Scheme For

Sixth Semester : Computer Engineering

S. No.	Course Code	Course Title	Hours Per Week			Internal Marks	External Marks (3 Hours)	Credits
			L	T	P			
1	23HS300	Entrepreneurship and Start-ups	3	1	0	50	100	4
2	23COPC302	Introduction to e-Governance	3	0	0	50	100	3
3		Program Elective - 3	3	0	0	50	100	3
	23COPE304	Internet of Things						
	23COPE306	Advance Computer Networks						
4		Open Elective - 3	3	0	0	50	100	3
	23COOE308	Cloud Computing						
	23COOE310	Mobile Computing						
5	23AU350	Indian Constitution	1	0	0	50	-	1
6		Lab based on Program Elective - 3	0	0	4	50	100	2
	23COPE352	Internet of Things						
	23COPE354	Advance Computer Networks						
7		Open Elective - 3	0	0	2	50	100	1
	23COOE356	Cloud Computing						
	23COOE358	Mobile Computing						
8	23COPR360	Major Project	0	0	8	50	100	4
9	23COSE362	Seminar	1	0	0	50		1
		Total				450	700	22

As per AICTE Guidelines:

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/subtopics.
- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Case Studies/Micro-projects may be given to group of students for hand-on experiences

However, Students will be required to appear for the exams STRICTLY as per the scheme of exam as proposed by Board of Technical Education, GNCT of Delhi.

Sixth Semester

Course Code	23HS300
Course Title	Entrepreneurship and Start-ups
Credits	Total: 3 Theory:3 (L:3 T:0 P:0)
Semester	Sixth Semester
Course Category	Humanities

Course Objective:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resources for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individuals and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture

Unit 1	Introduction to Entrepreneurship and Start – Ups; Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation; Types of Business Structures, Similarities/differences between entrepreneurs and managers.	
Unit 2	Business Ideas and their implementation Discovering ideas and visualizing the business; Activity map; Business Plan	
Unit 3	Idea to Start-up Market Analysis – Identifying the target market; Competition evaluation and Strategy Development; Marketing and accounting; Risk analysis	
Unit 4	Management Company's Organization Structure; Recruitment and management of talent; Financial organization and management	
Unit 5	Management Company's Organization Structure; Recruitment and management of talent; Financial organization and management	

Unit 6	Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy	

Course Outcome:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics: ● Understanding the dynamic role of entrepreneurship and small businesses

- Organizing and Managing a Small Business
- Financial Planning and Control
- Forms of Ownership for Small Business
- Strategic Marketing Planning
- New Product or Service D

Text Books

1. The Startup Owner's Manual: The Step-by-Step guide for buildings Company; Steve Blank and Bob Dorf; K & S Ranch
2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses; Eric Ries; Penguin UK
3. Demand: Creating What People Love Before They Know They Want It; Adrian J. Slywotzky with Karl Weber; Headline Book Publishing
4. The Innovator's Dilemma: The Revolutionary Book That will change the way you do business; Clayton M. Christensen; Harvard business

Online Resources:

1. https://www.fundable.com/learn/resources/guides/startup
2. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure
3. https://www.finder.com/small-business-finance-tips
4. https://profitbooks.net/funding-option-to-raise-startup-capital-for-your-business/

Course Code	23COPC302
Course Title	Introduction to e-Governance
Credits	Total: 3 (Theory - 3), L:3 T:0 P:0
Semester	Sixth Semester
Course Category	Mandatory

Course Objective:
To cover the concepts of e-Governance and to understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.

Unit 1	Exposure to emerging trends in ICT for development; Understanding of design and implementation of e-Government projects, e-governance lifecycle.	
Unit 2	Need for Government Process Re-engineering (GPR); National e-Governance Plan(NeGP) for India; SMART Governments & Thumb Rules	
Unit 3	Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for Innovation and Change Management in eGovernance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws	
Unit 4	Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.	
Unit 5	Mini Projects by students in groups – primarily evaluation of various e-governance projects.	

Course Outcome:

- Through exposure to introductory ideas and practices followed in a selected number of e-Governance initiatives in India, the course will help students to understand and appreciate the essence of e-Governance.

Text Books

1. Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India 2. The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
3. e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India
4. http://www.csi-sigegov.org/publications.php
5. https://negd.gov.in
6. https://www.nisg.org/case-studies-on-e-governance-in-india

Course Code	23COPE304 (Theory) / 23COPE352 (Practical)
Course Title	Internet of Things
Credits	Total 5 L: 3 T:0 P:2
Semester	Sixth Semester
Course Category	Elective

Course Objective:
By the end of this course, students will be able to:

- Understand the core concepts, architecture, and applications of IoT.
- Explore the role of sensors, microcontrollers, communication protocols, and cloud platforms.
- Gain hands-on experience in building simple IoT systems using Arduino/Raspberry Pi.
- Learn about data transmission, storage, and analysis in IoT.
- Understand IoT use cases in smart cities, healthcare, agriculture, and industry.

Unit 1	Introduction to IoT What is IoT? History and evolution; Characteristics and scope of IoT; IoT vs Traditional Internet; IoT architecture: Perception, Network, and Application layers; Applications: Smart Home, Smart Agriculture, Smart Cities, etc.	6
Unit 2	IoT Hardware and Sensors Sensors and Actuators: Types and applications; Microcontrollers: Arduino, Raspberry Pi – features and use; Communication Interfaces: GPIO, I2C, SPI, UART; Power management and energy harvesting	6
Unit 3	Networking and Communication Networking Basics: IP, TCP/UDP; IoT Protocols: MQTT, CoAP, HTTP, Bluetooth, ZigBee, LoRa, Wi-Fi; Data Formats: JSON, XML; Cloud integration for IoT	7
Unit 4	IoT Software and Platforms IoT programming tools: Arduino IDE, Python; Embedded OS (basics): Raspbian; Cloud platforms: ThingSpeak, Blynk, Firebase; Real-time data monitoring and visualization	7

Unit 5	IoT Applications and Security Case Studies: Smart Energy, Smart Health, Smart Environment; IoT Security: Threats, vulnerabilities, and mitigation; Data privacy and ethical concerns; Future trends in IoT and Industrial IoT (IIoT)	6

Course Outcome:

Upon successful completion of the course, students will be able to:

- CO1: Describe the architecture and components of IoT systems.
- CO2: Interface sensors and actuators with microcontrollers.
- CO3: Apply networking concepts to enable IoT communication.
- CO4: Design and implement basic IoT applications using Arduino or Raspberry Pi.
- CO5: Analyze data generated by IoT systems and interface with cloud platforms.

Text Books

1. "Internet of Things: A Hands-On Approach" – Arshdeep Bahga, Vijay Madisetti, Universities Press, 2014.
2. "Internet of Things" – Raj Kamal, McGraw Hill Education, 2017.

Reference Books:

1. "Getting Started with Raspberry Pi" – Matt Richardson & Shawn Wallace, O'Reilly, 2014.
2. "Designing the Internet of Things" – Adrian McEwen & Hakim Cassimally, Wiley, 2013.
3. "IoT Fundamentals: Networking Technologies, Protocols and Use Cases" – David Hanes et al., Cisco Press, 2017.

Online Resources:

1. https://swayam.gov.in/nd1_noc20_cs91
2. https://nptel.ac.in/courses/108/108/108108098/
3. https://swayam.gov.in/nd2_cec20_cs09

List of Experiments (Tentative, Should not be limited to the provided list):

1. Getting started with Arduino: LED blinking
2. Reading analog sensor values (e.g., temperature sensor LM35)
3. Motion detection using PIR sensor
4. Interfacing an ultrasonic sensor for distance measurement
5. Controlling devices using relay module
6. Displaying sensor data on LCD
7. Introduction to Raspberry Pi and GPIO programming
8. IoT Communication using MQTT (e.g., using Mosquitto broker)
9. Uploading data to ThingSpeak cloud platform
10. Home automation project: Controlling lights with IoT
11. IoT-based weather monitoring system (temperature & humidity)
12. Mini Project: Design and implementation of a real-life IoT prototype (e.g., Smart Dustbin, Smart Plant Watering System)

Course Code	23COPE306 (Theory) / 23COPE354 (Practical)
Course Title	Advance Computer Network
Credits	Total 3 Theory: 3 (L: 3 T: 0 P: 0)
Semester	Sixth Semester
Course Category	Elective

Course Objective:

- To provide in-depth knowledge of advanced concepts in computer networking.
- To explore modern networking technologies such as IPv6, MPLS, and wireless communication.
- To understand advanced protocols, network security, and quality of service (QoS).
- To introduce students to network simulation tools and real-world use cases.

Unit 1	Review of OSI and TCP/IP models, Limitations of IPv4 and transition to IPv6, IPv6 addressing, headers, and configuration, Dual stack and tunneling techniques, Subnetting and supernetting.	6
Unit 2	Static vs dynamic routing, Distance vector and link state protocols (RIP, OSPF, EIGRP), BGP overview, VLANs and inter-VLAN routing, Spanning Tree Protocol (STP), VTP	8
Unit 3	Wireless LAN (IEEE 802.11 standards), Wi-Fi architecture and security protocols (WEP, WPA, WPA2), Mobile IP, 3G/4G/5G basics, Bluetooth, RFID, and NFC, Introduction to MANETs and sensor networks	9
Unit 4	Basics of cryptography: symmetric & asymmetric, Firewalls, IDS, IPS, VPN and tunneling. Secure Socket Layer (SSL), HTTPS, Cybersecurity threats and mitigation	8
Unit 5	QoS fundamentals – bandwidth, delay, jitter, QoS models: IntServ and DiffServ, MPLS – architecture, working, and applications, Network congestion control, Basics of SDN (Software Defined Networking).	8
Unit 6	Introduction to packet tracer and NS2/NS3, Network monitoring tools: Wireshark, Nagios, SNMP – structure and operations, Network troubleshooting techniques, Case studies: Google's backbone, ISP routing	8

Course Outcome:

After completing this course, students will be able to:

- CO1: Analyze and apply advanced networking protocols.
- CO2: Design and manage networks using modern tools and technologies.
- CO3: Implement secure and efficient network configurations.
- CO4: Explore wireless and mobile networking in real-world scenarios.

Text Books
1. Behrouz A. Forouzan – Data Communications and Networking – McGraw-Hill 2. William Stallings – Data and Computer Communications – Pearson 3. Larry L. Peterson & Bruce S. Davie – Computer Networks: A Systems Approach – Morgan Kaufmann

Reference Books:
1. Andrew S. Tanenbaum – Computer Networks – Pearson 2. James F. Kurose and Keith W. Ross – Computer Networking: A Top-Down Approach – Pearson 3. Deep Medhi and Karthikeyan Ramasamy – Network Routing: Algorithms, Protocols, and Architectures – Morgan Kaufmann

Online Resources:
1. https://www.geeksforgeeks.org/computer-network-tutorial/ 2. https://www.packettracernetwork.com/ 3. https://nptel.ac.in/courses/106105183 – NPTEL Networking Course 4. https://www.wireshark.org/ – Network protocol analyzer https://www.cisco.com

List of Experiments (Tentative, Should not be limited to the provided list):
1. Configure static and dynamic routing using Cisco Packet Tracer. 2. Implement VLANs and inter-VLAN routing. 3. Setup a basic Wi-Fi network with WPA2 security. 4. Simulate IPv6 addressing and routing. 5. Capture and analyze packets using Wireshark. 6. Implement a basic VPN configuration. 7. Explore MPLS simulation using online tools. 8. Demonstrate SNMP-based network monitoring. 9. Setup and configure firewall rules using GNS3/Packet Tracer. 10. Analyze traffic using QoS and bandwidth management tools.

Course Code	23COOE308 (Theory) / 23COOE356 (Practical)
Course Title	Cloud Computing
Credits	3 (L:3, T:0, P:1) (3 Hrs Theory 2 Hrs Practical)
Semester	Sixth Semester

Course Category	Open Elective

Course Objective:

- To introduce the evolution of computing models and the fundamentals of cloud computing.
- To explain cloud service models, deployment types, and architectural components.
- To explore virtualization technologies and container-based systems used in cloud platforms.
- To understand key security issues in cloud computing and how to mitigate them.
- To study the design and management of scalable, distributed cloud architectures.
- To provide hands-on exposure to cloud platforms like AWS, Azure, and Google Cloud.

Unit 1	**Computing Paradigms** Evolution of centralized, distributed, cluster, and grid computing, System models: Client-server, peer-to-peer, multi-tier, Introduction to cloud computing: Concepts, benefits, and challenges	6
Unit 2	**Cloud Models and Architecture** Cloud characteristics, Service models: IaaS, PaaS, SaaS, FaaS, Deployment models: Public, Private, Hybrid, Community, Cloud architecture roles: Consumer, Provider, Broker, Auditor, Carrier, Resource access via APIs	7
Unit 3	**Virtualization Essentials** Role of virtualization in cloud computing, Types: Full, Para, OS-level, Hypervisors: Type 1 & Type 2 (e.g., VMware, VirtualBox), Containers and orchestration: Docker, Kubernetes	7
Unit 4	**Cloud Security** Core principles: CIA triad, privacy, access control, Threats: Data breaches, insecure APIs, DDoS, Virtualization-specific attacks: Guest hopping, VM migration risks, Mitigation strategies: Encryption, IAM, monitoring	7
Unit 5	**Cloud Architecture & Management** Design principles: Scalability, elasticity, fault tolerance, Resource pooling and auto-scaling, Load balancing and capacity planning, Real-world deployments and case studies	6
Unit 6	**Cloud Computing Platforms** Cloud programming models: Parallel, distributed, serverless, Platforms: AWS, Azure, Google Cloud, Tools: Hadoop, Spark, Docker, Terraform, Trends: Cloud-native apps, serverless development	6

Course Outcome: After completing this course, students will be able to:

- Understand and differentiate between various computing paradigms, including cloud computing.
- Explain cloud service and deployment models along with core architectural components.
- Apply virtualization and containerization concepts in cloud environments.
- Identify cloud security threats and suggest appropriate mitigation strategies.
- Analyze and design scalable cloud-based systems using resource management techniques.
- Use cloud platforms like AWS, Azure, or Google Cloud for deploying basic applications.

Text Books

1. Rajkumar Buyya, James Broberg, & Andrzej Goscinski. (2011). Cloud Computing: Principles and Paradigms. Wiley.
2. Kai Hwang, Geoffrey C. Fox, & Jack J. Dongarra. (2012). Distributed and Cloud Computing: From Parallel Processing to the Internet of Things. Morgan Kaufmann.
3. Arshdeep Bahga & Vijay Madisetti. (2014). Cloud Computing: A Hands-On Approach. Universities Press.

Reference Books:

1. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini. (2013). Cloud Computing: Concepts, Technology & Architecture. Prentice Hall.
2. Dan C. Marinescu. (2013). Cloud Computing: Theory and Practice. Morgan Kaufmann.
3. Michael Miller. (2012). Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online. Que Publishing.

Online Resources:

1. https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf
2. https://www.ibm.com/cloud/learn
3. https://aws.amazon.com/getting-started/
4. https://cloudsecurityalliance.org/resources/
5. https://www.coursera.org/specializations/cloud-computing

List of Experiments (Tentative, Should not be limited to the provided list):

1. Setup and Demonstrate Client-Server Communication;
    a. Using socket programming or HTTP protocol;
    b. Tools: Python/Node.js
2. Simulate Peer-to-Peer File Sharing;
    a. Basic file sharing system using Python or Java
3. Identify and Compare Centralized, Cluster, and Grid Systems;
    a. Use tools like BOINC or GridSim (for simulation)
4. Compare IaaS, PaaS, SaaS Models using Real Examples
    a. Use AWS EC2 (IaaS), Heroku (PaaS), Google Docs (SaaS)
    b. Document feature differences and use cases
5. Deploy a Web App on Public Cloud (AWS Free Tier / Heroku)
    a. Host a static/dynamic website using S3, EC2, or Heroku
    b. Introduce APIs for resource provisioning
6. Explore Roles in Cloud Architecture using Diagrams/Tools
    a. Model architecture showing consumer, provider, broker, etc. using draw.io or Lucidchart
7. Install and Use Type-2 Hypervisor (VirtualBox/VMware)
    a. Launch a Linux VM, install software, and test networking
8. Introduction to Containers with Docker
    a. Run containers from Docker Hub (e.g., nginx, MySQL)
    b. Understand docker pull, run, ps, exec, rm

9. Container Orchestration Basics with Kubernetes (Minikube or Play with K8s)

    a. Deploy and manage a multi-container app
10. Simulate Role-Based Access Control (RBAC) on Cloud Platform (AWS IAM / Azure) a. Create users, assign policies
11. Identify and Analyze Cloud Security Threats (Case-Based)
    a. Analyze DDoS or VM escape attack case study
    b. Discuss mitigation steps in lab report
12. Encrypt Cloud Storage (S3 or Google Drive)
    a. Demonstrate use of client-side encryption tools (e.g., Cryptomator, GPG)
13. Auto-Scaling and Load Balancing with AWS or GCP (Simulated)
    a. Use demo tools or AWS Elastic Load Balancer walkthrough
    b. Use diagrams to show how autoscaling works
14. Resource Monitoring on the Cloud (AWS CloudWatch or Prometheus)
    a. Set up basic metrics tracking (CPU, memory)
15. Deploy a Fault-Tolerant Web Application (Multi-zone Setup)
    a. Use redundant EC2 instances with Load Balancer (mock setup or simulate via local VM)
16. Write a Serverless Function using AWS Lambda / GCP Cloud Functions
    a. Simple “Hello World” or file conversion function
17. Hadoop Word Count on Local/Cloud Environment
    a. Install Hadoop, run word count example
18. Spark Data Processing on Sample Dataset
    a. Use Google Colab or local Spark setup
19. Infrastructure as Code (IaC) using Terraform
    a. Provision EC2 instance or a simple S3 bucket
20. Develop a Cloud-Native Microservice App using Docker and Flask/Node.js
    a. Deploy as a container, simulate API gateway
21. Cloud Service Comparison and Cost Estimation (AWS vs GCP vs Azure)
    a. Capstone: Mini Cloud App Deployment with Logging, Monitoring, Scaling

- Tools & Platforms
    - Free Cloud Tiers: AWS Educate, GCP Free Tier, Heroku
    - Virtualization: VirtualBox, VMware
    - Containerization: Docker, Kubernetes (Minikube)
    - IaC: Terraform

- Security: AWS IAM, OpenSSL, Cryptomator
- Data Platforms: Hadoop, Spark

Course Code	23COOE310 (Theory) / 23COOE358 (Practical)
Course Title	Mobile Computing
Credits	Total 3 (L:3, T:0, P:1) (3 Hrs Theory 2 Hrs Practical)
Semester	Sixth Semester
Course Category	Elective

Course Objective:

- Understand the fundamental concepts, evolution, and future trends of mobile computing.
- Identify the characteristics, limitations, and challenges of mobile environments.
- Analyze various mobile communication technologies, their architectures, and applications.
- Grasp the principles of mobile network architectures, including 2G, 3G, 4G, and a basic understanding of 5G.
- Comprehend the concepts of mobile IP and wireless ad-hoc networks.
- Evaluate the security challenges and privacy concerns in mobile computing.
- Develop a foundational understanding of mobile application development principles and user interface considerations.

Unit 1	Introduction to Mobile Computing; Evolution of Mobile Computing, Benefits, Challenges, Applications; Defining Mobile Computing: Features (portability, ubiquity, connectivity, personalization, context-awareness). Limitations and challenges in mobile computing (resource constraints, power, bandwidth, security). Mobile Devices and Operating Systems; Smartphones, Tablets; Android, iOS, Harmony OS; Sensors and Features	7
Unit 2	Wireless Communication Technologies;Infrared, Bluetooth, Wi-Fi, WiMAX, ZigBee, NFC, RFID Mobile Communication Networks; GSM, GPRS, EDGE, 3G, 4G, 5G; Mobile IP, Handoff, Roaming	9
Unit 3	Mobile Application Development Overview; Native, Web, Hybrid Apps; Android Development Basics (IDE, Emulator, APKs)	4
Unit 4	Mobile Protocols and Standards; WAP, TCP/IP in mobile context, Mobile DNS, Mobile VPNs Security and Privacy in Mobile Computing; Device Security, App Permissions, Authentication, Encryption, Malware	7
Unit 5	Use Cases and Applications; Mobile Banking, E-Learning, E-Governance, Healthcare, Smart Cities Future Trends in Mobile Computing; IoT, Cloud-Mobile Convergence, Wearables, AI in Mobile	5

Course Outcome:

- CO1: Explain the basic principles, historical evolution, and key applications of mobile computing.
- CO2: Differentiate between various generations of mobile communication technologies (2G, 3G, 4G, and emerging 5G features) and their operational characteristics.
- CO3: Describe in detail the architecture and services of cellular networks like GSM and GPRS, including call processing.
- CO4: Analyze the concepts of Mobile IP and illustrate the characteristics and challenges of Mobile Ad-hoc Networks (MANETs).
- CO5: Identify key hardware components and software platforms (OS) of modern mobile devices.
- CO6: Discuss various types of mobile applications, their development approaches, and critical user interface design considerations.
- CO7: Evaluate security vulnerabilities, privacy issues, and basic protective measures in mobile computing environments.

Text Books

1. "Fundamentals of Mobile Computing" by Prasant Kumar Pattnaik, Rajib Mall, PHI Learning Pvt. Ltd.
2. "Mobile Communications" by Jochen H. Schller, Pearson Education.
3. "Mobile Computing: Technology, Applications and Service Creation" by Asoke K. Talukdar and Roopa R. Yavagal, Tata McGraw Hill.

Reference Books:

1. "Wireless Communications & Networks" by William Stallings, Pearson Education.
2. "Principles of Mobile Computing" by Uwe Hansmann, Lothar Merk, Martin S. Nicklous, and Thomas Stober, Springer.
3. "A Glance over Android with Kotlin" by Khanna Publishing House
4. “Mobile Computing: Technology, Applications, and Service Creation” by Martyn Mallick – McGraw Hill
5. “Wireless and Mobile Networks: Concepts and Protocols” by Dr. Sunilkumar S. Manvi – Wiley

Online Resources:

1. Android Developers: https://developer.android.com/
2. Apple Developer: https://developer.apple.com/
3. https://www.youtube.com/@NOUGE-wb8ei

List of Experiments (Tentative, Should not be limited to the provided list):

1. Comparative Study on Evolution of Mobile Devices
    a. Analyze evolution from feature phones to 5G-enabled smartphones.
    b. Submit a report or presentation comparing features, limitations, and use cases.
2. Identify Mobile Computing Features Using a Real Smartphone
    a. Explore and report features like portability, GPS (context-awareness), personalization settings, etc.
3. Compare Android and iOS: Architecture & Interface
    a. Use emulators or real devices to study OS layout, settings, and app installation process.
4. Sensor Exploration Using Mobile Apps (e.g., Sensor Kinetics)
    a. Demonstrate sensors like accelerometer, gyroscope, magnetometer, proximity sensor, etc.
5. Bluetooth Communication Between Two Devices
    a. Transfer files, pair devices, and monitor communication logs.
6. Wi-Fi Scanning and Analysis using Apps (e.g., NetSpot, WiFi Analyzer)
    a. Identify nearby Wi-Fi networks, channels used, signal strength.
7. NFC or RFID Demonstration
    a. Use NFC-capable phones or RFID reader kits (if available) to simulate communication.
8. Analyze Mobile Network Types (2G, 3G, 4G, 5G)
    a. Use apps like OpenSignal or Network Cell Info to analyze speed, latency, and signal strength.
9. Demonstration of Mobile IP and Handoff
    a. Simulate mobile IP handoff using tools like GNS3 or visualize using videos and diagrams.

10. Setup Android Studio, Emulator, and Hello World App
    a. Develop and deploy a basic app on emulator or Android device.
11. Design a Simple Android App with Multiple Activities
    a. Create an app with buttons, input fields, and activity navigation.
12. Package and Generate APK for Simple App
    a. Generate and install APK on real/emulated device.
13. Analyze TCP/IP Packet Transmission on Mobile Devices
    a. Use apps like Wireshark (on computer) or Packet Capture (on mobile) to monitor network traffic.
14. Configure and Demonstrate Mobile VPN
    a. Setup and test VPN on Android or iOS using free VPN apps (e.g., ProtonVPN, OpenVPN)
15. Analyze App Permissions on Android
    a. Inspect and document permission access by popular apps (Facebook, WhatsApp, etc.)
16. Install & Analyze Antivirus/Anti-Malware App
    a. Use apps like Avast, Bitdefender to scan device and assess threats.
17. Implement Authentication in an Android App
    a. Basic login screen with username/password validation (offline)
18. Survey and Present Real Mobile Use Cases
    a. Choose a use case like E-Governance or Mobile Banking, study and document its mobile app features and challenges.
19. Demonstration of IoT App on Mobile (e.g., Blynk, Arduino IoT Cloud)
    a. Connect to a sensor or mock an IoT device and control via mobile.
20. Use Google Assistant or Siri and Analyze AI Capabilities
    a. Identify context-awareness, personalization, and AI-driven features.
21. Mini Project: Build a Functional Mobile App
    a. Use Android Studio to create a real-world app (calculator, attendance tracker, etc.)
22. Wearables and Mobile Integration (Demo/Research)
    a. Demo integration with smartwatches/fitness bands if available; else, explore via videos or SDK docs.

- **Tools & Platforms Suggested**
  - **Mobile Platforms**: Android Studio, iOS (Xcode – optional), Harmony OS (Huawei SDK – optional)
  - **Wireless Analysis**: WiFi Analyzer, NetSpot
  - **Security**: Avast Mobile Security, App Permissions Manager
  - **Networking**: OpenSignal, GNS3 (simulation), Packet Capture
  - **App Development**: Android Studio, Java/Kotlin
  - **IoT Integration**: Blynk, Arduino Cloud, Firebase (for notifications)

Course Code	23AU350
Course Title	Indian Constitution
Credits	Total 1 (L: 1, T:0; P:0)
Semester	Sixth Semester
Course Category	Audit

Unit 1	The Constitution - Introduction • The History of the Making of the Indian Constitution • Preamble and the Basic Structure, and its interpretation • Fundamental Rights and Duties and their interpretation • State Policy Principles	
Unit 2	Union Government • Structure of the Indian Union • President – Role and Power • Prime Minister and Council of Ministers • Lok Sabha and Rajya Sabha	
Unit 3	State Government • Governor – Role and Power • Chief Minister and Council of Ministers • State Secretariat	
Unit 4	Local Administration • District Administration • Municipal Corporation • Zila Panchayat	
Unit 5	Election Commission • Role and Functioning • Chief Election Commissioner • State Election Commission	

Text Books

1. Ethics and Politics of the Indian Constitution; Rajeev Bhargava; Oxford University Press, New Delhi, 2008
2. The Constitution of India; B.L. Fadia; Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India; DD Basu; Lexis Nexis; Twenty-Third 2018 edition

Online Resources:

- https://www.constitution.org/cons/india/const.html
- http://www.legislative.gov.in/constitution-of-india
- https://www.sci.gov.in/constitution
- https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/