(Time: 2½ *H*ours) **[Total Marks: 60]**

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculator is **allowed**.

1. Attempt *any two* of the following: **12**
a. What is Information Storage? Explain types of Data.
b. What are the activities to be carried out in managing a Data Center? Explain.
c. Explain Disk Service Time and data transfer rate.
d. Compare the different RAID levels.

2. Attempt *any two* of the following: **12**
a. Explain Components of an Intelligent Storage System.
b. What is Intelligent Storage Array? Explain its categories.
c. Explain the concept of zoning. What are its types?
d. Explain Fibre Channel topologies and its types.

3. Attempt *any two* of the following: **12**
a. Explain NAS implementations with its types.
b. Explain Features and Benefits of Content-Addressed Storage.
c. Explain Fault Tolerance and Single Point of Failure.
d. Explain Backup Technologies and explain limitation of Tape.

4. Attempt *any two* of the following: **12**
a. What is Restore and Restart Considerations in local replication?
b. What is Three-Site Replication—Cascade/Multi-hop?
c. State and explain the characteristics of cloud computing.
d. Discuss the storage array based local replication.

5. Attempt *any two* of the following: **12**
a. What are Storage Security Domains? Explain.
b. Explain Security Implementations in Storage Networking.
c. Explain the various Storage Management Activities in in a storage infrastructure.
d. Explain Storage Infrastructure Management Challenges.

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(Time: 2½ Hours) **[Total Marks: 60]**

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1. Attempt *any two* of the following: **12**
a. Explain phases of identity and access life cycle.
b. Explain the term Kerberos in detail.
c. Differentiate VPNs Site to Site VPNs and Remote Access VPNs.
d. Explain Vulnerability analysis and Prioritization.

2. Attempt *any two* of the following: **12**
a. Explain System Sandboxing.
b. Explain Windows Event log format.
c. What are Apache Access Logs?
d. Write a short note on Host-based Intrusion Prevention System.

3. Attempt *any two* of the following: **12**
a. Describe CIA Triad in detail.
b. How data is collected and analyzed in mobile forensics?
c. What is the use of Digital Evidence?
d. What are Sources of Security Events False Positives, False Negatives, True Positives, and True Negatives?

4. Attempt *any two* of the following: **12**
a. Differentiate Events and Incidents.
b. Explain Health Insurance Portability and Accountability Act.
c. What is Product Security Incident Response Teams?
d. Explain Vocabulary for Event Recording and Incident Sharing.

5. Attempt *any two* of the following: **12**
a. Differentiate Deterministic Versus Probabilistic Analysis.
b. Explain Diamond Model of Intrusion in detail.
c. Explain Man-in-the Middle Attack.
d. What is Backdoor attack? Explain in detail.

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(Time: 2½ hours) **[Total Marks: 60]**

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(5) Draw **neat labeled diagrams** wherever **necessary**.
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1. Attempt *any two* of the following: **12**

a. Explain current State of Computer forensics and types of Computer forensics.
b. Explain the present scenario of Cyber forensics and steps involved in investigation process.
c. Explain the procedure and legal consideration while seizing Digital evidence during cyber forensics investigation.
d. Explain the role of first responder during cyber forensic investigation.

2. Attempt *any two* of the following: **12**

a. Write and explain the components required to set up computer forensic lab.
b. Write and explain the Factors to be considered for strategic planning of laboratory for business.
c. What tools and techniques are commonly used in Locating and Gathering Evidence on a Windows Host?
d. Write and explain various data acquisition tools used in cyber forensics.

3. Attempt *any two* of the following: **12**

a. Write and explain the role of Recycle bin in file Recovery and its limitations.
b. Write in brief how Recuva can be used to recover deleted files with its features.
c. Write and explain the main features of Forensic Tool Kit (FTK) with its uses in digital investigations.
d. Write a short note on steganography with its types.

4. Attempt *any two* of the following: **12**

a. Explain the OSI Model and discuss how its layers are essential in network forensics.
b. Write and explain the function of Snort in network forensics and steps used to identify and investigate security threats.
c. Write and explain the advantages and disadvantages of wireless network.
d. Write a short note on Wireless Penetration testing.

5. Attempt *any two* of the following: **12**

a. Write and explain the working of email system in brief
b. Write and explain phishing with how phishing can bypass two factor authentication.
c. Explain in brief of tracing email messages with importance in viewing and analyzing email headers.
d. What are the tools and techniques to investigate email messages.

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(Time: 2½ Hours) **[Total Marks: 60]**

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1. Attempt *any two* of the following: **12**
a. Explain different use cases of block chain.
b. Explain the different layers of Blockchain.
c. How does game theory influence blockchain?
d. What is Off-chain computation and sharding?

2. Attempt *any two* of the following: **12**
a. Specify the Characteristics of Ethereum.
b. Why Gas is important?
c. What are Complementary currency and its different purpose?
d. What is testing and formatting of Solidity programming language?

3. Attempt *any two* of the following: **12**
a. What is Hyperledger Fabric? Give its importance over simple blockchain.
b. What is the Hyperledger composer? Give its advantages.
c. Briefly describe the working of smart contracts.
d. Explain "Cryptocurrency Is A Measure of Time".

4. Attempt *any two* of the following: **12**
a. Differentiate between Faster Blocks and Stale Blocks.
b. How Ethereum and Bitcoin use Trees?
c. Enlist applications based on crypto economics.
d. How speed of blocks play an important role in mining?

5. Attempt *any two* of the following: **12**
a. What are decentralized applications?
b. Explain public and private Blockchain.
c. Does blockchain involves third party? If no,explain.
d. What are Dapp?

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(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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1. Attempt *any two* of the following: **12**

a. Explain the different types of Computer Forensics Services.
b. Explain Law Enforcement with its different types in computer forensic technology.
c. Who is the first responder in a cybercrime? What are the different roles and benefits of first responders for solving the cybercrime case?
d. What is mean by electronic evidence? Explain its different types.

2. Attempt *any two* of the following: **12**

a. Write a short note on "Forensic Duplication of Digital Evidence".
b. Write a short note on "File System".
c. What is the importance of Hard Disc and File System for solving the cybercrime case?
d. How you can setup a lab for computer forensic department? Explain virtual lab in briefly.

3. Attempt *any two* of the following: **12**

a. Explain the anatomy of a disk drive.
b. Explain an overview of Steganography for the Computer Forensics Examiner.
c. What is forensic image? Explain its different types with importance of capturing and creating a forensic image.
d. What is FTK cyber security? What are the 4 abilities of the FTK software?

4. Attempt *any two* of the following: **12**

a. Explain log analysis for digital forensic investigation.
b. What is Network Forensic? Explain the different sources of network forensic evidence.
c. Explain log analysis for digital forensic investigation.
d. What is the cyber-attack? Explain the different types of cyber-attacks.

5. Attempt *any two* of the following: **12**

a. How you trace Emails & Email Servers for Digital Forensic as an Investigator?
b. What are mobile forensics? Explain the process of mobile device processing.
c. Who is an expert witness under the Indian Evidence Act, 1872? Define its responsibilities in briefly.
d. What are the differentiate between fact witness and expert witness? Explain the role of digital forensics expert witness.

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(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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1. Attempt *any two* of the following: **12**

a. Write a short note on Transition from Film to Digital Imaging.
b. Scientific Working Group on Imaging Technology (SWGIT) was formed by the Federal Bureau of Investigation (FBI) in 1997. Write a short note SWGIT and the Use of Imaging Technology in the Criminal Justice System.
c. Explain the OSAC and SAC organizational chart using suitable diagram.
d. Write a short note on Storage of Digital Data.

2. Attempt *any two* of the following: **12**

a. Write a short note on Digital Cameras and its evolution.
b. What are Spectrophotometers? Explain.
c. Explain the Color Models and Color Channels in Adobe Photoshop.
d. Write a short note on Single Chip Camera.

3. Attempt *any two* of the following: **12**

a. Write a short note on Channel subtraction.
b. What is the Rationale for Erasure of Evidence? Explain the factors.
c. Explain Fast Fourier Transform (FFT) in background removal pattern.
d. If there are repeating pattern elements within the image, they generate a *signature* in the periodic display**,** consisting of white dots or spikes. Write a short note on pattern signature.

4. Attempt *any two* of the following: **12**

a. Explain the Clipping feature in Adobe Photoshop.
b. Write a short note on Morphological Filters.
c. How images are compares using side by side comparison.
d. Facial recognition is a very challenging problem, because of pose variation, expressions, and lighting, not to mention changes in hair, makeup, glasses etc. Explain Facial Recognition in Image Processing.

5. Attempt *any two* of the following: **12**

a. What are the Four General Enhancement Steps? Explain using suitable example.
b. Define the following with reference to image forensic.
I) Alter II) Change III) Enhance IV) manipulate V) Restore VI) Evidence
c. Write a short note on "Digital Image Processing-Introduction into Court"**.**
d. Explain the use of Computer Graphics and Animations as evidences into the Court.

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(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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1. Attempt *any two* of the following: **12**

a. Explain with diagram the various layers of blockchain.
b. Explain Data Encryption Standard (DES) cryptography mechanism
c. Explain construction of SHA-3 algorithm.
d. Explain SPV communication mechanism with the Bitcoin network.

2. Attempt *any two* of the following: **12**

a. What Ethereum Is Good For? Explain.
b. What is Mist browser? Explain steps by step instructions for setting up the Mist.
c. What is Gas? Explain the details of working with gas.
d. Describes the types of values the EVM can interpret when writing Solidity code.

3. Attempt *any two* of the following: **12**

a. Enlist and explain Hyperledger open source frameworks and tools.
b. What is Hyperledger Composer? What are the components and files needed to make up Hyperledger Composer?
c. Write a short note on "Tokens are a category of Smart Contract".
d. What are the steps of Creating a Token on the Testnet?

4. Attempt *any two* of the following: **12**

a. Define Mining in Ethereum. What are the factors required for Block Validation?
b. Write short note on “DAG & Nonce” under mining ether.
c. What is Cryptoeconomics? Enlist the domains of Cryptoeconomics. Why it is useful?
d. What are the assumptions predicated on real-life experience with other cryptonetwork protocols?

5. Attempt *any two* of the following: **12**

a. What is Blockchain Application Development? Explain how a DApp interacts with a Blockchain.
b. Explain how to Interacting Programmatically with Ethereum—Creating Smart Contract.
c. How an EVM backend talks to a JS frontend?
d. How to setup a Local Private Chain? Enlist and Explain Optional Flags for creating a new chain to customize in testnet environment.

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