Qp code : 10097614

TE sem VI CSE (IOT) R-19 cscheme

[3 hrs] [80 Marks]

Note: 1. Question 1 is compulsory
2. Answer any three out of remaining questions
3. Assume suitable data where required

Q1 Solve any 4

a) Define Actuator and its role in IoT Ecosystem. 5
b) Discuss how low power consumption is essential for prolonging the life of battery-operated devices in IoT. 5
c) Short note on OCTAVE 5
d) Explain physical design of IoT 5
e) Briefly elaborate the MQTT (Message Queuing Telemetry Transport). 5

Q2

a) Explain how the convergence of IT and OT in IoT impacts industrial processes. 10
b) Define Micro-Electro-Mechanical Systems (MEMS) and explain their significance in the development of smart objects. 10

Q3

a) Differentiate between fog computing and edge computing in the IoT context. 10
b) Present a simplified IoT architecture and discuss the trade-offs between complexity and efficiency. 10

Q4

a) Examine the considerations for adopting or adapting the Internet Protocol in IoT applications. 10
b) Explain the importance of the physical layer and MAC (Medium Access Control) layer in IoT access technologies. 10

Q5

a) Explain the concepts of objective function rank, RPL headers, and metrics in the context of RPL. 10
b) Illustrate the Purdue Model for Control Hierarchy and its implications for security practices in OT. 10

Q6

a) Examine the impact of legacy systems on OT security. Discuss how the continued use of outdated technologies poses challenges in terms of vulnerabilities, patching, and overall security management. 10
b) Explain topology role in selecting communication mode in IoT Network. 10

QP code : 10093604

TE sem VI CSE(IOT) R-19 Cscheme

Duration: 3 Hours **Maximum Marks: 80**

N.B.: -

1. **Question No 1 is Compulsory**
2. **Solve any three questions out of remaining questions.**
3. **Assume suitable data if required and mention it clearly.**
4. **Figures to right indicate full marks.**

Q1		Solve any four of following: -	
	[A]	Why is the Caesar cipher substitution technique vulnerable to a brute-force cryptanalysis?	5
	[B]	List and briefly explain passive security attacks	5
	[C]	Compare block and stream cipher.	5
	[D]	What are Elements of Network Access Control	5
	[E]	Write a short note on the Intrusion detection system	5
	[F]	List various services provided by IPsec.	5
Q2	[A]	What are mono alphabetic and poly alphabetic substitution ciphers? Explain both with appropriate examples. Discuss the advantages and disadvantages of both	10
	[B]	Explain the Key Transformation Phase of Advanced Encryption Standard in detail. Illustrate how the 44 Word keys are generated from the 4-word key.	10
Q3	[A]	In a public-key system using RSA, you intercept the ciphertext $C = 20$ sent to a user whose public key is $e = 13$, $n = 77$. What is the plaintext M? List the different approaches to attack the RSA algorithm.	10
	[B]	Explain and differentiate between IPSec Transport and Tunnel Mode.	10
Q4	[A]	What is Hashing? How is a HMAC generated. Explain the process.	10
	[B]	Explain briefly with examples DOS and Phishing attack.	10
Q5	[A]	Discuss in detail, how the Kerberos Authentication Protocol works	10
	[B]	What protocols comprise TLS? Explain steps are involved in the TLS Record Protocol transmission?	10
Q6	[A]	What is an EAP? List and briefly define four EAP authentication methods.	10
	[B]	Define Firewall. What are various types of it?	10

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QP code : 10085435
16 MAY 2025

TE sem VI CSE (IOT) R-19 C scheme

[3 hrs] [80 Marks]

Note: 1. Question 1 is compulsory
2. Answer any three out of remaining questions
3. Assume suitable data where required

Q1	Solve any 4	
a)	Define Actuator and Actuator?State its role in IoT Ecosystém.	5
b)	Discuss how low power consumption is essential for prolonging the life of battery-operated devices in IoT.	5
c)	Briefly elaborate the MQTT (Message Queuing Telemetry Transport),	5
d)	Explain physical design of IoT	5
e)	Short note on OCTAVE	5
Q2		
a)	Discuss the significance of topology considerations in IoT communications. How does the choice of network topology impact scalability, reliability, and efficiency in IoT deployments?	10
b)	Define Micro-Electro-Mechanical Systems (MEMS) and explain their significance in the development of smart objects.	10
Q3		
a)	Differentiate between fog computing and edge computing in the IoT context.	10
b)	How data analytics is performed in IoT and mentioned its advantages	10
Q4		
a)	Examine the considerations for adopting or adapting the Internet Protocol in IoT applications.	10
b)	Explain RFID working in detail	10
Q5		
a)	Explain the concepts of objective function rank, RPL headers, and metrics in the context of RPL.	10
b)	Illustrate the Purdue Model for Control Hierarchy and its implications for security practices in OT.	10
Q6		
a)	Compare and contrast MQTT and CoAP protocols. Which one would you choose for a wearable health tracker, and why	10
b)	Illustrate the Purdue Model for Control Hierarchy and its implications for security practices in OT.	10

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QP code : 10079597

TE sem VI CSE (IOT) R-19 C schem

(3 Hours) **Total Marks: 80**

14 MAY 2025

N.B.: (1) Question No.1 is compulsory.
(2) Attempt any three questions from the remaining five questions.
(3) Make suitable assumptions wherever necessary but justify your assumptions.

Q.1 Solve any Four

a. Explain Design principles of Firewall **05M**
b. Discuss various attacks **05M**
c. Explain Public Key Infrastructure. **05M**
d. Discuss Virtual Private Network. **05M**
e. Explain Keylogger **05M**
f. Explain various NAC enforcement methods **05M**

Q2.

a. Use Affine cipher and perform encrypt and decryption, Plaintext "SECURITY with a key pair (5, 2). **10M**

b. Explain Kerberos with diagram. Discus the technical deficiencies in Kerberos V4. **10M**

Q3.

a. Explain S/MIME for secure Email also list advantages and disadvantages. **10M**
b. Explain DOS and DDOS attacks with suitable example. **10M**

Q4.

a. What is Network Access Control? Discuss the element present in Network Access Control context. **10M**

b. Discuss characteristics of firewall. Compare packet filtering, stateful inspection, circuit gateway, application proxy firewall. **10M**

Q5.

a. Explain Advance Encryption Standard Algorithm with diagram also discuss various operations in AES. 10M
b. Explain network management with respect to SNMP protocol also Compare SNMPv1, SNMPv2c and SNMPv3. **10M**

Q6.

a. Discuss various Monoalphabetic substitution cipher. Demonstrate Autokey cipher with suitable example. **10M**
b. Explain the Secure Socket Layer (SSL) protocol stack with a diagram and describe the various protocols used in SSL **10M**

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QP code: 10082732

TE sem VI CSE-IOT R-19 Cscheme

Time: 3 Hrs **Max. Marks: 80**

Note
1) Attempt any **Four questions** out of Six.
2) All question carries equal marks.
3) Illustrate your answers with neat sketches wherever necessary.
4) Figures to the right indicate full marks.
5) Assume suitable additional data, if necessary and clearly state it.
6) All sub-questions of the same question should be grouped together.

Q.1 **Solve any Four out of Six.** **20**

A Illustrate the phases of ethical hacking with a practical example. How does each phase contribute to an organization's cyber defense?

B What is footprinting in ethical hacking? Describe in detail active and passive footprinting methods with examples and tools.

Q.2 **20**

A Explain the Phases of Penetration Testing. Why is reporting considered as important as actual testing?

B Define Social Engineering. With the help of examples, explain how psychological manipulation is exploited in cyberattacks.

Q.3 **20**

A Draw and explain the Digital Forensics Life Cycle. How does this life cycle ensure evidence integrity?

B During an incident response, explain the Initial Response Strategy you would apply for a ransomware attack. Why is immediate containment critical?

Q.4 **20**

A Compare Static and Live Data Acquisition methods. Discuss challenges faced during live acquisition with real-world examples.

B What is a Forensic Duplicate? Explain how tools like FTK Imager and dd are used to create forensic images. How is the hash value significant?

Q.5 **20**

A Describe the method to investigate Windows Registry and Event Log files during a forensic investigation. What types of evidence can be extracted?

B What is Data Carving? Discuss the importance of data carving tools like Bulk Extractor in recovering deleted data during forensic analysis.

Q.6 **20**

A What is the Chain of Custody in digital forensics? Provide a detailed sample form and explain how mishandling can affect legal proceedings.

B Prepare a structured format for a Forensic Investigation Report based on a cyber fraud case. Highlight the do's and don'ts during report writing.

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QP code : 10083332

TE sem VI CSE (IOT) R-19 C scheme

(3 Hours) [Total Marks: 80]

N.B.: (1) Question **No.1** is **Compulsory**.
(2) Attempt **any three** questions from the **remaining** questions.
(3) Assume **suitable** data wherever required but **justify** the same.
(4) **Figures** to the **right** indicate **full marks**.
(5) Answer each new question to be started on a **fresh page**.

1. (a) How to declare variables in Typescript? differentiate between let and Var. **(5)**
   (b) Describe Click Stream Analysis in brief. **(5)**
   (c) Elaborate MEAN stack architecture. **(5)**
   (d) Explain the features of MongoDB. **(5)**

2. (a) Explain how events are handled in Node.js with EventEmitter class. Write a suitable program for the same. **(10)**
   (b) Illustrate the following term **(10)**
   1.ng-app , 2.ng-init , 3. ng-model ,4. ng-bind , 5. ng-show in Angular JS with suitable example.

3. (a) Define Semantic Web. Explain in detail the components of the Semantic Web Stack. **(10)**
   (b) Explain Express.js Cookies management with example. **(10)**

4. (a) Write a Typescript program to explain the concept of inheritance. **(10)**
   (b) Construct a Simple application for AngularJs form Validation. it will check if an email is valid or not. Draw a mock UI of the Output. **(10)**

5. (a) Explain different methods available in the networking module of Node.js. **(10)**
   (b) Implement CRUD Operations in MongoDB. **(10)**

6. (a) Explain REST API in detail. **(10)**
   (b) State the significance of the Request Object in Express.js. Also, explain the different properties of Express.js Request Object.

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QP code : 10086246

TE sem VI CSE-IOT R-19 Cscheme

Time: 3 Hours

Total Marks: 80

N. B. 1. Question No. 1 is compulsory.
2. Attempt any 3 from remaining questions.
3. Assume suitable data if necessary and justify the assumptions.

Q. 1 Attempt Any Four 4*5=20

1. What are the main components of a blockchain?
2. What are Bitcoin addresses and their role in transactions?
3. What is the role of Certificate Authority (CA) in Hyperledger Fabric?
4. What are the components of Ethereum architecture?
5. What are ERC20 tokens, and what are their key features?

Q. 2 20

1. Describe the consensus mechanisms used in Hyperledger Fabric.
2. Explain the structure of a block in a blockchain.

Q. 3 20

1. Explain how Bitcoin transactions are validated and recorded on the blockchain.
2. What are different types of cryptocurrencies, and how do they function?

Q. 4 20

1. Explain Ethereum's end-to-end transaction process.
2. Explain the architecture of the Hyperledger Fabric framework.

Q. 5 20

1. Explain the purpose of a Merkle Tree in blockchain and describe how it works.
2. Explain how Blockchain strengthens Cybersecurity. What are the limitations?

Q. 6 20

1. Describe the Peer-to-Peer (P2P) network architecture of Bitcoin.
2. Explain the Ethereum Virtual Machine (EVM) and its role in smart contracts.

TE - Sem-VI - IOT - R-19 QP :- 10082333

(3 Hours) [Total Marks: 80]

N.B.: (1) Question **No.1** is **Compulsory**.
(2) Attempt **any three** questions from the **remaining** questions.
(3) Assume **suitable** data wherever required but **justify** the same.
(4) **Figures** to the **right** indicate **full marks**.
(5) Answer to each new question to be started on a **fresh page**.

1. (a) Explain Web Analytics 2.0 in detail. Discuss how clickstream analysis contributes to understanding user behavior, and outline three key metrics that businesses should track. Illustrate with examples. **(10)**

   (b) Explain MongoDB datatypes with suitable examples. **(10)**

2. (a) Explain the TypeScript internal architecture in detail. Discuss how TypeScript code is processed from compilation to execution, and describe the role of the TypeScript compiler. Include a diagram to illustrate the architecture. **(10)**

   (b) Develop a Node.js networking application that: **(10)**
   a) Creates an HTTP server listening on port 3000
   b) Handles different routes with appropriate middleware
   c) Implements both GET and POST methods
   d) Uses streams for handling large data transfers
   e) Implements proper error handling and logging.

3. (a) Explain the following Express.js concepts in detail: **(10)**
   a) Application object and its methods
   b) Request object properties
   c) Response object methods
   d) Route handling mechanisms
   e) Middleware chain execution

   (b) Explain the Event Loop architecture in Node.js with the help of a suitable diagram. Discuss how different phases of the event loop handle various types of operations. **(10)**

4. (a) Describe the following AngularJS directives: **(10)**
   a) ng-repeat and its scope
   b) ng-show vs ng-if
   c) ng-class and ng-style
   d) Event handling directives
   e) Form directives

   (b) Write a TypeScript program that implements a module system for a library management application. Your solution should: **(10)**
   a) Create separate modules for books, users, and transactions
   b) Demonstrate export and import statements
   c) Use namespaces appropriately
   d) Implement proper error handling.

5. (a) Create an Express.js application that implements a complete authentication system with the following requirements: **(10)**
   a) User registration and login routes
   b) Password hashing and validation
   c) Session management
   d) Protected routes using middleware
   e) Logout functionality

   (b) Discuss Mongoose middleware and validation: **(10)**
   a) Types of middleware
   b) Validation chains
   c) Custom validators
   d) Error handling
   e) Async validation

6. (a) Explain the following aspects of AngularJS expressions: **(10)**
   a) Expression syntax
   b) Comparison with JavaScript expressions
   c) Expression context
   d) Filters in expressions
   e) Expression limitations

   (b) Create a complete REST API for a blog application using Express, MongoDB, and Mongoose that implements: **(10)**
   a) User authentication and authorization
   b) CRUD operations for blog posts
   c) Input validation using Mongoose schemas

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TE - VI - IOT - R-19 gp:-10095816

Time: 3 Hours **Total Marks: 80**

N. B. 1. Question No. 1 is compulsory.
2. Attempt any 3 from remaining questions.
3. Assume suitable data if necessary and justify the assumptions.

Q. 1 Attempt Any Four **4*5=20**

1. Write the tools used in forensic duplication.
2. What are the goals of incident response?
3. List phases of penetration testing
4. Define *ethical hacking* and state two primary objectives.
5. What is data carving?

Q. 2 **20**

1. Explain static and live data acquisition.
2. Describe social engineering types and countermeasures.

Q. 3 **20**

1. Describe guidelines for writing forensic reports
2. Compare vulnerability scanning and penetration testing

Q. 4 **20**

1. Explain footprinting process and tools used.
2. Explain importance of chain of custody.

Q. 5 **20**

1. Describe working of network forensics using Wireshark.
2. Explain enumeration techniques and tools

Q. 6 **20**

1. Explain digital forensics life cycle.
2. Discuss log file investigation and importance.

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TE - VI - IOT - R-19 qp:-10095816

Time: 3 Hours Total Marks: 80

N. B. 1. Question No. 1 is compulsory.
2. Attempt any 3 from remaining questions.
3. Assume suitable data if necessary and justify the assumptions.

Q. 1 Attempt Any Four 4*5=20

1. Write the tools used in forensic duplication.
2. What are the goals of incident response?
3. List phases of penetration testing.
4. Define *ethical hacking* and state two primary objectives.
5. What is data carving?

Q. 2 20

1. Explain static and live data acquisition.
2. Describe social engineering types and countermeasures.

Q. 3 20

1. Describe guidelines for writing forensic reports
2. Compare vulnerability scanning and penetration testing.

Q. 4 20

1. Explain footprinting process and tools used.
2. Explain importance of chain of custody.

Q. 5 20

1. Describe working of network forensics using Wireshark.
2. Explain enumeration techniques and tools.

Q. 6 20

1. Explain digital forensics life cycle.
2. Discuss log file investigation and importance.

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TE - Sem-VI - IOT - R-19 QP :- 10082333

(3 Hours) [Total Marks: 80]

N.B.: (1) Question **No.1** is **Compulsory**.
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(3) Assume **suitable** data wherever required but **justify** the same.
(4) **Figures** to the **right** indicate **full marks**.
(5) Answer to each new question to be started on a **fresh page**.

1. (a) Explain Web Analytics 2.0 in detail. Discuss how clickstream analysis contributes to understanding user behavior, and outline three key metrics that businesses should track. Illustrate with examples. **(10)**

   (b) Explain MongoDB datatypes with suitable examples. **(10)**

2. (a) Explain the TypeScript internal architecture in detail. Discuss how TypeScript code is processed from compilation to execution, and describe the role of the TypeScript compiler. Include a diagram to illustrate the architecture. **(10)**

   (b) Develop a Node.js networking application that: **(10)**
   a) Creates an HTTP server listening on port 3000
   b) Handles different routes with appropriate middleware
   c) Implements both GET and POST methods
   d) Uses streams for handling large data transfers
   e) Implements proper error handling and logging.

3. (a) Explain the following Express.js concepts in detail: **(10)**
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   c) Response object methods
   d) Route handling mechanisms
   e) Middleware chain execution

   (b) Explain the Event Loop architecture in Node.js with the help of a suitable diagram. Discuss how different phases of the event loop handle various types of operations. **(10)**

4. (a) Describe the following AngularJS directives: **(10)**
   a) ng-repeat and its scope
   b) ng-show vs ng-if
   c) ng-class and ng-style
   d) Event handling directives
   e) Form directives

   (b) Write a TypeScript program that implements a module system for a library management application. Your solution should: **(10)**
   a) Create separate modules for books, users, and transactions
   b) Demonstrate export and import statements
   c) Use namespaces appropriately
   d) Implement proper error handling.

5. (a) Create an Express.js application that implements a complete authentication system with the following requirements: (10)
   a) User registration and login routes
   b) Password hashing and validation
   c) Session management
   d) Protected routes using middleware
   e) Logout functionality

   (b) Discuss Mongoose middleware and validation: (10)
   a) Types of middleware
   b) Validation chains
   c) Custom validators
   d) Error handling
   e) Async validation

6. (a) Explain the following aspects of AngularJS expressions: (10)
   a) Expression syntax
   b) Comparison with JavaScript expressions
   c) Expression context
   d) Filters in expressions
   e) Expression limitations

   (b) Create a complete REST API for a blog application using Express, MongoDB, and Mongoose that implements: (10)
   a) User authentication and authorization
   b) CRUD operations for blog posts
   c) Input validation using Mongoose schemas

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TE - Sem-VI - IOT - R-19

QP:- 10097161

Time: 3 Hours **Marks: 80**

N. B. 1. Question No. 1 is compulsory.
2. Attempt any 3 from remaining questions.
3. Assume suitable data if necessary and justify the assumptions.

Q. 1 Attempt Any Four **20**

1. Define Ethereum Virtual Machine and its purpose.
2. Explain the concept of Proof of Work in Bitcoin.
3. Mention three consensus mechanisms used in Hyperledger Fabric.
4. What are Chaincodes in Hyperledger Fabric?
5. List and describe the different types of blockchains with suitable examples.

Q. 2 **20**

1. Discuss smart contracts in Ethereum, their deployment, and associated risks.
2. Explain how transaction pools work and their role in confirming Bitcoin transactions.

Q. 3 **20**

1. Explain the steps involved in designing a Hyperledger Fabric network.
2. Examine how Merkle Trees and hashing contribute to data verification and tamper detection in blockchain systems.

Q. 4 **20**

1. Explain ERC20 and ERC721 tokens and their key differences.
2. Explain the Bitcoin P2P network architecture and the roles of its node types.

Q. 5 **20**

1. Describe the ledger structure in Hyperledger Fabric.
2. Explain the structure of a block and the role of its header components in ensuring blockchain integrity.

Q. 6 **20**

1. Discuss a real-world case study where blockchain improved transparency and security in any industry.
2. Compare Ethereum's PoW and PoS consensus mechanisms in terms of security, efficiency, and scalability