conditioning, Digital conversion, Sensor Interface Techniques, Sensor Integration.

3. Control Techniques and Standards

Basic Sensor Control Techniques (Basic Idea Only),
Brief Introduction of Various Standards used for Sensor controlling.

4. Communication For Smart Sensors

Wireless Data Communications- RF Sensing, Telemetry, Automotive Protocols, Industrial Networks Home Automation, MCU Protocols.

5. Testing and Reliability Implications of Smart Sensors

Reliability Implications, Testing Smart Sensors- HVAC Sensor Chip

Suggested Books:

1. Artificial Intelligence by Elaine Rich, Kevin Knight and Shivashankar B Nair, Tata McGraw Hill.
2. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Pearson Education.
3. Artificial Intelligence: A Modern Approach by S. Russell and P. Norvig, Prentice Hall.

SUMMER INTERNSHIP-II

Course Code:	AS501
Course Title	Summer Internship - II
No. of Credits	3 (TH:0,T:0,P:0)

Summer Internship provides an invaluable opportunity for students pursuing their Diploma in Engineering to gain real-world experience and exposure to various industrial production units and commercial activities related to their field of study. This program aims to bridge the gap between theoretical knowledge and practical application, equipping students with the necessary skills and expertise to thrive in the branch related industry.

At the end of the **Fourth semester**, students will undertake a minimum **6-week** Summer Internship, scheduled during the semester break following the Fourth Semester examinations. The respective Heads of Departments (HoDs) and experienced faculty members will guide and assist students in securing suitable training opportunities that align with their specialization. Each student will have a personalized training schedule developed in collaboration with the training providers, ensuring a comprehensive and enriching learning experience.

Before starting their training, students will receive a comprehensive briefing about the organizational setup, product range, manufacturing processes, and significant machinery and materials used in the training organization. This preliminary understanding will enhance their engagement and productivity during the internship.

To ensure a fruitful learning experience, faculty members will supervise students during their training in the industry or field organization. Each teacher will mentor a small group of 4-5 students, providing personalized attention and guidance. Students will be encouraged to maintain daily reports in their diaries, which will assist them in composing their final training report and presentation.

The evaluation process for the Summer Internship will include both internal and external assessments, as per the study and evaluation scheme of the **Fifth Semester**. During the viva-voce/presentation examination, students' understanding of materials, industrial processes, practices in the industry, and problem-solving abilities will be assessed. The evaluation will also focus on their application of knowledge and skills in real-life situations.

The components of evaluation will comprise:

- (a) Punctuality and regularity: 15%**
- (b) Initiative in learning new things: 15%**
- (c) Relationship with peers and colleagues: 10%**
- (d) Summer Internship report: 25%**
- (e) Viva-Voce: 35%**

We believe that this Summer Internship program will be a transformative experience for our students, empowering them to excel in their future careers and make meaningful contributions to the Engineering industry. The collaborative efforts of our experienced faculty members and industry partners will ensure that students gain valuable insights and practical skills during this immersive learning journey.

MAJOR PROJECT-I

Course Code:	AS502
Course Title	Major Project - I
No. of Credits	1 (TH:0,T:0,P:2)

The evaluation of Major Project-I will be conducted to assess students' understanding, application, and presentation of their chosen project topic. The following evaluation criteria will be used to measure their performance:

1. Project Identification (10%):

- Clarity and relevance of the chosen project topic.
- Demonstration of understanding of the industry or community needs addressed by the project.
- Adequate justification for selecting the particular project topic.

2. Project Proposal (10%):

- Comprehensive description of project objectives and scope.
- Logical and well-structured methodology for project execution.
- Feasibility of the proposed project, considering available resources.

3. Literature Review (10%):

- Thoroughness of the research conducted in relevant academic and professional sources.
- Critical analysis of existing literature, identifying gaps and potential contributions of the project.

4. Feasibility Study (10%):

- Evaluation of the project's practicality and viability.
- Assessment of potential risks and proposed mitigation strategies.

5. Project Planning (20%):

- Detailed project plan, including timeline, milestones, and resource allocation.
- Realistic budgeting and cost management strategies.

6. Proposal Presentation (30%):

- Clarity and effectiveness of communication during the presentation.
- Ability to address questions and defend the project proposal confidently.
- Professionalism and engagement with the panel and audience.

7. Overall Impression (10%):

- Demonstrated commitment and effort throughout the project.
- Creativity and innovation in problem-solving.
- Adherence to project management principles and best practices.
