UNITED INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

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Periyanaickenpalayam, Coimbatore – 641020

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

QUESTION BANK

III YEAR

EVEN SEMESTER

ACADEMIC YEAR 2024 – 2025

INDEX

HEAD OF THE DEPARTMENT

ACOE **PRINCIPAL** **CHAIRMAN**

CS3691
EMBEDDED SYSTEMS AND IOT

UNIT I 8-Bit Embedded Processor

8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Compare pooling and interrupts. How a microcontroller perform upon activation of interrupts ?	1	1	2
2.	Differentiate microprocessor and microcontroller.	1	1	2
3.	Interpret Embedded Systems and its components.	1	1	2
4.	List Embedded Systems addressing modes.	1	1	2
5.	Which register has the SMOD bit, and what is its status when the 8051 is powered up?	1	1	2
6.	List the 8051 interrupts with its priority?	1	1	2
7.	Define the operating mode 0 of 8051 serial ports.?	1	1	2
8.	Give the format of the register PSW of 8051 and name each it.	1	1	2
	PART B			
1.	Explain the Block diagram of 8051 ? or Explain the architecture of 8051?	1	4	16
2.	For microcontroller discuss the following : (i)How RAM is organized and addressed ?	1	4	8
	(ii)How many register banks are present in RAM and how is bank switching executed ?	1	4	8
3.	List the various instructions available in 8051 Microcontroller.	1	2	16
4.	Describe the different modes of operation of Timer/Counter in 8051 with its associated registers (or)Explain the timer modes of 8051 microcontroller ?	1	2	16

UNIT II Embedded C Programming

Memory And I/O Devices Interfacing – Programming Embedded Systems in C – Need For RTOS – Multiple Tasks and Processes – Context Switching – Priority Based Scheduling Policies.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is embedded C Programing?	2	1	2
2.	Define memory and I/O device interfacing?	2	1	2
3.	List the advantages and limitations of Priority based process scheduling.	2	1	2
4.	Define context switching in RTOS ?	2	2	2
5.	Bring out the difference between multiple process and multiple task ?	2	1	2
6.	What is RTOS ?	2	1	2
7.	List the bitwise operators in Embedded C language.	2	2	2
8.	What is difference between compiler and cross compiler ?	2	1	2
	PART B			
1.	Write Embedded C program for generating LED output sequence as shown below 00000001,00000010,00000100,00001000 so on till 10000000.	2	4	16
2.	Explain the context switching mechanism for moving the CPU from one executing process to another with an example?	2	4	16
3.	Briefly explain the Multiple Tasks and Processes?	2	2	16
4.	Explain priority scheduling and its types with example also explain its characterstics.	2	4	16

Introduction to the Concept of IOT Devices – IOT Devices Versus Computers – IOT Configurations – Basic Components – Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output From Pins

Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino.

UNIT III IOT And Arduino Programming

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Draw the logic design of IOT and describe its Components.	3	1	2
2.	What are the different protocols of IoT?	3	1	2
3.	Define IOT	3	1	2
4.	Point out the challenges faced by Internet of Things.	3	1	2
5.	What are the types of shields?	3	1	2
6.	Define I2C	3	1	2
7.	List various Libraries in Arduino	3	1	2
8.	How debugging works in Arduino?	3	1	2
	PART B			
1.	Briefly explain the Technical Building blocks of IoT.	3	4	16
2.	Describe the Communication Technologies of IOT.	3	5	16
3.	Explain in detail about Arduino Programming structure with examples.	3	5	16
4.	Define Arduino Shields and explain integration of Sensors and Actuators with Arduino.	3	5	16

UNIT IV IOT Communication And Open Platforms

IOT Communication Models and APIs – IOT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is Zigbee?	4	1	2
2.	What is Piconet?	4	1	2
3.	What is GSM/GPRS module?	4	1	2
4.	Define NFC	4	1	2
5.	Define Home Location Register (HLR)	4	1	2
6.	What is SMS Gateway (SMS-G)?	4	1	2
7.	What is Operation and Support Subsystem (OSS)?	4	1	2
8.	Define Equipment Identity Register (EIR)	4	1	2
	PART B			
1.	Explain GSM services and its architecture in detail	4	4	16
2.	Explain Raspberry Pi architecture and discuss how RPi used for IOT application.	4	4	16
3.	Brief about Bluetooth architecture.	4	5	16
4.	Explain GPS in detail.	4	4	16

UNIT V Applications Development

Complete Design of Embedded Systems – Development of IOT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.

Q.No	Question	CO	BTL	Marks

PART A

1.	What is an Embedded System Design?	5	1	2
2.	Write the Types of Embedded Systems	5	1	2
3.	What are the challenges of Embedded Systems?	5	1	2
4.	What are sensors and Actuators	5	1	2
5.	What is MQTT Protocol?	5	1	2
6.	Define Signal Conditioning Unit.	5	1	2
7.	Write the applications of IOT in Smart Supply Chain	5	1	2
8.	Write the Disadvantages of Embedded System	5	1	2

PART B

1.	Explain the Complete Design of Embedded Systems and development of IOT applications	5	4	16
2.	Write a program for Home Automation and explain.	5	4	16
3.	Explain the above design process for Agriculture and explain with relevant diagram	5	4	16
4.	Explain Embedded system that enhance Smart city.	5	4	16

OEE351

RENEWABLE ENERGY SYSTEMS

UNIT 1

RENEWABLE ENERGY SYSTEMS

Environmental consequences of fossil fuel use, Importance of renewable sources of energy, Sustainable Design and development, Types of RE sources, Limitations of RE sources, Present Indian and international energy scenario of conventional and RE sources.

PART- A

Q.NO	QUESTION	CO	BTL	MARKS
1.	What are Renewable Energy Systems? What are the applications	1	1	2
2	How does Renewable Energy be different from Non-Renewable differ?	1	2	2
3.	Define sources of Renewable Energy.	1	1	2
4.	How does Fossil Fuel differ from Natural source? Justify	1	2	2
5.	What are the limitations of renewable energy source?	1	2	2
6.	Can we call Fossil Fuels as part of RES? Justify the answer	1	1	2
7.	Is Atmospheric Pollution termed as RES or Non RES? Why & How	1	2	2
8.	What are the Environmental Issues of Acid Rain?	1	2	2

PART- B

1.	Define TEDA and how is it useful?	1	4	16
2.	India uses about 500 million T of coal every year to produce electricity, about 3.6 trillion cubic feet of natural gas for power, chemicals and fertilizers and over 160 million T of oil for transport and Industry. Comment .	1	1	16
3.	What is Greenhouse effect? Can Mumbai experience this? Justify	1	6	16
4.	How can RES be termed as Reliable and Resiliant?.	1	3	16

UNIT II

WIND ENERGY

Power in the Wind – Types of Wind Power Plants (WPPs)–Components of WPPs-Working of WPPs-Sighting of WPPs-Grid integration issues of WPPs.

PART- A

Q.NO	QUESTION	CO	BTL	MARKS
1.	Define Wind Power or Wind Energy	2	1	2
2	How is wind caused? What are wind turbines and how do they work?	2	1	2
3.	What is the process of converting air motion to electricity called as?	2	2	2
4.	How are the wind power plants based on? Give details.	2	1	2
5.	What are wind farms?	2	1	2
6.	Define uneven solar heating?	2	2	2
7.	What is Coriolis Effect?	2	2	2
8.	What is an idealized atmospheric circulation	2	2	2

PART- B

1.	Explain Coriolis Force in detail	2	5	16
2.	Most of the modern wind mills have 3 blades. Why	2	5	16
3.	Explain the wind power parameters in detail	2	6	16
4.	Define Lanchester Betz limit in detail	2	6	16

UNIT III

SOLAR PV AND THERMAL SYSTEMS

Solar Radiation, Radiation Measurement, Solar Thermal Power Plant, Central Receiver Power Plants, Solar Ponds.- Thermal Energy storage system with PCM- Solar Photovoltaic systems : Basic Principle of SPV conversion – Types of PV Systems- Types of Solar Cells, Photovoltaic cell concepts: Cell, module, array ,PV Module I-V Characteristics, Efficiency & Quality of the Cell, series and parallel connections, maximum power point tracking, Applications

PART- A

Q.NO	QUESTION	CO	BTL	MARKS
1.	Define solar radiation.	3	1	2
2	Infer solar azimuth angle and zenith angle	3	1	2
3.	Express the estimation of average solar radiation?	3	2	2
4.	State the principle involved in generating solar power.	3	2	2
5.	Examine the working principle of pyranometer.	3	2	2
6.	Describe the solar thermal power plant.	3	1	2
7.	Express the advantage of solar concentrators	3	1	2
8.	Explain the Solar Photovoltaic systems.	3	1	2

PART–B

1.	Explain the in detail about the solar radiation phenomena.	3	5	16
2.	What are the reasons for variation in the amount of solar energy reaching earth surface.	3	6	16
3.	Explain strategy design pattern for any scenario with neat class diagram.	3	5	16
4.	Explain the working of thermal energy storage system with PCM.	3	5	16

UNIT IV

BIOMASS ENERGY

Introduction-Bio mass resources –Energy from Bio mass: conversion processes-Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal Electricity. Mini/micro hydro power: Classification of hydropower schemes, Classification of water turbine, Turbine theory, Essential components of hydroelectric system.

PART- A

Q.NO	QUESTION	CO	BTL	MARKS
1.	Name the constituents of biogas	4	1	2
2	What is geothermal energy?	4	2	2
3.	Describe Geothermal gradient.	4	1	2
4.	Explain the concept of wet steam geothermal system..	4	2	2
5.	Define hydroelectric power plant.	4	1	2
6.	Give the necessity of surge tank in hydropower plant.	4	3	2
7.	Explain the primary requirements for site selection of hydropower plant	4	3	2
8.	Explain two differences between carbon in CO2 from burning coal and from burning biomass.?	4	1	2

PART–B

1.	Discuss the following methods of biogas generation i. Gasification ii. Anaerobic Digestion.	4	5	16
2.	With a neat sketch explain the operation dry steam geothermal power plant..	4	6	16
3.	Discuss about selection of water turbine based on capacity of the power plan, head and water flow rate.	4	4	16
4.	Which biomass energy crops and products are (i) most likely, and (ii) least likely to affect food supplies?	4	5	16

UNIT V

OTHER ENERGY SOURCES

Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC)- Hydrogen Production and Storage- Fuel cell : Principle of working- various types -construction and applications. Energy Storage System- Hybrid Energy Systems.

PART- A

Q.NO	QUESTION	CO	BTL	MARKS
1.	What is tidal energy?	5	2	2
2	Illustrate the limitations of tidal power generation	5	2	2
3.	Explain the factors determines the maximum length and height of ocean waves..	5	1	2
4.	Give the overall efficiency of an OTEC power plant.	5	2	2
5.	Illustrate OTEC open cycle.	5	2	2
6.	What is hydrogen energy?	5	2	2
7.	Draw the schematic of fuel cell.?	5	2	2
8.	Does the energy carried forward in a deep-water wave travel at the same speed as the wave?	5	1	2

PART- B

1.	Explain the different economic and environmental considerations of tidal power plant.	5	5	16
2.	Discuss, what is the minimum tidal range required for the working of tidal plant. Explain how much the potential in tides is.	5	5	16
3.	Discuss the following: i. OTEC open cycle. ii. OTEC closed (Anderson) cycle..	5	5	16
4.	With the help of neat diagram, explain the working of geo thermal-preheat hybrid..	5	4	16

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CCS 332
APP DEVELOPMENT

UNIT – 1

FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design.

PART – A

Q.NO	QUESTION	CO	BTL	MARKS
1.	Define web application.	1	1	2
2	Explain the flow of web application.	1	2	2
3.	Define Mobile App development	1	1	2
4.	Compare Native app and Hybrid app on the basis of Native App Hybrid App	1	4	2
5.	What is cross platform App?	1	1	2
6.	Define Progressive web apps	1	1	2
7.	Why you should include responsive design in your website?	1	1	2
8.	How To Design a Responsive Website in Eight Steps	1	1	2

PART – B

1.	Design the web app for hospital management with necessary items.	1	6	16
2.	A retail company wants to improve the in-store shopping experience for its customers. Design it by using native app	1	6	16
3.	List the simulators and emulators in mobile application.	1	4	16
4.	Tabulate the difference between simulators & emulators	1	4	16

UNIT II

NATIVE APP DEVELOPMENT USING JAVA

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Development Frameworks, Java &Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

PART – A

Q.NO	QUESTION	CO	BTL	MARKS
1.	What is React Native?	2	1	2
2	List some popular tools for developing native apps	2	1	2
3.	Give the Pros and cons of Native app	2	2	2
4.	Define Mobile App Development Framework	2	1	2
5.	What is Kotlin and Why Do We Use it?	2	1	2
6.	Define swift in ios.	2	1	2
7.	What is JSX?	2	1	2
8.	What are Components in React?	2	1	2

PART - B

1.	Explain the Scenarios to create Native App with example	2	5	16
2.	Create a Popular Native App Development Frameworks using Java & Kotlin.	2	6	16
3.	Explain the basics of Basics of React Native, Native Components, JSX, State, Props.	2	5	16
4.	Explain the tools for creating native app.	2	5	16

UNIT III

HYBRID APP DEVELOPMENT

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova

PART - A

Q.NO	QUESTION	CO	BTL	MARKS
1.	What is Hybrid App Development?	3	1	2
2	List the example of hybrid app development	3	1	2
3.	List the key features of Native, hybrid and web app	3	1	2
4.	List the advantage of hybrid app development	3	1	2
5.	List of hybrid mobile application development frameworks with their pros and cons.	3	1	2
6.	Pros of using Flutter Development Framework	3	4	2
7.	Define Ionic.	3	1	2
8.	Pros and Cons using Ionic Development Framework	3	4	2

PART – B

1.	Explain Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App with example.	3	5	16
2.	Create Hybrid App for real time application.	3	6	16
3.	Explain the frameworks, Ionic, Apache Cordova in detail with example.	3	5	16
4.	Explain the tools of hybrid app.	3	5	16

UNIT IV

CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross-platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props.

PART – A

Q.NO	QUESTION	CO	BT L	MARKS
1.	List the two frameworks in cross platform Architecture?	4	1	2
2	Difference between Native vs. cross-platform development.	4	4	2
3.	List the tools creating Cross-platform App and programming languages support for it	4	1	2
4.	How to develop cross-platform mobile apps?	4	1	2
5.	How do you choose the right cross-platform app development framework for your project?	4	1	2
6.	Future of cross-platform app development	4	1	2
7.	What is JSX?	4	1	2
8.	What is the tool supported to develop a Facebook app?	4	1	2

PART – B

1.	Illustrate the Criteria for creating Cross-platform App.	4	2	16
2.	Differentiate Native vs Hybrid vs Cross-Platform.	4	4	16
3.	Discuss about the Flutter Architecture in detail.	4	6	16
4.	Write down the steps to create simple Hello world App in Xamerin.	4	5	16

UNIT V

NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability.

PART – A

Q.NO	QUESTION	CO	BTL	MARKS
1.	Give real time App developed with Flutter?	5	1	2
2	Difference between React Native and Flutter?	5	4	2
3.	What is Mobile Angular UI?	5	1	2
4.	Mobile app performance KPIs to measure app quality	5	3	2
5.	List the metrics of app performance.	5	1	2
6.	List the functional aspects of debugging capabilities	5	1	2
7.	What is Reusability in app framework?	5	1	2
8.	Define easy development in app framework	5	1	2

PART – B

1.	Differentiate Xamarin, React Native and Flutter framework.	5	4	16
2.	Write down the steps to debug in android.	5	5	16
3.	Explain ways to reduce time to market in product development.	5	5	16
4.	Differentiate UI and UX	5	4	16

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CCS 345

ETHICS AND AI

UNIT I

INTRODUCTION

Definition of morality and ethics in AI-Impact on society-Impact on human psychology-Impact on the legal system-Impact on the environment and the planet-Impact on trust

PART A

Q. No	QUESTION	CO	BTL	Marks
1	Define Ethics	1	1	2
2	Define Kant's Principle?	1	1	2
3	Define order-book spoofing	1	1	2
4	Summarize why is ethics needed in Artificial Intelligence?	1	2	2
5	Discuss on Artificial Neural Network.	1	2	2
6	Differentiate Narrow AI and AGI.	1	2	2
7	Define Machine Learning.	1	1	2
8	Define Deep Learning.	1	1	2

PART B

1	Explain the impact of AI on Society.	1	2	16
2	Discuss how trust is influenced by AI.	1	2	16
3	Discuss how does AI affect Human Psychology.	1	2	16
4	Elobrate on the impact of AI on financial system.	1	2	16

UNIT II

ETHICAL INITIATIVES IN AI

International ethical initiatives-Ethical harms and concerns-Case study: healthcare robots, Autonomous Vehicles, Warfare and weaponization**.**

PART A

Q.No	QUESTION	CO	BTL	Marks
1	Explain the purpose of having ethical initiatives in AI?	2	2	2
2	Define Emotional harm	2	1	2
3	Define Environmental harm.	2	1	2
4	Define Financial harm.	2	1	2
5	List out the roles of robot in health care.	2	1	2
6	Define Autonomy.	2	1	2
7	List few Ethical initiatives and the harms addressed.	2	1	2
8	Explain warefare and weaponization	2	2	2

PART B

1	Discuss the idea behind warfare and weaponization.	2	2	16
2	Explain Health care robots in detail.	2	2	16
3	Describe the concept of Autonomous Vehicles	2	2	16
4	Explain various ethical harms and concern	2	2	16

UNIT III

AI STANDARDS AND REGULATION

Model Process for Addressing Ethical Concerns During System Design - Transparency of Autonomous Systems-Data Privacy Process- Algorithmic Bias Considerations - Ontological Standard for Ethically Driven Robotics and Automation Systems

PART A

Q. No	QUESTION	CO	BTL	Marks
1	Draw the relationship of processes and stages in IEEE 7000	3	1	2
2	List the benefits of IEEE 7000	3	1	2
3	Define Autonomous system.	3	1	2
4	Tabulate the IEEEP7001 standards to address the stake holders issues	3	2	2
5	List the scope of IEEE P7003	3	1	2
6	Differentiate medical ontology with product ontology	3	2	2
7	List the benefits of ontology	3	1	2
8	Discuss transparency of autonomous system.	3	2	2

PART B

1	Explain the Data Privacy process in detail.	3	2	16
2	Discuss on the ontological standards for ethically driven robotics and automation systems	3	2	16
3	Explain the model process for addressing ethical concerns.	3	2	16
4	Discuss algorithmic bias consideration.	3	2	16

UNIT IV

ROBOETHICS: SOCIAL AND ETHICAL IMPLICATION OF ROBOTICS

Robot-Roboethics- Ethics and Morality- Moral Theories-Ethics in Science and Technology - Ethical Issues in an ICT Society- Harmonization of Principles- Ethics and Professional Responsibility Roboethics Taxonomy.

PART A

Q. No	QUESTION	CO	BTL	Marks
1	Define the term Robo ethics	4	1	2
2	Differentiate Ethics and morality.	4	2	2
3	Define humanoids	4	1	2
4	Define deontologism	4	1	2
5	List few examples of technology ethics	4	1	2
6	List few ethical issues faced by Information & communication Technology	4	1	2
7	List few applications of surgical robots	4	1	2
8	List the laws of Robotics by Isaac Asimov	4	1	2

PART B

1	Explain on the ethics in science and technology.	4	2	16
2	Discuss on ethics and professional responsibility.	4	2	16
3	Explain the ethical issues in ICT.	4	2	16
4	Explain Robo ethics taxonomy.	4	2	16

UNIT V

AI AND ETHICS - CHALLENGES AND OPPORTUNITIES

Challenges - Opportunities- ethical issues in artificial intelligence- Societal Issues Concerning the Application of Artificial Intelligence in Medicine- decision-making role in industries-National and International Strategies on AI.

PART A

Q. No	QUESTION	CO	BTL	Marks
1	Define Artificial Intelligence	5	1	2
2	Define is NLP?	5	1	2
3	Discuss the purpose of GPS.	5	2	2
4	Define Telehealth?	5	2	2
5	Discuss on ADAS	5	2	2
6	Define Autonomy	5	1	2
7	Define pest management	5	1	2
8	List the issues in using healthcare robots	5	1	2

PART B

1	Explain on the seven biggest challenges in Artificial Intelligence.	5	2	16
2	Discuss on the impact of AI in decision making roles in industry.	5	2	16
3	Discuss the Societal Issues Concerning the Application of Artificial Intelligence in Medicine	5	2	16
4	Explain the National strategy of AI.	5	2	16

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CCS 374

WEB APPLICATION SECURITY

UNIT I

FUNDAMENTALS OF WEB APPLICATION SECURITY

The history of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, Session Management-Input Validation

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is the significance of recognizing web application security threats?	1	1	2
2	Define Web Application Security.	1	1	2
3.	Differentiate between Authentication and Authorization.	1	2	2
4.	What is Secure Socket Layer (SSL)?	1	1	2
5.	Explain the role of a Web Application firewall (WAF).	1	2	2
6.	What is Cross-Origin Resource Sharing (CORS), and why is it relevant to web application security?	1	1	2
7.	Define Distributed Denial of Service (DDoS) attack.	1	1	2
8.	Explain the concept of Clickjacking..	1	2	2

PART – B

1.	Explain the various authentication mechanisms commonly employed in web applications, along with their strengths and weaknesses. Compare and contrast session-based and token- based authentication methods.	1	2	16
2.	Describe the components and processes involved in Secure Socket Layer (SSL) and Transport Layer Security (TLS), elucidating how they ensure secure communication over the internet.	1	5	16
3.	Analyze the impact of common web application security threats such as Cross-Site Scripting (XSS), SQL Injection, and Cross-Site Request Forgery (CSRF) on the security posture of web applications. Propose mitigation strategies to address these threats effectively.	1	4	16
4	Examine the role of Web Application firewalls (WAFs) in protecting web applications from various threats, including SQL Injection, DDoS attacks, and malicious bots. Compare the effectiveness of network-based and host-based WAF deployments in different scenarios.	1	4	16

UNIT II

SECURE DEVELOPMENT AND DEPLOYMENT

Web Applications Security - Security Testing, Security Incident Response Planning,The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is the purpose of security testing in web applications?	2	1	2
2	What is Microsoft Security Development Lifecycle (SDL)?	2	1	2
3.	Explain OWASP CLASP.	2	2	2
4.	Briefly define Software Assurance Maturity Model (SAMM)	2	1	2
5.	Name a widely used tool for security testing in web applications.	2	1	2
6.	What are the key considerations for effective Security Incident Response Planning?	2	1	2
7.	Discuss the phases of the Microsoft Security Development Lifecycle.	2	2	2
8.	What are some advantages of implementing Microsoft SDL?	2	1	2

PART – B

1.	Compare and contrast the Microsoft Security Development Lifecycle (SDL) and OWASP Comprehensive Lightweight Application Security Process (CLASP) in terms of their approaches, methodologies, and effiectiveness in enhancing web application security.	2	5	16
2.	Explain the process of security testing in web applications, highlighting its importance in ensuring robust security measures.	2	2	16
3.	Evaluate the strengths and weaknesses of the OWASP Comprehensive Lightweight Application Security Process (CLASP) and its applicability in diverse software development environments. Provide recommendations for overcoming potential limitations.	2	5	16
4	Assess the effectiveness of the Software Assurance Maturity Model (SAMM) in improving software security across different stages of the development lifecycle. Discuss its impact on organizational security practices and its alignment with industry standards and best practices	2	6	16

UNIT III
SECURE API DEVELOPMENT

API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys , OAuth2, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests.

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is the purpose of session cookies in API security?	3	1	2
2	What is the role of encryption in API security?	3	1	2
3.	Why is audit logging important in API security?	3	1	2
4.	How are incoming requests secured in API development?	3	1	2
5.	Explain the concept of token-based authentication in API security.	3	2	2
6.	What is OAuth2, and how does it contribute to securing APIs?	3	1	2
7.	What are the primary security benefits of using a service mesh in microservice architectures?	3	2	2
8.	How can network connections be locked down to enhance API security?	3	1	2

PART – B

1.	Discuss the role of session cookies and token-based authentication in securing APIs. Compare and contrast their implementation, security implications, and suitability for different use cases in web application development.	3	6	16
2.	Evaluate the effectiveness of different authentication mechanisms, including API keys and OAuth2, in securing service-to-service APIs. Discuss their strengths, weaknesses, and suitability for various deployment scenarios, considering factors such as scalability, manageability, and security requirements.	3	5	16
3.	Explore the challenges and benefits of securing microservice APIs using a service mesh architecture. Discuss how service mesh technologies facilitate secure communication, traffic management, and observability in distributed microservice environments, and assess their impact on overall system reliability and security posture.	3	5	16
4	Analyze the importance of locking down network connections in API security. Discuss strategies for implementing network-level security measures such as firewalls, network segmentation, and access control policies to protect API endpoints from unauthorized access and malicious attacks.	3	5	16

UNIT IV

VULNERABILITY ASSESSMENT AND PENETRATION TESTING

Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database- based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing.

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is the Vulnerability Assessment Lifecycle?	4	1	2
2	What is the primary purpose of network-based vulnerability scanners?	4	1	2
3.	What is the primary objective of Mobile Application Testing in penetration testing?	4	1	2
4.	What are the stages involved in the Vulnerability Assessment Lifecycle?	4	1	2
5.	What is Network-based vulnerability scanners?	4	1	2
6.	What are the types of penetration test?	4	1	2
7.	What is web application testing? And its types.	4	1	2
8.	What is the primary objective of Mobile Application Testing in penetration testing?	4	1	2

PART – B

1.	Discuss the Vulnerability Assessment Lifecycle in detail, outlining each stage's significance and activities involved. Provide examples of tools and techniques commonly used in each stage to effiectively identify, remediate, and verify vulnerabilities within an organization's infrastructure.	4	6	16
2.	Compare and contrast various types of vulnerability assessment tools, including cloud-based, host-based, network-based, and database-based scanners. Evaluate their strengths, weaknesses, and suitability for diffierent environments and scenarios, considering factors such as scalability, accuracy, and ease of use.	4	4	16
3.	Explore the importance of penetration testing in identifying and mitigating security risks within an organization's infrastructure. Discuss the diffierent types of penetration tests, including External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, and Mobile Application Testing, and provide examples of when each type should be employed.	4	6	16

4	Evaluate the significance of Mobile Application Testing in penetration testing and its role in identifying security vulnerabilities in mobile applications and their interaction with backend services. Discuss common security challenges faced by mobile applications, and provide strategies for securing mobile applications against potential threats.	4	5	16

UNIT V
HACKING TECHNIQUES AND TOOLS

Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is Social Engineering in the context of hacking?	5	1	2
2	What type of attack is commonly associated with injecting malicious code into databases?	5	1	2
3.	What vulnerability is exploited when sensitive data is stored in an insecure manner?	5	1	2
4.	What role does Burp Suite play in thefield of cybersecurity?	5	1	2
5.	Define Social Engineering and its significance in cybersecurity.	5	1	2
6.	What are the common types of injection attacks, and how do they exploit vulnerabilities?	5	1	2
7.	Discuss the importance of secure cryptographic storage in protecting sensitive data.	5	2	2
8.	Discuss the impact of Cross-Site Scripting (XSS) attacks on web applications and users.	5	2	2

PART - B

1.	Explore the techniques and psychological principles behind Social Engineering attacks, and discuss their effiectiveness in bypassing traditional cybersecurity defenses. Provide real-world examples of Social Engineering attacks and analyze their impact on organizations and individuals.	5	6	16
2.	Evaluate the effectiveness of vulnerability assessment tools such as OpenVAS, Nexpose, and Nikto in identifying and mitigating security vulnerabilities in web applications and network infrastructure. Compare and contrast the features, capabilities, and limitations of these tools, and provide recommendations for selecting the most appropriate tool for a given scenario.	5	5	16
3.	Analyze the prevalence of Cross-Site Scripting (XSS) vulnerabilities in web applications and their impact on security. Discuss the diffierent types of XSS attacks, such as reflected XSS, stored XSS, and DOM-based XSS, and provide strategies for detecting, preventing, and mitigating XSS vulnerabilities.	5	4	16

4	Evaluate the risks associated with broken authentication and session management vulnerabilities in web applications. Discuss common causes of these vulnerabilities, such as weak passwords, sessionfixation, and insufficient session expiration policies, and provide best practices for improving authentication and session management security.	5	5	16

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CCS 366

SOFTWARE TESTING AND AUTOMATION

UNIT I

FOUNDATIONS OF SOFTWARE TESTING

Why do we test Software?, Black-Box Testing and White-Box Testing, Software Testing Life Cycle, V-model of Software Testing, Program Correctness and Verification, Reliability versus Safety, Failures, Errors and Faults (Defects), Software Testing Principles, Program Inspections, Stages of Testing: Unit Testing, Integration Testing, System Testing

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	Why is software testing necessary?	1	2	2
2	Differentiate Black-Box Testing and White box Testing	1	1	2
3.	What are the phases of the Software Testing Life Cycle (STLC)?	1	2	2
4.	Describe the V-model of Software Testing.	1	1	2
5.	What is the difference between an error, a fault, and a failure?	1	1	2
6.	State any two principles of software testing.	1	1	2
7.	Define Unit Testing	1	2	2
8.	Differentiate program correctness and program verification?	1	1	2

PART – B

1.	i.	Compare and contrast Black-Box Testing and White-Box Testing with examples.	1	4	8
	ii.	Explain the relationship between failures, errors, and faults (defects) in software.	1	4	8
2.		Discuss the phases of the Software Testing Life Cycle (STLC) in detail.	1	4	16
3.	i.	Explain the V-model of Software Testing and its advantages.	1	5	8
	ii.	Discuss the key principles of software testing and their significance.	1	5	8
4	i.	Elaborate on the stages of testing: Unit Testing, Integration Testing, and System Testing with examples.	1	5	8
	ii.	Discuss the importance of program correctness and its verification techniques.	1	5	8

UNIT – 2

TEST PLANNING

The Goal of Test Planning, High Level Expectations, Intergroup Responsibilities, Test Phases, Test Strategy, Resource Requirements, Tester Assignments, Test Schedule, Test Cases, Bug Reporting, Metrics and Statistics.

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is the primary goal of test planning?	2	2	2
2	Name the different test phases in software testing.	2	1	2
3.	Why are resource requirements important in test planning?	2	2	2
4.	What is the role of tester assignments in test planning?	2	2	2
5.	What is the purpose of bug reporting?	2	1	2
6.	Define statistics in the context of software testing.	2	1	2
7.	What is the significance of defining test phases in a project?	2	2	2
8.	Mention two essential components of a test strategy.	2	1	2

PART – B

1.	(i) Explain the goal of test planning and its significance in software development.	2	5	8
	(ii) Discuss the concept of high-level expectations in test planning with examples	2	5	8
2.	i. Explain the different test phases and their importance in software testing.	2	5	8
	ii. Discuss the components of an effective test strategy.	2	5	8
3.	i. Explain the importance of tester assignments and their role in achieving testing goals	2	5	8
	ii. Describe the characteristics of well-written test cases and their role in software testing	2	5	8
4	i. Explain the process of bug reporting and its importance in software quality assurance.	2	5	8
	ii. Explain how to align test phases with project milestones to ensure efficient testing.	2	5	8

UNIT – 3
TEST DESIGN AND EXECUTION

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Design, Test Procedures, Test Case Organization and Tracking, Bug Reporting, Bug Life Cycle.

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	Define test design factors.	3	2	2
2	What are testable requirements?	3	2	2
3.	What is modeling in the test design process?	3	1	2
4.	Define boundary value testing.	3	1	2
5.	What is equivalence class testing?	3	1	2
6.	Explain data flow testing in brief.	3	1	2
7.	Why is test case organization important?	3	2	2
8.	What is the bug life cycle?	3	1	2

PART – B

1.	i.	Explain the steps involved in identifying test objectives and their role in the test planning process.	3	5	8
	ii.	Elaborate on the process of identifying requirements and ensuring they are testable	3	5	8
2.	i.	Describe the steps and considerations in modeling a test design process.	3	4	8
	ii.	Compare and contrast boundary value testing and equivalence class testing with examples.	3	4	8
3.	i.	Discuss the principles of path testing and its application in software testing.	3	5	8
	ii.	Describe the methods to evaluate test case design effectiveness with examples.	3	5	8
4	i.	Explain the bug life cycle and the role of bug reporting in maintaining software quality.	3	5	8
	ii.	Compare traditional test design approaches with model-driven test design.	3	4	8

UNIT – 4

ADVANCED TESTING CONCEPTS

Performance Testing: Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Security testing, Testing in the Agile Environment, Testing Web and Mobile Applications.

PART – A

Q.NO		QUESTION	CO	BTL	MARK
1.		Define performance testing.	4	1	2
2		What is load testing?	4	1	2
3.		What is fail-over testing?	4	2	2
4.		What is configuration testing?	4	1	2
5.		Why is testing documentation important?	4	2	2
6.		How is testing different in the agile environment compared to traditional methods?	4	1	2
7.		What is the significance of testing web applications?	4	2	2
8.		What challenges are unique to mobile application testing?	4	1	2

PART – B

1.	i.	Discuss the key differences between load testing, stress testing, and volume testing with examples.	4	5	8
	ii.	Describe the purpose and process of fail-over testing and recovery testing.	4	5	8
2.	i.	Explain the role of configuration testing in ensuring software works across different environments.	4	5	8
	ii.	Discuss compatibility testing and its importance in multi-platform applications.	4	5	8
3.	i.	Describe the steps involved in testing documentation and its role in software quality assurance.	4	5	8
	ii.	Discuss the unique challenges and practices of testing in the agile environment.	4	5	8
4	i.	Explain the key considerations when testing web applications, including functionality, performance, and security.	4	5	8
	ii.	Discuss the challenges and best practices for mobile application testing, including testing for various devices, OS versions, and screen sizes.	4	5	8

UNIT – 5

TEST AUTOMATION AND TOOLS

Automated Software Testing, Automate Testing of Web Applications, Selenium: Introducing Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events, Testing: Understanding Testing.xml, Adding Classes, Packages, Methods to Test, Test Reports.

PART – A

Q.NO	QUESTION	CO	BTL	MARK
1.	What is automated software testing? Mention any two advantages	5	2	2
2	Define automated testing for web applications	5	2	2
3.	What is Selenium, and why is it widely used for web application testing?	5	1	2
4.	Define web elements in the context of Selenium.	5	1	2
5.	List any two types of web drivers in Selenium	5	2	2
6.	Define the purpose of a testing.xml file	5	1	2
7.	How can you add classes to a testing.xml file?	5	2	2
8.	What is the significance of adding packages to a testing.xml file?	5	2	2

PART - B

1.	i.	Discuss the process of automating the testing of web applications with Selenium.	5	5	8
	ii.	Explain the concept of a Web Driver in Selenium and the role it plays in test automation.	5	5	8
2.	i.	Describe the different methods of locating web elements in Selenium and their use cases	5	5	8
	ii.	Compare different types of Web Drivers in Selenium and their applications.	5	5	8
3.	i.	Discuss the purpose and structure of a testing.xml file in TestNG, with examples.	5	5	8
	ii.	Describe the steps involved in adding classes, packages, and methods to a testing.xml file.	5	5	8
4	i.	Explain how test reports are generated using TestNG and their importance in automation testing.	5	5	8
	ii.	Explain the role of TestNG annotations in managing test execution and reporting.	5	5	8

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MX3081

INDUSTRIAL SAFTEY

UNIT I

SAFETY TERMINOLOGIES

Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators - lag Indicators - Flammability - Toxicity Time - weighted Average (TWA) - Threshold LimitValue (TLV) - Short Term Exposure Limit (STEL) - Immediately dangerous to life or health (IDLH) - acute and chronic Effects - Routes of Chemical Entry - Personnel Protective Equipment - Health and Safety Policy - Material Safety Data Sheet MSDS

PART – A

Q.NO	QUESTION	CO	BTL	Marks
1.	Define the term "hazard."	1	1	2
2	Differentiate between lead and lag indicators with an example for each.	1	2	2
3.	Distinguish between flammability and toxicity.	1	2	2
4.	Define Time-Weighted Average	1	1	2
5.	Differentiate between acute and chronic effects with examples.	1	2	2
6.	Name the four primary routes of chemical entry into the body.	1	1	2
7.	What is the purpose of a Health and Safety Policy?	1	1	2
8.	How does an MSDS help in chemical safety management?	1	2	2

PART -B

1.	Explain the types of Hazard in detail.	1	2	16
2.	Analyze the effectiveness of the hierarchy of hazard control measures in reducing risks in a manufacturing plant with toxic fumes and rotating machinery.	1	4	16
3.	Analyze how acute and chronic effects influence the choice of safety measures in handling hazardous chemicals.	1	4	16
4	Evaluate the effectiveness of a health and safety policy in fostering a culture of safety in an organization.	1	5	16

UNIT II

STANDARDS AND REGULATIONS

Indian Factories Act-1948 - Health - Safety- Hazardous materials and Welfare - ISO 45001:2018 health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998 – Hazard Identification and Risk Analysis - code of practice IS 15656:2006

Q.NO	QUESTION	CO	BTL	Marks
1.	What is the primary objective of the Indian Factories Act, 1948?	2	1	2
2	Name two health provisions under the Indian Factories Act, 1948.	2	1	2
3.	What is the main objective of risk analysis?	2	1	2
4.	List two examples of hazardous materials commonly found in industries.	2	1	2
5.	How does ISO 45001:2018 differ from traditional safety practices?	2	2	2
6.	What is IS 14489:1998 related to?	2	1	2
7.	What is the role of HIRA in workplace safety?	2	1	2
8.	How does IS 15656:2006 contribute to industrial safety?	2	2	2
	PART - B			
1.	Explain the key provisions of the Indian Factories Act, 1948 related to health, safety, hazardous materials, and worker welfare. How do these provisions ensure a safe working environment?	2	4	16
2.	Discuss the key principles of ISO 45001:2018 and its role in occupational health and safety management. How does it help organizations improve workplace safety?	2	4	16
3.	What is the significance of IS 14489:1998 in occupational safety audits? Describe the steps involved in conducting a workplace safety audit as per this standard.	2	4	16
4	Develop a Hazard Identification and Risk Analysis (HIRA) framework based on IS 15656:2006 for a manufacturing plant. How would you implement risk control measures to minimize workplace hazards?	2	6	16

UNIT III

SAFETY ACTIVITIES

Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment.

PART – A

Q.NO	QUESTION	CO	BTL	Mark
1.	What is the primary function of a safety committee?	3	1	2
2	What are two responsibilities of a safety officer in an organization?	3	2	2
3.	How does a safety representative contribute to workplace safety?	3	2	2
4.	Give two examples of safety incentives used to encourage safe behavior	3	2	2
5.	What is the purpose of conducting a mock drill?	3	2	2
6.	What is the significance of safety posters in the workplace?	3	2	2
7.	What is meant by human error in workplace safety?	3	2	2

PART B

1.	Explain the structure and functions of a safety committee in an organization. How does it contribute to work place safety.	3	4	16
2	Discuss the importance of safety training programs in an industrial Setting. How do safety incentives encourage a culture of a safety?	3	5	16
3.	Design a comprehensive emergency action plan for an industrial plant, Including both onsite and off- site measures. What challenges might arise during implementation?	3	6	16
4.	Analyse different types of human errors in the workplace. How can organizations assess and minimize the risk of human errors affecting safety?	3	4	16

UNIT - IV

WORKPLACE HEALTH AND SAFTEY

Noise hazard- Particulate matter- musculoskeletal disorder improper sitting poster and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxic gas Release

PART - A

Q.NO	QUESTION	CO	BTL	Marks
1.	State how prolonged exposure to high noise levels can affect human health.	4	2	2
2	Define particulate matter and give an example of its source.	4	2	2
3.	Identify two ergonomics solutions to prevent musculoskeletal disorders caused by improper lifting .	4	2	2
4.	Compare RULE and REBA in terms of their application in ergonomic risk assessment.	4	2	2
5.	Differentiate between an unsafe act and an unsafe condition with examples.	4	2	2
6.	State two safety measures to prevent crane related accidents on a construction site.	4	2	2
7.	Why grounding and insulation are essential to prevent electrical hazards in the workplace?	4	2	2

PART - B

1.	Discuss the various types of electrical hazards in the workplace. What precautions and safety measures should be taken to prevent electrical accidents?	4	2	16
2.	Illustrate how to apply REBA to identify and mitigate ergonomic risk in various job tasks.	4	3	16
3.	Explain the impact of improper sitting posture and incorrect lifting techniques on musculoskeletal health. Suggest ergonomic solutions to prevent such disorders.	4	2	16
4	What are the causes and consequences of toxic gas release in industries? Discuss control measures, emergency response strategies and the role of safety regulations in preventing such incidents.	4	2	16

UNIT – V

HAZARD IDENTIFICATION TECHNIQUES

Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment-Checklist Analysis Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment

PART – A

Q.NO	QUESTIONS	CO	BTL	Marks
1.	What is Job Safety Analysis (JSA), and why is it important?	5	1	2
2.	Define Preliminary Hazard Analysis and (PHA) and mention its primary purpose.	5	1	2
3.	List two key Objectives of Failure Modde and Effects Analysis	5	2	2
4.	How does a Hazar and Operability Study (HAZOP) help in process Saftey.	5	2	2
5.	Differentiate between Fault Tree Analysis (FTA) and Event Tree Analysis (ETA).	5	2	2
6.	Explain the purpose of Qualitative and Quantitative Risk Assessment in workplace safety	5	3	2
7.	How does Checklist Analysis contribute to hazard identification?	5	3	2
8.	Give an example of how Root Cause Analysis (RCA) can be used to prevent future accidents.	5	3	2

PART -B

1.	Describe the key principles of the Job Safety Analysis (JSA) process. What are the main steps involved, and how does this technique help in ensuring workplace safety? Provide examples of how JSA can be applied in different industries.	5	2	16
2.	Explain the importance of Failure Mode and Effects Analysis (FMEA) in the context of risk management. How does this method contribute to the identification of potential failures and the prevention of system breakdowns? Provide an example of how FMEA is used in a high-risk industry such as aerospace or manufacturing	5	3	16

3.	Apply the principles of Hazard and Operability Study (HAZOP) to analyze the potential risks involved in a chemical processing plant. How would you identify deviations in the process and suggest appropriate safeguards to prevent hazardous events? Discuss how the HAZOP process can be applied to ensure safety in complex industrial systems.	5	4	16
4	Design a comprehensive risk management plan for a construction project that involves multiple stakeholders and complex processes. Synthesize various risk assessment methods such as Fault Tree Analysis (FTA), Event Tree Analysis, and Root Cause Analysis to develop a holistic framework for identifying, analyzing, and mitigating risks. What strategies would you incorporate to ensure that safety and operational efficiency are maintained throughout the project lifecycle?	5	4	16

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