

Roll No.

OPEN BOOK EXAMINATION

Time allowed : 3 hours

Maximum marks : 100

Total number of questions : 4

Total number of printed pages : 11

NOTE : *Answer ALL Questions.*

1. In recent years, India has witnessed an unprecedented transformation in its financial services sector. The widespread adoption of smartphones and various government initiatives such as Digital India have accelerated the shift toward digital payments and online financial services. One of the key organizations at the center of this transformation is PaySure FinTech Solutions Pvt. Ltd., a rapidly growing financial technology company headquartered in Bengaluru. PaySure specializes in providing digital payment infrastructure for banks, e-commerce platforms and small businesses across India. Its services include real-time payment processing, fraud detection analytics, cross-border remittance platforms and blockchain-based smart contract systems for automated financial settlements. The company processes millions of financial transactions every day through mobile wallets, digital banking APIs and merchant payment gateways. Because it handles large volumes of sensitive financial data—including customer identities, transaction histories, biometric authentication records and merchant settlement information—PaySure plays a critical role in India's digital financial ecosystem.

However, as digital transactions increased dramatically, so did the complexity of cybersecurity threats facing the organization. Cybercriminal networks began targeting payment systems with increasingly sophisticated attacks, including phishing campaigns, malware-based account takeovers, distributed denial-of-service attacks and automated fraud schemes.

To address these threats, PaySure's Chief Technology Officer proposed the integration of Artificial Intelligence (AI) based fraud detection systems combined with blockchain technology to create a more transparent and secure payment infrastructure. The idea was to use AI algorithms to detect suspicious transaction patterns while using blockchain's distributed ledger to ensure tamper-resistant transaction records.

At the same time, the company deployed a machine learning fraud detection system designed to analyze massive datasets of financial transactions. The system monitored behavioural patterns such as transaction timing, device usage, geographic locations and spending patterns to identify potential fraud attempts.

The company's legal advisors reminded management that although blockchain systems can automate financial processes, organizations must still comply with existing regulatory frameworks such as the Information Technology Act, 2000 and financial guidelines issued by the Reserve Bank of India.

Under the IT Act, unauthorized access to computer systems and data manipulation are criminal offenses. In addition, organizations handling digital financial information must implement reasonable security practices to protect customer data. The company also needed to comply with provisions of the Digital Personal Data Protection Act, 2023, which imposes strict requirements regarding the collection, processing and storage of personal data.

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While the legal and compliance teams were still analyzing the implications of blockchain technology, PaySure faced another major security incident.

The company's cybersecurity monitoring system detected unusual traffic patterns originating from one of its internal analytics servers. Investigators discovered that an employee from the data science team had accessed confidential datasets containing millions of anonymized transaction records used to train the AI fraud detection system.

During the investigation, analysts discovered that the suspect had attempted to delete several log files and temporary records to conceal the unauthorized data transfer. However, forensic experts were able to recover fragments of the deleted files using specialized digital forensic software tools.

Despite recovering the data, investigators encountered serious procedural challenges. Some of the evidence had been collected after the suspect's computer had already been shut down, which resulted in the loss of volatile memory data such as encryption keys and active process information.

Furthermore, the company's legal department raised concerns regarding the chain of custody documentation associated with the digital evidence. In Indian courts, electronic evidence must comply with strict legal standards under Section 65B of the Indian Evidence Act, which requires proper certification regarding how electronic records were collected and preserved.

Some customers also expressed concerns about how their financial data was being used to train AI models. Even though the data used by PaySure had been anonymized, critics argued that large-scale data analytics could still pose risks to individual privacy.

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The company's Board of Directors realized that adopting emerging technologies like AI and blockchain required not only technical expertise but also a robust governance framework capable of addressing legal, ethical and cybersecurity challenges.

To address these concerns, PaySure established a Technology Governance and Ethics Committee responsible for overseeing AI development, data protection policies, vendor contracts and cybersecurity risk management.

The PaySure case illustrates the complex challenges faced by organizations operating at the intersection of financial technology, artificial intelligence, blockchain innovation and cybersecurity governance.

While advanced technologies can significantly improve operational efficiency and fraud detection capabilities, they also introduce new risks involving data privacy, legal compliance, cybercrime investigations and public trust.

In view of the above, answer the following :

- (a) AI's advent has had a big effect on modern society. Like PaySure FinTech Solutions Pvt. Ltd., the usage of AI in various sectors is increasing rapidly. Explain the Future of AI in India.
- (b) The Ministry of Electronics and Information Technology (MeitY), Government of India launched the 'Digital India' programme with the vision to transform India into a digitally empowered society and knowledge-based economy by ensuring digital access, digital inclusion, digital empowerment and bridging the digital divide. Discuss the major initiatives taken by the Government related to public service delivery for the companies.
- (c) As the analysts of PaySure FinTech Solutions Pvt. Ltd. discovered that anyone attempted to delete several log files and temporary records to conceal the unauthorized data transfer. What are the various ways to recover deleted temp files ?

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- (d) The PaySure FinTech Solutions Pvt. Ltd. needed to comply with provisions of the Digital Personal Data Protection Act, 2023. How the company can establish Data Protection Board and how it may work as per the key provisions of the DPDP Act, 2023 ?
- (e) Preservation of the digital and physical evidence should be done by trained and skilled staff members that possess the required techniques and the knowledge of using appropriate tools. Explain various methods for preserving the digital evidence by forensic investigator for PaySure FinTech Solutions Pvt. Ltd.

(5 marks each)

2. Mr. R, a chemical engineer, started a business to manufacture perfumes in the year 2015 on a very small scale. The company was using conventional manual methods of records keeping under which information was stored manually in different files. These files used to be stored in filing cabinets. Retrieving information from these files was a very tedious job. In the year 2020, the company introduced a new perfume for women which met with unexpected success. Mr. R was not able to cope up with the growing volume of business using manual legacy systems. The company employed more employees to ensure that the growing demand of the new perfume is met better and faster. But with the increase in number of monthly transactions to 25000, the manual processes which were being followed by the company, were holding it back. The managers were facing difficulties in decision-making due to non-availability of timely, relevant and reliable information due to the usage of manual and conventional filing system. The difficulties faced by managers in decision-making many-a-times resulted in loss of opportunities to the company. Moreover, the success of the new perfume encouraged Mr. R to enter into B2C e-commerce to enhance the reputation of his company. He feels that with e-commerce, more and more consumers would buy his products online from any corner of the world and his company would touch new heights. Management information systems can also help the decision maker to make valid decisions by providing accurate and up-to-date information and performing analytic functions. Mr. R approached a management consultant to suggest him on these issues urgently because he knew that the competition will emerge in the market sooner or later and his company will lose the competitive edge. After holding several discussions with Mr. R to understand the problems being faced by him, the consultant suggested that database is a crucial tool for successfully and efficiently handling massive amounts of data. The company should install computers to store data as computers can store large volume of data for future reference which can be accessed effectively and even from remote

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locations, for the following reasons :

- To implement different information systems in the company which would assist the managers in their decision-making process.
- To develop a website with which customers of the company can directly purchase from the company online instead of buying it from the open market.
- To employ Artificial Intelligence (AI) to provide the best possible customer services to its existing as well as potential customers by analyzing customer browsing behavior, purchase history and even the time spent looking at specific items. He also suggested that the AI system can assist in analyzing huge amounts of network data and in understanding the variations in network traffic that is different from normal or usual network traffic.

The consultant cautioned Mr. R that the suggestions made by him would involve the following issues :

- Installation of computers in the company would definitely lead to fast and accurate processing of data, but computers lack in common sense and IQ.
- Computers work on the principle of Garbage-In-Garbage-Out (GIGO). The incorrect data fed into the system and incorrect program would produce incorrect results.
- Usage of these technologies will lead to new types of risks in the company's business as data handling through computers is prone to the loss of information and being tampered.

For indulging into B2C e-commerce, the company will have to host its website. When people access the web, they often entrust vital personal information such as their name, address, phone number, credit card number, etc. to the website they accessed. This personal information may fall into wrong hands and may be used for illegitimate purposes. In case the company is unable to protect the personal information collected on its website, it would be responsible to pay damages to the person affected.

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The consultant also cautioned Mr. R that due to the use of Artificial Intelligence (AI) and Machine Learning (ML), the company would be facing an exponential increase in the amount of data produced through these technologies. The conventional database tools would not be having the processing power to analyze this increase in the amount of data produced through AI and ML. They would have to use other advanced techniques such as Data Mining to analyze the data.

In view of the above, answer the following questions :

- (a) As the consultant suggested to implement the new Information system to assist the managers in their decision-making process. Explain the main reasons why the information system may be useful for the company ?
- (b) After the suggestion of consultant, Mr. R uses common softwares for his company. What types of softwares, he may use in his office for efficient working and operation ?
- (c) Explain how Management Information System (MIS) can help the Mr. R's company in decision-making ?
- (d) Explain how the database management system can be structured as per various levels to handle massive amounts of data of the company ?
- (e) Explain some of the challenges that may be faced by the company after indulging into B2C e-commerce to protect their user privacy for his perfume business.

(5 marks each)

3. LV Manufacturing Company, one of India's leading automotive component manufacturers, had embarked on an ambitious digital transformation program by late 2024. They moved from legacy systems to SAP ERP tightly integrated with Oracle Database 19c, deployed AWS S3 for backups, and adopted a Hyperledger-based blockchain to track raw material sourcing and shipment verification. LV Manufacturing Company also rolled out IoT-based factory sensors connected through a 5G private network to feed real-time production data into their Decision Support System (DSS).

One of LV's largest trading partners was Mr. RK, a high-profile Mumbai-based stockbroker and commodities trader. Mr. RK was specialized in predictive investment strategies for manufacturing and logistics sectors, relying heavily on real-time operational data feeds from suppliers like LV. LV Manufacturing Company granted Mr. RK, API-based access to certain DSS metrics, secured through their corporate firewall and an API gateway.

In early 2025, LV Manufacturing Company entered a large export contract with European automotive clients that required blockchain-verified shipping updates. Mr. RK's analytics platform consumed this blockchain data along with ERP metrics to predict LV's share performance.

Mr. RK's analytics models flagged abrupt drops in LV's production output and delayed shipment logs. Blockchain ledger entries mismatched ERP shipment records. Firewall logs showed traffic spikes from unrecognized IP ranges—many geolocated outside India.

Within days, Mr. RK's AWS-based data lake suffered corruption of historical performance datasets, causing predictive models to produce flawed investment signals. Forensics hinted at API credential compromise, likely through phishing of a LV admin user, coupled with firewall misconfiguration allowing API traffic from unvetted IP addresses. On Mr. RK's side, object versioning was disabled in S3, allowing corrupted data to overwrite originals without rollback. Investigators determined :

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- (1) Compromised API tokens were used to pull legitimate LV's data and inject falsified metrics.
- (2) Attackers modified Oracle DB query responses in-transit before they hit the blockchain validation layer.
- (3) Mr. RK's network security appliance was only in monitoring mode, so malicious packets were not blocked in real time. The attack impacted not only LV's credibility but also Mr. RK's financial standing, as some investments were made on the basis of tampered analytics. International clients demanded an independent blockchain audit, while both LV Manufacturing Company and Mr. RK had to halt operations temporarily for data restoration.

Based on the above case answer the following :

- (a) While designing a joint security architecture for LV Manufacturing Company and Mr. RK to secure the API data exchange, covering both network and application layers, how TCP/IP Protocol suite will work ? Explain the functions of each layer.
- (b) How IaaS storage can be beneficial for LV Manufacturing Company ? What are main drawbacks of using these services ?
- (c) As LV Manufacturing Company want to move towards SAP ERP tightly integrated with Oracle Database, how the database files may be structured into a variety of forms to speed up access times and maximize storages space ?

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- (d) The Company authorised Mr. RK to access the data secured through their corporate firewall. Explain various types of Firewalls.
- (e) Is LV Manufacturing Company can use blockchain startups for the payment gateways for cryptocurrencies ? Explain various examples of payment gateways.

(5 marks each)

4. Cyb-D Solutions Pvt. Ltd. is a Chennai based Cyber security firm. This firm was hired by AB Bank after regulators flagged compliance gaps. During the audit, the bank faced insider fraud, where manipulation of online banking records was detected. Cyb-D collected logs and e-mails, but in court, the defence challenged the forensic preservation methods. Regulator also objected to AB bank's merged IT and cyber security policy. According to this policy, RBI mandates a separate cyber security framework. Cyb-D drafted a new cyber security policy covering incident response, VAPT, encryption and data protection, while keeping IT operations distinct.

Later, AB Bank's lawyers wanted to use legal analytics tool to predict the outcome of customer disputes. While these tools gave useful insights, concerns about privacy and admissibility in court were raised.

Cyb-D solved this by anonymizing data, taking consent and following the IT and data protection bill.

In another fraud case, Cyb-D did forensic imaging of employee laptops but the defence argued that missing hash values and time stamps weakened the chain of custody. Cyb-D responded by maintaining proper custody logs and using standard forensic methods.

Finally, Cyb-D VAPT testing found serious weaknesses in the bank's mobile app. Manager delayed fixing them and hackers later exploited these flaws causing a customer data breach. The bank was sued for negligence. To prevent this in future, Cyb-D setup a risk escalation system, having strict timelines for fixing issues and a high-level committee.

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In the light of the above case scenario, answer the following questions :

- (a) As Cyb-D drafted a new cyber security policy that covers the data protection also. Illustrate the Indian Laws for Data Protection, that must be taken into consideration.
- (b) Regulator said that AB Bank should not mix its IT and cyber security policies. How should Cyb-D create a distinct cyber security policy from the broader IT policy ?
- (c) Today, many advanced level analytics tools are available. How do these legal analytics tool assist AB Bank lawyers in making risk-based litigation decision ?
- (d) In the fraud case with employee laptops, the defence said missing hash values and timestamps weakened the chain of custody. What critical procedural steps must be taken to effectively establish and authenticate the chain of custody in digital forensics ?
- (e) AB Bank Managers delayed fixing issues found in VAPT, which led to a data breach and lawsuits. How did Cyb-D leverage the VPAT to provide crucial and timely oversight of cybersecurity risks for portfolio managers, thereby safeguarding against such damaging outcomes.

(5 marks each)

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