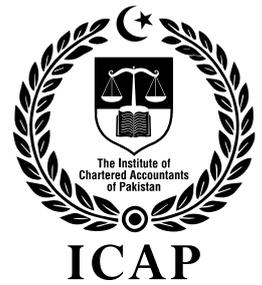# Certificate in Accounting and Finance Stage Examination

Data, Systems and Risks

9 March 2026
100 marks
3 hours and 15 minutes (including 15 minutes' reading time)

ICAP

The Institute of Chartered Accountants of Pakistan

Instructions to examinees:
(i)   Answer all **SEVEN** questions.
(ii)   Answer in **black** pen only.
(iii)   Use the first page of the answer script to answer the Multiple-Choice Questions.

SECTION A

QUESTION 1

Select the most appropriate answer from the options provided for each of the following Multiple-Choice Questions (MCQs). Each MCQ carries **ONE** mark.

(i)   After purchasing a product, every customer of Rectangle Rings (RR) completes a survey to rate RR's customer service quality in one of four categories: Excellent, Good, Average, or Poor. At the end of each month, RR's manager calculates the percentage of customer responses in each category.

   The original survey responses provided by the customers would be classified as:

   (a)   Nominal data   (b)   Discrete data
   (c)   Ordinal data   (d)   Continuous data

(ii)   Which of the following best describes the activities undertaken at the tactical level of data governance?

   (a)   Implementing data standards, establishing governance frameworks, and monitoring progress
   (b)   Implementing data standards, developing implementation plans, and monitoring progress
   (c)   Managing data quality, managing metadata, and defining vision and goals
   (d)   Developing data governance policies, securing executive sponsorship, and managing metadata

(iii)   Shahzad Ali, the Finance Manager of Arrow Associates, has prepared a dashboard that reports monthly sales for February 2026, analyses the decline in sales compared to February 2025, and recommends increasing discounts to 20% of the retail price for March 2026.

   The recommendation provided by Shahzad Ali in the above dashboard reflects:

   (a)   Descriptive analytics   (b)   Diagnostic analytics
   (c)   Predictive analytics   (d)   Prescriptive analytics

(iv)   Which of the following statements regarding the implications of data analytics is **NOT** correct?

   (a)   Data analytics provides valuable insights that enable organizations to make informed decisions
   (b)   Data analytics helps organizations identify inefficiencies and optimize performance
   (c)   Data analytics guarantees reliable insights regardless of the quality of the underlying data
   (d)   Data analytics helps companies gain a competitive advantage by enabling them to respond more quickly to market changes

(v)   Cylinder Airline (Private) Limited (CAPL) streams real-time sensor data from various aircraft engines to detect potential faults during flights and initiate immediate corrective actions. However, despite heavy investment in technology, CAPL's system fails to process the collected data in real time.

   CAPL's inability to process data in real time directly affects which characteristic of Big Data?

   (a)   Velocity   (b)   Veracity   (c)   Variety   (d)   Value

(vi)   Nonagon Foods Limited (NFL) recently collected a large volume of data from online transactions, customer surveys, and sensors. Before performing detailed analysis, NFL's manager is resolving inconsistencies, handling missing values, and correcting data entry errors.

Which stage of the Data Analytics Cycle is being performed by NFL's manager?

(a)   Data Collection   (b)   Data Exploration
(c)   Data Modeling   (d)   Data Cleaning

(vii)   Octagon Innovations (OI), a rapidly growing startup, does not want to invest in physical servers. Instead, OI has engaged a cloud provider to manage the data center and physical hardware. OI rents virtual machines, installs its own operating systems, and configures applications according to its business needs. The cloud service model being utilized by OI is:

(a)   Software as a Service (SaaS)   (b)   Platform as a Service (PaaS)
(c)   Infrastructure as a Service (IaaS) (d)   Heroku

(viii)   Sphere Hospital and Clinics (SHC) stores patient records in a dedicated cloud environment that is not shared with any other organization. The infrastructure is customized to meet SHC's specific regulatory and data privacy requirements.

Which of the following cloud deployment models is being utilized by SHC?

(a)   Public Cloud   (b)   Private Cloud
(c)   Community Cloud   (d)   Hybrid Cloud

(ix)   Rhombus Creative Designers (RCD), a global marketing firm, uses a cloud-based collaborative platform to manage its international campaigns. Team members residing in London, Tokyo, and Beijing work on the same project files in real time. Employees access the cloud environment using company laptops and personal smartphones over various public and private network connections.

Which key cloud characteristic is most clearly demonstrated by RCD's setup?

(a)   Broad network access   (b)   Rapid elasticity
(c)   Resource pooling   (d)   Measured service

(x)   Which of the following is the key components of a Blockchain?

(a)   Blocks, Hashing, Consensus Mechanisms, Nodes, Cryptocurrencies
(b)   Blocks, Hashing, Smart Contracts, Nodes, Hashgraph
(c)   Blocks, Chain Propagation, Smart Contracts, Nodes, Holochain
(d)   Blocks, Hashing, Consensus Mechanisms, Nodes

(xi)   Which of the following types of Distributed Ledger Technology uses a non-linear, graph-like structure that eliminates the need for mining and enables faster and more scalable transactions?

(a)   Blockchain   (b)   Directed Acyclic Graph
(c)   Holochain   (d)   Hashgraph

(xii)   A digital audit of a financial system is being conducted to evaluate the effectiveness of its IT General Controls (ITGCs). The audit team is assessing the purpose, scope, and organizational impact of ITGCs. Which of the following statements about ITGCs is **NOT** correct?

(a)   ITGCs are essential for maintaining the confidentiality, integrity, and availability of systems and data
(b)   ITGCs are designed to ensure data integrity and privacy; however, ITGCs are not able to provide any protection against external cyber threats
(c)   ITGCs enhance stakeholder confidence by safeguarding sensitive data / information and supporting data privacy
(d)   ITGCs aim to ensure data integrity and compliance with regulatory and legal requirements

(xiii) Square Automotive Limited (SAL) is in the process of migrating its legacy inventory system to a cloud-based platform. During the transition, the IT manager came to know that, to meet project timelines, the software development team implemented code changes directly to the production environment without prior testing in a separate test environment and without formal authorization.

Which of the following IT General Controls has been violated by SAL's software development team?

(a)	IT operations controls	(b)	Privileged access controls
(c)	Program development controls	(d)	Change management controls

(xiv) Which of the following is the examples of IT Operations Controls?

(a) User authentication and incident management
(b) Code reviews and role-based access control
(c) Incident management and system monitoring
(d) Environment controls and system monitoring

(xv) How do automated risk scanners primarily assist an organization in its risk management process?

(a) They simulate attacks on IT infrastructure to uncover security flaws
(b) They use predictive modeling techniques to anticipate future risks
(c) They detect unusual login attempts or unauthorized access attempts
(d) They monitor network traffic and send real-time alerts to security teams

QUESTION 2

(a) Trapezoid Airways (TA), after providing domestic travel services within Pakistan for one year, has recently commenced international flight operations to Middle Eastern countries.

The Database Management System (DBMS) of TA follows the standard three-level ANSI/SPARC architecture, which consists of three schema levels. However, employees of TA have reported several issues regarding the DBMS, which are summarized as follows:

- Two different passengers were able to book the same seat on Flight TA102. The system accepted both entries without generating an error message, resulting in duplicate seat allocation.
- A recently inducted junior flight attendant was able to view a screen in the crew portal displaying hourly pay rates of senior pilots, although access to such information was restricted to authorized senior management personnel only.
- Following the commencement of international operations, booking staff observed that there is no designated field available to store passengers' meal preferences.
- Passenger data is stored in an unencrypted form, which is non-compliance with the regulatory requirements.

Required:
(i) To resolve each of the reported issues, identify the appropriate level of the DBMS architecture at which the database administrator should implement changes. Also, suggest an appropriate corrective action. **(06 marks)**
(ii) Briefly explain each level of DBMS architecture identified in part (i) above. Also, provide any **two** characteristics of each identified level. **(06 marks)**

(b) TA's management has observed that, despite the availability of large volumes of data generated from online bookings, mobile applications, international check-ins, flight sensors, and customer service interactions, TA is facing several challenges in utilising this data effectively.

Management has noted that some records contain inconsistent information, while other data arrives in different formats from multiple systems. The IT department has reported increasing difficulties in storing and processing this growing volume of data efficiently, particularly during peak travel seasons during which system slowdown is common. Furthermore, the legal department has raised increasing concerns regarding the protection of sensitive passenger information.

Required:
Identify and briefly explain the Big Data challenges faced by TA and recommend a suitable solution to address each challenge. **(06 marks)**

QUESTION 3

(a) Pyramid Traders (Private) Limited (PTL) is a medium-sized trading company that stores all its inventory, sales, and customer data in a single large table maintained across multiple spreadsheets. Over time, different departments have added new data fields to meet their specific requirements. This has resulted in data duplication, update anomalies, and inconsistencies in reporting.

Due to the increasing volume of data and structural inefficiencies, PTL has been advised by a database consultant to implement database normalization to restructure its data.

Required:
Explain the concept of database normalization and discuss its importance for PTL. Also, describe the rules and prerequisites (if any) of the **three** most commonly used normal forms.   **(06 marks)**

(b) Data security involves protecting data from unauthorized access, disclosure, alteration, and destruction. Organizations often use a multi-layered approach to safeguard their data assets.

Required:
Briefly explain any **five** data security practices that organizations can adopt to address emerging threats to data security.   **(05 marks)**

(c) The expansion of data-driven decision making has significantly increased both the scope and complexity of data collection practices.

Required:
Briefly explain any **two** key considerations involved in data collection. Also, briefly discuss any **two** key ethical principles that govern data collection practices.   **(04 marks)**

SECTION B

QUESTION 4

Ellipse Lifeline Hospital (ELH) operates a network of 65 hospitals across the country. The hospital group uses 'Spiral', which is an integrated application developed by a local software vendor, to manage ELH's operations, reporting and data processing. The application and database servers run on the Linux operating system and are hosted at ELH's head office data centre.

ELH has continued to use the older version of the Spiral despite the release of three newer versions over the past five years. Due to the tightly integrated (monolithic) architecture of the older version currently in use, incorporating changes or upgrades is complex and often leads to unexpected system issues. The latest version of Spiral adopts a modular system architecture and requires significantly upgraded hardware infrastructure.

A backup server for disaster recovery purposes has been installed in another city located approximately 1,250 km from the head office. Data is transferred to this backup server at the end of each month; however, restoration of the backup requires manual intervention by highly skilled technical staff. Last year, ELH experienced a major service disruption when the customer-facing reporting module of the Spiral remained unavailable for two days due to a hardware failure in the primary server. The prolong downtime was attributed to the lack of trained technical staff capable of executing the switchover to the backup system.

Required:
(a) Identify the system software and application software used by ELH and explain their respective roles within ELH's IT environment.   **(04 marks)**
(b) Explain the concept of modular system design with reference to the latest version of the Spiral. Also, state any **two** advantages of modular system design.   **(04 marks)**
(c) With reference to the service disruption experienced by ELH, explain why the mere presence of a backup server proved to be insufficient to ensure system availability. Also, briefly discuss how a properly designed redundancy and failover mechanism could have minimized the downtime.
        (05 marks)

QUESTION 5

Diamond Corporation (DC) is a rapidly growing multinational firm currently restructuring its digital footprint. To remain competitive, DC is preparing a 'Three-Pillar Modernization Plan', which includes the following initiatives:

(i)   Evaluating infrastructure options for its Enterprise Resource Planning (ERP) system.
(ii) Transforming specialised staff training and enhancing customer experience through Virtual Reality (VR).
(iii) Implementing intelligent data processing systems to automate complex decision-making, preferably using neural networks, a core component of artificial intelligence modelled loosely on the structure and functioning of the human brain.

Required:

(a)   Briefly explain any **two** distinct features of On-Premise ERP, Cloud ERP, and Hybrid ERP.
(06 marks)
(b)   Explain any **two** benefits and **two** challenges of VR.   **(04 marks)**
(c)   Explain how neural networks learn. Also, identify any **four** types of neural networks.   **(05 marks)**

QUESTION 6

Cube Bank Limited (CBL) operates 800+ branches nationwide and serves 7 million customers through internet banking, a mobile banking application, and ATM networks. CBL processes over 5 million transactions daily, including fund transfers, bill payments, and remittances.

The following matters related to CBL have been brought to your attention:

(a)   Recently, the following security incidents were reported to senior management:

   (i)   Multiple customers received fraudulent text messages and emails impersonating CBL officials, requesting them to click malicious links to verify account details. Similar emails were also sent to employees requesting their login credentials for CBL's official systems.

   (ii) The IT security team discovered that three employees in the loan processing department had intentionally shared their login credentials with unauthorised persons, granting them access to sensitive customer financial data and credit histories of approximately 50,000 customers.

   (iii) In February 2026, CBL's website experienced two separate incidents in which an unusually large volume of traffic from multiple unknown sources overwhelmed the system's capacity. As a result, internet banking services became unavailable for approximately four hours during peak banking periods, affecting customer transactions and causing reputational damage.

   (iv) A laptop containing sensitive customer financial data was stolen from the branch premises. This was the second such incident reported within the same month.

   Required:
   For each incident described above, identify and explain the type of risk involved (digital risk, human risk, or physical risk). Also, recommend an appropriate mitigation strategy for each incident.
   (07 marks)

(b)   During CBL's risk management committee meeting, the Chairman emphasised the need to implement a layered security model supported by proactive security defenses.

   Required:
   Briefly describe the layered security approach and explain any **two** security layers that CBL can implement as part of a robust cybersecurity strategy. Also, identify and briefly explain any **three** proactive security defenses that can help to prevent cybersecurity incidents in future.   **(07 marks)**

(c)   Recognizing the increasing cyber risk exposure, CBL attempted to recruit experienced cybersecurity professionals, including cybersecurity analysts and incident response specialists. However, despite multiple recruitment campaigns and attractive compensation packages, CBL has been unable to fill these critical roles due to a shortage of suitably skilled candidates.

   Required:
   Briefly explain any **five** practical measures that CBL can adopt to address its cybersecurity workforce challenge.   **(05 marks)**

QUESTION 7

You have been engaged by Circle Textiles (CT), a manufacturer and retailer of high-quality fabrics, to review its IT environment.

During your review, you observed the following:

(i)   CT is using an in-house information system that was originally developed ten years ago.

(ii)   The information system has been modified several times; however, changes have not been properly documented.

(iii)   Of the three original developers, two have left the organization. The remaining developer now leads the software development and maintenance team, which consists primarily of junior staff members.

(iv)   The current head of IT department joined three years ago and has strong expertise in network security but limited experience in software development and IT governance.

(v)   Although certain information security controls are in place, CT does not have a documented risk management process and does not follow any formal IT governance framework.

(vi)   IT procurement decisions are made annually at the discretion of the IT Head. Recently, high-capacity servers were purchased that appear excessive for business requirements.

(vii)   A recent data breach resulted in customers' names and phone numbers being leaked on social media. This incident damaged CT's reputation and led to regulatory penalties.

Required:
With reference to the issues identified in the scenario, explain **three** best practices which CT should adopt to ensure effective IT governance and management. Support your answer by clearly linking their benefits to specific weaknesses observed at CT.   **(05 marks)**

(THE END)