



**THE INSTITUTE OF CHARTERED  
ACCOUNTANTS OF NIGERIA**

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# **INSIGHT**

**ATSWA MARCH 2026 EXAMINATIONS**

**PART II**

**Question Papers, Suggested Solutions and  
Examiners' Comments**

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**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA****ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
MARCH 2026 EXAMINATIONS (PART II)****FINANCIAL ACCOUNTING**

**PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER**

**EXAMINATION INSTRUCTIONS**

1. All solutions should be in **blue** or **black** ink. Any solution in pencil will not be marked.
2. Read all instructions on each part of the paper carefully before answering the questions.
3. Ensure that you do not answer more than the number of questions required for **Section B (The Essay Section)**.
4. Check your pockets, purse and mathematical sets, etc, to ensure that you do not have prohibited items such as telephone handset, electronic storage device, wrist watches, programmable devices or any form of written material on or around you in the examination hall. You will be stopped from continuing with the examination and liable to further disciplinary actions including cancellation of examination result if caught.
5. Do not enter the hall with anything written on your docket.
6. Insert your examination number in the space provided above.

**TUESDAY, MARCH 24, 2026**

**DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO**

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA  
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
PART II EXAMINATIONS – MARCH 2026**

**FINANCIAL ACCOUNTING**

**Time Allowed: 3 hours**

**SECTION A: PART I      MULTIPLE CHOICE QUESTIONS      (30 MARKS)**

**ATTEMPT ALL QUESTIONS IN THIS SECTION**

**Write ONLY the alphabet (A, B, C, D or E) that corresponds to the correct option in each of the following questions/statements.**

1. Which of the following consists of a list of ledger balances on a particular date?
  - A. Suspense account
  - B. Control account
  - C. Trial balance
  - D. Bank statement
  - E. General journal
  
2. Benjamin issued an invoice, a credit note and a receipt. Which of the following correctly describe what has happened?
  - A. Benjamin purchased goods and paid the suppliers immediately
  - B. Benjamin sold goods and received immediate payment from the customer
  - C. Benjamin purchased goods on credit, made return to the supplier and paid the balance due
  - D. Benjamin sold goods on credit, received goods returns from customers and received the balance
  - E. Benjamin issued goods from the warehouse and received payment for goods sold on credit
  
3. Tokunbo ventures deals in secondhand clothing. The firm sold its furniture and fittings with a carrying amount of ₦200,000 for ₦180,000. Cash was received but no entries had been made in the books. What is the effect of this on the company's assets?

<b>Non-current assets</b>	<b>Current assets</b>
A. Decrease by ₦180,000	Increase by ₦180,000
B. Decrease by ₦180,000	Increase by ₦200,000
C. Decrease by ₦200,000	Increase by ₦180,000
D. Decrease by ₦200,000	Increase by ₦200,000
E. Increase by ₦180,000	Increase by ₦180,000

4. Why is accrued expenses shown in the financial statements of a business?
- So that the correct total assets are shown in the statement of financial position
  - So that the total income for the period is matched against the total cost of that period
  - To show how much the customer owes the business
  - To show the amount owed credit suppliers
  - To reduce the non-current assets of the business
5. Which of the following equations is correct?
- Cost of sales – gross profit – sales returns = revenue
  - Cost of sales – gross profit + sales returns = revenue
  - Cost of sales + gross profit – sales returns = revenue
  - Cost of sales + gross profit + sales returns = revenue
  - Cost of sales – gross profit = revenue
6. Which accounting objective is being applied when financial information affects business decisions?
- Comparability
  - Relevance
  - Reliability
  - Understandability
  - Timeliness
7. The trial balance below of Kastina Nig Ltd contains errors

	Debit L\$'000	Credit L\$'000
Plant and equipment	4,000	
Revenue		16,500
Trade payables		3,500
Drawings		2,000
Trade receivables	5,500	
Bank overdraft	1,000	
Share capital		3,500
Purchases	13,000	
<b>Total</b>	<b>23,500</b>	<b>25,500</b>

What is the correct trial balance total?

- L\$23,500,000
- L\$24,500,000
- L\$25,500,000
- L\$26,500,000
- L\$27,500,000

8. Which of the following is a potential consequence of engaging in cyberbullying?
- A. improved online reputation
  - B. Increased social media followers
  - C. Legal consequences and loss of internet privileges
  - D. Online popularity
  - E. limited reciprocal attack
9. Which of the following is the cornerstone of ethical behaviour by a professional?
- A. Well trained employees
  - B. Infrastructural facilities
  - C. Advocacy
  - D. Integrity
  - E. Negative attitude
10. The key or secret word which is used to protect your information from unauthorised access is
- A. Copyright
  - B. Patents
  - C. Trade mark
  - D. Password
  - E. Hacker preventer
11. Deferred revenue is
- A. a type of accrued expense
  - B. revenue earned but not yet received in cash
  - C. an asset representing future income
  - D. revenue received in advance but not yet earned
  - E. a liability that has been written off
12. When a company receives L\$10,000 in advance for services to be rendered over 6 months, the correct initial journal entry is
- A. Dr. Cash L\$10,000; Cr. Revenue L\$10,000
  - B. Dr. Accounts Receivable L\$10,000; Cr. Service Revenue L\$10,000
  - C. Dr. Unearned Revenue L\$10,000; Cr. Cash L\$10,000
  - D. Dr. Cash L\$10,000; Cr. Unearned Revenue L\$10,000
  - E. Dr. Deferred Expense L\$10,000; Cr. Cash L\$10,000

13. If opening capital is L\$50,000, closing capital is L\$70,000, drawings during the year are L\$10,000, and additional capital introduced is L\$5,000, then the profit is:
- A. L\$ 5,000
  - B. L\$10,000
  - C. L\$15,000
  - D. L\$20,000
  - E. L\$25,000
14. Which of the following is **NOT** a fundamental principle in the Code of Ethics for Professional Accountants?
- A. Integrity
  - B. Objectivity
  - C. Confidentiality
  - D. Professional Competence and Due Care
  - E. Attitude
15. The principle of 'Objectivity' requires a professional accountant to
- A. promote client's interests over public interest
  - B. avoid bias, conflict of interest, or undue influence
  - C. always agree with client's opinion
  - D. disclose confidential information
  - E. maximise revenue for the client
16. Which of the following is **NOT** a disclosure requirement under IAS 16?
- A. The depreciation methods used
  - B. The useful lives or depreciation rates used
  - C. The fair value of investment property
  - D. The gross carrying amount and accumulated depreciation
  - E. Reconciliation of carrying amount at the beginning and end of the period
17. Which of the following is true regarding IAS 16 revaluations?
- A. Revaluations must be performed annually
  - B. Revaluation increases are recognised in profit or loss
  - C. Revaluation increase should be recognised in the statement of changes in equity
  - D. Revaluation are only permitted for intangible assets
  - E. Revaluation eliminates the need for depreciation

18. What is the main reason for the development of accounting standards?
- A. To regulate multinational companies
  - B. To harmonize tax reporting across countries
  - C. To simplify and ensure uniformity in financial reporting for entities
  - D. To provide a cost-effective way of managing big organisations
  - E. To enhance audit quality in large corporations
19. How is an irrecoverable debt recovered recorded in the ledger?
- A. Debit Irrecoverable debts recovered account, Credit debtors account
  - B. Debit Cash/Bank account, Credit Irrecoverable debts recovered account
  - C. Debit Bad debts account, Credit cash account
  - D. Debit Debtors account, Credit Profit or loss account
  - E. Debit Cash/Bank account, Credit Bad debts account
20. Which of the following would **NOT** appear in the sales ledger control account?
- A. Credit sales
  - B. Receipts from customers
  - C. Discounts allowed
  - D. Purchases returns
  - E. Irrecoverable debts written off
21. Which of the following financial ratios indicates long term financial stability of a business?
- A. Gross profit to revenue ratio
  - B. Capital employed to owners' equity ratio
  - C. Working capital ratio
  - D. Revenue collection period
  - E. Inventory turnover
22. On completing the dissolution of partnership accounts, what does the debit balance in a partner's capital account represent?
- A. Amount owed to the other partners
  - B. Amount due from the other partners
  - C. Share of realisation gain
  - D. Profit of the partner
  - E. Loan advanced to the partnership by a partner

23. The statement that reveals the performance of a social club for a period is called
- Statement of financial position
  - Statement of profit or loss
  - Receipts and payments account
  - Accumulated fund account
  - Income and expenditure account
24. Which of the underlisted option(s) may warrant keeping incomplete records books of accounts of an organisation
- Nature of business
  - Legislative restriction
  - Non availability of stationery for record keeping
  - Loss of records due to catastrophe
  - Limited accounting knowledge
- i, ii and iii
  - ii, iii and v
  - i, iv and v
  - ii and iii
  - iii, iv and v
25. Which of the underlisted options are the advantages of a double entry bookkeeping system over that of an incomplete records system of bookkeeping?
- The cost of keeping records is minimal when compared to that of incomplete records
  - Extraction of trial balance in order to test arithmetical accuracy
  - It requires less effort to keep when compared to incomplete records keeping
  - Reduces the possibility of inaccuracies
  - Information needed has to be obtained from memorandum records
- i and ii
  - ii, iii and v
  - ii, iii and iv
  - ii and iv
  - iv and v
26. The incomplete record system of bookkeeping is unsatisfactory because
- it requires less effort to maintain
  - it can be prepared and maintained by any untrained personnel
  - it is easy and straightforward to understand
  - information needed has to be obtained from memorandum records
  - cost and time of preparing and maintenance is minimal

27. Which of the following transactions is revenue expenditure?
- Repaying bank overdraft
  - Purchasing non-current assets
  - Payment of interest on loan notes
  - Expenditure resulting in improvement to property
  - Buying shares in the form of investment
28. Which of the following do **NOT** appear in the statement of changes in equity?
- Company tax
  - Retained earnings
  - Dividend paid
  - Revenue reserve
  - Capital reserve
29. In the statement of financial position of a not-for-profit organisation, member subscription in advance is an example of
- Prepayment
  - Accrual
  - Receivables
  - Provision
  - Reserve
30. Using the information provided below, determine the working capital change in the statement of cashflows?
- |                               | <b>GH¢'000</b> |
|-------------------------------|----------------|
| Increase in inventory         | 2,240          |
| Increase in trade receivables | 4,640          |
| Increase in trade payables    | 920            |
| Increase in bills payables    | 960            |
- GH¢5,000,000
  - GH¢6,080,000
  - GH¢6,880,000
  - GH¢8,060,000
  - GH¢8,760,000

**SECTION A: PART II****SHORT ANSWER QUESTIONS****(20 MARKS)****ATTEMPT ALL QUESTIONS**

**Write the correct answer that best completes each of the following questions/statements.**

1. Closing inventory is incorporated into the financial statements by debiting ..... and crediting .....
2. An item of inventory was purchased for ₦1000. However, due to a fall in demand, its selling price is ₦800, an additional cost of ₦100 will be incurred before a sale can be effected. The net realisable value (NRV) of the inventory is .....
3. The cost of a non-current asset less its accumulated depreciation and impairment is called .....
4. An expense charged against profit for a period, even though it has not yet been paid or invoiced, is known as .....
5. A complete set of financial statements for SMEs typically includes the Statement of Financial Position, Statement of Profit or Loss, Statement of Changes in Equity, and .....
- 6 Revenue less cost of goods sold is: .....
- 7 The write-off of an irrecoverable debt does not affect the income statement if a corresponding amount was already included in the .....
- 8 The accumulated fund represents the surplus of assets over liabilities in ..... organisations.
- 9 Gains or losses on the disposal of non-current assets are calculated as the difference between the net disposal proceeds and .....
- 10 If a revalued asset is subsequently impaired, the impairment loss is first charged against any existing .....
- 11 Unlike a company, a partnership does not have a separate legal personality; the partners are jointly and severally liable for the partnership's .....
- 12 A blockchain is a distributed ledger technology that records transactions in a secured, transparent, and ..... manner.

- 13 In book-keeping the golden rule is that "every debit entry, must have corresponding credit entry in the books of account. Accounting records not kept according to this rule is .....
- 14 Yemi and Dele are in partnership sharing profit or losses in ratio 1:2. They have agreed to admit Ade who will be entitled to  $\frac{1}{5}$  of the profit or losses in the new business. The new profit or losses sharing ratio of the new partnership is .....
- 15 In the books of not-for-profit organisation, the accounting entries required to record membership subscriptions yet to be received for the accounting year are ..... and .....
- 16 The statement that provides details of movement in shareholders' interest disclosed in the statement of financial position is .....

**Use the following information to answer questions 17 and 18**

In the incomplete records of Welldone Enterprises are:  
 Sales ₦4,600,000 and closing inventory ₦600,000. It was ascertained that the business maintains a markup of  $33\frac{1}{3}\%$  of the cost of goods sold.

- 17 The gross profit of Welldone Enterprises is .....
- 18 The goods available for sale is .....
- 19 Limited accounting information under incomplete records notwithstanding, can be used to determine networth of entity which is also called .....
- 20 An aspect of statement of profit or loss that deals with gains or losses and related taxes is called .....

**SECTION B:                    ATTEMPT ANY FOUR QUESTIONS                    (50 MARKS)**

**QUESTION 1**

- a. Distinguish between accounting policies and accounting standards  
 (3 Marks)
- b. The following information relates to non – current assets of Profundis Farm Ltd as at October 1, 2023.

	Cost	Accm depreciation
Non- current assets	₦'000	₦'000
Freehold property	175,000	-
Plant and equipment	131,250	50,575
Tractors and farm implements	26,250	12,775
Motor vehicles	78,750	45,500

**Additional information:**

- i) The following non-current assets were acquired during the year ended September 30, 2024

Date	Non- current assets	₦'000
October 1, 2023	Plant and equipment	17,500
April 1, 2024	Motor vehicle	10,500

- ii) The following non-current assets were disposed of during the year ended September 30, 2024

Date	Non- current assets	Sales proceeds	Cost	Accumulated depreciation
		₦'000	₦'000	₦'000
October 1, 2023	Plant and equip.	12,075	15,750	1,750
January 1, 2024	Tractor and F/Implements	1,120	1,400	350
September 30, 2024	Motor vehicle	5,600	8750	875

- iii) Profundis Farm Ltd. depreciates the assets using straight-line method on prorated basis at the following rates per annum:

Non-current assets	Rates per annum
Plant and equipment	20%
Tractors and farm implements	15%
Motor vehicles	25%

Also on October 1, 2023 the management of Profundis Farm Ltd decided to start depreciating the freehold property at the rate of 2.5% per annum

**Required:**

Prepare non-current assets movement schedule for the year ended September 30, 2024.

(9½ Marks)

**(Total 12½ Marks)**

**QUESTION 2**

- a. i. What is the role of a conceptual framework in ethics?  
 ii. What is the difference between Integrity and Professional behavior?  
 (2 Marks)
- b. State each of the five fundamental principles of the professional code of ethics, giving one example each.  
 (7½ Marks)

- c. You are a newly qualified Accounting Technician working for a firm of chartered accountants. You discover that a client, who is also a friend of one of the partners, has overstated revenue in the last quarter. When you raise the issue, the partner suggests not taking any action to “make the client happy.”

**Required:**

- i. Identify and explain which fundamental ethical principles are under threat. (2 Marks)
- ii. Suggest appropriate actions to address this situation. (1 Mark)

**(Total 12½ Marks)**

**QUESTION 3**

The following information was presented in the books of Excellent cultural group for the year ended December 31, 2024

	₦'000		₦'000
Bank balance -1 Jan.	524	Stamps and postages	4
Donations received	12	Taking from: Bar	550
Live membership	70	Ticketing	875
Salaries	138	Payments for supplies: Bar	150
Bar attendant wages	25	Ticketing	492
Stationery	12		
Bar expenses	17		
Subscriptions received: 2023	55		
2024	247		
2025	16		

**Additional information:**

- (i) Assets and liabilities

	1 January	31 December
	₦'000	₦'000
Bar inventory	9.9	10.5
Bar supplies owing	58	68
Subscriptions owing	11	13

- (ii) Life membership fees are to be capitalised and one-tenth to be written off yearly.

**Required:**

Prepare the following Ledger accounts:

- a. Bar supplies account (2 Marks)
- b. Bar expenses account (2 Marks)
- c. Subscriptions account (3½ Marks)

- d. Bar account (3 Marks)  
 e. Life membership fees account (2 Marks)  
**(Total 12½ Marks)**

**QUESTION 4**

Financial accounting ratios are calculations that use relative data from a company financial statement to evaluate its financial health and performance. Extracted from the books of Princo Nigeria Limited for the year ended December 31, 2024

	L\$'000		L\$'000
Revenue	35,000	Administrative overhead	6,000
Cost of goods sold	26,000	Profit or loss account 1 Jan. 2024	700
Ordinary shares	10,000	5% loan notes	2,000
5% preference shares	5,000	General Reserve	2,905
		Profits or loss-31 Dec. 2024	1605
		Current liabilities	6945

**Additional information:**

- i. Income tax rate was 30% of the net profit for the year.  
 ii. Included in the administrative overhead is interest on loan notes.

**You are required to calculate:**

- a. i. Total debts to shareholders' fund  
 ii. Rate of return on total assets  
 iii. Return on ordinary shares (6½ Marks)

**Show all workings**

- b. Using the ratios computed above, comment briefly on the company's leverage (6 Marks)

**(Total 12½ Marks)**

**QUESTION 5**

- a. List the components of the financial statements and state the purpose of each. (7½ Marks)

- b. List **FIVE** items included in statement of changes in equity. (5 Marks)

**(Total 12½ Marks)**

## **QUESTION 6**

Artificial intelligence (AI) is at the heart of modern innovation, powering breakthroughs in various industries like finance, health care etc.

### **Required:**

- a. Explain the term Artificial Intelligence (AI). (3 Marks)
- b. Outline **FIVE** main branches of AI. (5 Marks)
- c. Discuss **THREE** applications of AI in finance and accounts. (4½ Marks)

**(Total 12½ Marks)**

## SECTION A: PART I

### MULTIPLE CHOICE SOLUTIONS

1. C
2. D
3. C
4. D
5. D
6. B
7. B
8. C
9. D
10. D
11. D
12. D
13. E
14. E
15. B
16. C
17. C
18. C
19. B
20. D
21. B
22. A
23. E
24. C
25. D
26. D
27. E
28. A
29. B
30. A

### Workings

Q7. Add the 2 totals and divide by 2 =  $23,500 + 25,500 \div 2 = 24,500$

or

$$23,500 - 1,000 + 2,000 = 24,500$$

or

$$23,500 - 1,000 + 2,000 = 24,500$$

Q13.  $70,000 - 50,000 + 10,000 - 5,000 = 25,000$

Q30.  $2,240,000 + 4,640,000 - 920,000 - 960,000 = 5,000,000$

### **Examiner's comment**

Being compulsory questions, all the candidates attempted the questions, and the performance was very good.

### **SECTION A: PART II**

#### **SHORT ANSWER SOLUTIONS**

1. Debiting statement of financial position and crediting statement of profit or loss.
2. ₦700 (~~₦800~~ - ₦100 = ₦700)
3. Carrying amount/Net book value
4. Accruals
5. Statement of cash flows
6. Gross Profit
7. Allowance for doubtful accounts/Provision for bad debts
8. Non-for-profit
9. Carrying amount/NBV
10. Revaluation surplus/Revaluation reserve
11. Liabilities or debts
12. Immutable/Decentralised/Tamper-proof/Reliable
13. Incomplete records or single entry
14. Ade  $\frac{1}{5}$ , Yemi  $\frac{4}{15}$ , Dele  $\frac{8}{15}$  or Ade  $\frac{3}{15}$ , Yemi  $\frac{4}{15}$ , Dele  $\frac{8}{15}$ , 4: 8: 3  $\frac{4}{15}$ :  $\frac{8}{15}$ :  $\frac{3}{15}$
15. DR. Subscriptions in arrears account, CR. Income and expenditure account/subscription income account/subscription account
16. Statement of changes of equity
17. ₦1,150,000
18. ₦4,050,000
19. Accumulation fund
20. Other comprehensive income

#### **Workings**

Q2.  $\text{₦}800 - \text{₦}100 = \text{₦}700$

Q17.  $\frac{33}{133} \times 100\% = 25\% \times 4,600,000 = \text{₦}1,150,000$

Q18.  $\text{N}4,600,000 - \text{N}1,150,000 + \text{N}600,000 = \text{N}4,050,000$

**Examiner's comment**

As compulsory questions, all the candidates attempted the questions and performance was good.

**SECTION B**

**SOLUTION 1**

(a) **Accounting policies:**

- i. Accounting policies refer to the specific principles, methods and procedures that an organisation uses to prepare its financial statements.
- ii. These policies are typically set by the management of the company and may vary from one organisation to another.
- iii. Accounting policies include decisions about the valuation of assets and liabilities, recognition of revenue and expenses and disclosure of accounting information.
- iv. Companies may choose accounting policies that best reflect their business operations and financial performance.

**Accounting standards:**

- i. Accounting standards on the other hand are established rules and guidelines that are issued by relevant accounting standards -setting bodies or authorities, such as International Accounting Standards Boards (IASB), Financial Reporting Council of Nigeria (FRCN).
- ii. Accounting standards provide common framework for financial reporting, ensuring consistency and comparability of financial statements across different organisations.
- iii. These standards dictate how various accounting transactions and events should be recorded, measured and reported in the financial statements.
- iv. Compliance with accounting standards is often mandatory and legally required in many jurisdictions to ensure transparency and reliability in financial reporting.

(b)

**Profundis farm Limited**

**Non-current assets movement schedule for the year ended September 30, 2024**

	Freehold property	Plant & equip	TRACT/ FM	M/vehicle	Total
Cost	₦'000	₦'000	₦'000	₦'000	₦'000
Bal/bd 01/10/23	175,000	131,250	26,250	78,750	411,250
Additions	-	17,500		10,500	28,000
Disposal		(15,750)	(1,400)	( 8,750)	(25,900)
Bal/cd 30/09/24	175,000	133,000	24,850	80,500	413,350
Accmdeprn					
Bal/bd 01/10/23	-	50,575	12,775	45,500	108,850
Charged for the year (w1- w4)	4,375	26,600	3,780	21,000	55,755
Disposal		(1,750)	(350)	(875)	( 2,975)
C/d 30/09/24	4,375	75,425	16,205	65,625	161,630
Carrying amount					
Sept 30,2024	170,625	57,575	8,645	14,875	251,720
Oct 1, 2023	175,000	80,675	13,475	33,250	302,400

**Workings**

**W1- Depreciation charged on property:**

$$\text{₦175m} \times 2.5\% = \text{₦4,375,000}$$

**W2 - Plant and Equipment:**

$$\text{Old (₦131.25m} - \text{₦15.75m)} \times 20\% = \text{₦23,100,000}$$

$$\text{New (₦17.5m} \times 20\% \times 1) = \text{₦3,500,000}$$

$$\text{Total} \quad \text{₦26,600,000}$$

**W3- Tractors and farm implements:**

$$\text{Old (₦26.25m} - \text{₦1.4m)} \times 15\% = \text{₦3,727,500}$$

$$\text{New (₦1.4m} \times 15\% \times 3/12) = \text{₦52,500}$$

$$\text{Total} \quad \text{₦3,780,000}$$

**W4- Motor vehicle:**

$$\text{Old (₦78.75m} - \text{₦8.75m)} \times 25\% = \text{₦17,500,000}$$

$$\text{New ₦10.5m} \times 25\% \times 6/12 = \text{₦1,312,500}$$

$$\text{Disposal ₦8.75m} \times 25\% = \text{₦2,187,500}$$

$$\text{Total} \quad \text{₦21,000,000}$$

## **Examiner's comment**

The question is of two parts a and b

Part a tested candidates understanding of accounting policies and accounting standards. Very poor understanding of these accounting topics was observed.

Most of the candidates did not know the difference between the two.

Part b was preparation of non-current assets movements schedule. Most of the candidates that attempted the question performed very well.

## **SOLUTION 2**

- (a) i. The conceptual framework helps accountants identify, evaluate, and address threats to compliance with the fundamental principles. It ensures professional judgment is applied consistently. Rather than providing a list of rules, it guides accountant to apply fundamental principles to various situations, using professional judgement to determine the appropriate course of action when threats arises.
- ii. **Integrity** relates to honesty and fairness in all dealings.  
**Professional Behaviour** involves complying with laws and avoiding any conduct that brings disrepute to the profession.
- (b) i. Integrity: Being honest and truthful. Example: Reporting actual expenses in a financial report without manipulation.
- ii. Objectivity: Avoiding bias or conflict of interest. Example: Not allowing personal relationships to influence auditing decisions.
- iii. Professional Competence and Due Care: Maintaining skill levels through ongoing education. Example: Attending updates on new tax laws.
- iv. Confidentiality: Not disclosing information without authority. Example: Not revealing a client's business plan to competitors.
- v. Professional Behaviour: Complying with laws and avoiding discreditable acts. Example: Refusing to engage in fraudulent tax filings.
- (c) i. Ethical Principles Threatened:  
Integrity: Being asked to conceal information.  
Objectivity: Pressure from the partner may impair your judgment.  
Professional Behaviour: Allowing misleading financial statements damages public trust.
- ii. Actions to Take:
- Document the findings and your concerns formally.
  - Discuss the issue with the firm's ethics officer or senior partner.

- If internal avenues fail, consider whistleblowing in line with professional guidance.
- Refuse to be associated with the false statements.

### Examiner's comment

The question is of 3 parts a, b, c. The question is centred on Conceptual Framework in Ethics, and Fundamental Principles of the Professional Code of Ethics.

Some of them got the five fundamental principles of the Professional Code of Ethics correctly, but their major pitfall was differentiating between integrity and professional behaviour.

Performance was good as about 84% of the candidates that attempted the question scored above 45% of the allocated marks.

### SOLUTION 3

a. **EXCELLENT CULTURAL**

**Bar Supplies Account**

	N'000		N'000
Bank	150	Bal b/f	58
Balance c/d	<u>68</u>	Bar expenses (P or L)	<u>160</u>
	<u>218</u>	Balance b/d	<u>68</u>

b. **Bar Expense Account**

	N'000		N'000
Bar attendance wages	25	Bar account	42
Bar expenses	<u>17</u>		<u>42</u>
	<u>42</u>		

c. **Subscription Account**

	N'000		N'000
Bal b/f	11	Cash received 2023	55
Bar Account (Bal fig)	304	2024	247
Bal c/d 2025 - Advance	<u>16</u>	2025	16
	<u>331</u>	Balance c/d	<u>13</u>
Balance b/d	13	Balance b/d	<u>331</u>
			16

d.		Bar Account	
	<b>₦'000</b>		<b>₦'000</b>
Opening Inventory	9.9	Sales/Taking	550.0
Purchases	160		
Closing Inventory	<u>(10.5)</u>		
Cost of goods sold	159.4		
Gross Profit c/d	<u>390.60</u>		
	<u>550.0</u>		<u>550.0</u>
Expense		Gross profit b/d	390.6
Bar expense	42.0		
Bar net profit	<u>348.6</u>		
	<u>390.0</u>		<u>390.6</u>

e.		Life Membership Fee Account	
	<b>₦'000</b>		<b>₦'000</b>
Opening Inventory	7	Sales/Taking	70
Purchases	<u>63</u>		
Closing Inventory	<u>70</u>		<u>70</u>

#### **SOLUTION 4**

- a. i. Total debts to shareholders fund  
 $(2,000,000 + 6,945,000) \div \text{₦}19,510,000 : 1 = 0.46:1$
- ii. Return on total asset (PBIT / Total Assets)

<b>Total Assets</b>	
Equity	9,510
Loan notes	2,000
Current Liabilities	<u>6,945</u>
<b>Total Assets</b>	<u>28,455</u>
ROTA (EBIT/Total Asset)	10.9%

- iii. Return on Shareholders Equity (PATOSH/Equity)

<b>Total Debt to Shareholders Fund</b>	LS'000	LS'000
Ordinary shares		10,000
Retained earnings		1,605
General reserve		<u>2,905</u>
<b>Total Shareholders Equity</b>		<u>14,510</u>
Return on Ordinary Shares (PATOSH/Total Shareholders Equity)		12.7%

or

This can as well be interpreted as Earnings Per Share

PATOSH	1,850
Ordinary Shares Outstanding (Assume NGN1 nominal price)	10,000
Return on Ordinary Shares (PATOSH/ordinary shares outstanding)	18.5%

- b. The company's debt to shareholders fund ratio of 0.46:1 shows that it uses very little debt and is financed mainly by equity, which keeps financial risk low.

There return on total assets of 10.9% indicates that the company is using its assets efficiently to generate profits.

There return on shareholders equity, between 12.7% and 18.5%, shows strong profitability and good value creation for the owners.

### Workings

- i. Shareholders fund:  $\text{N}10,000,000 + \text{N}5,000,000 + \text{N}2,905,000 + \text{N}1,605,000 = \text{N}19,510,000$
- ii. Net profit:  $\text{N}35,000,000 - (\text{N}26,000,000 + \text{N}6,000,000) = \text{N}3,000,000$
- iii. Interest on loan Notes:  $5\% \times \text{N}2,000,000 = \text{N}100,000$
- iv. Total assets:  
 $\text{N}10,000,000 + \text{N}5,000,000 + 2,905,000 + 6,945,000 + \text{N}1,605,000 + \text{N}2,000 = \text{N}28,455,000$
- v. Tax on net profit:  $30\% \times \text{N}2,650,000 = \text{N}795,000$
- vi. Preference shares dividend:  $5\% \times \text{N}5,000,000 = \text{N}250,000$
- vii. Ordinary shareholders fund at the beginning of the year:  
 $\text{N}10,000,000 + \text{N}2,905,000 + \text{N}700,000 = \text{N}13,605,000$

### Examiner's comment

The question is on ratio analysis. Many candidates ran away from the question and the performance of the few that attempted it was below average. One of their major pitfalls was the calculation of shareholders' fund and calculation of return of the company.

It was clear that the candidates were not good in financial accounting ratios.

### SOLUTION 5

- (a) Components of financial statements and their purpose
- i. **Statement of financial position**  
**Purpose:** Shows the financial position of a company at a specific point in time by presenting its assets, liabilities, and equity. It helps stakeholders understand what the company owns and owes.
  - ii. **Profit or loss statement)**  
**Purpose:** Reports the company's financial performance over a period by summarising revenues, expenses, gains, and losses to show profit or loss.

- iii. **Statement of cashflows**  
**Purpose:** Provides information about cash inflows and outflows during a period, classified into operating, investing, and financing activities, to help assess liquidity and cash management.
  - iv. **Statement of changes in equity**  
**Purpose:** Explains changes in shareholders' equity during the reporting period, including profits retained, dividends paid, issuance or repurchase of shares, and other equity movements.
  - v. **Notes to the financial statements**  
**Purpose:** Provide additional explanations, details, and disclosures regarding the figures in the financial statements, including accounting policies, contingencies, and breakdowns, to enhance transparency and understanding.
- (b)
- i. Share capital
  - ii. Share premium
  - iii. Retained earnings
  - iv. Revenue reserve
  - v. Revaluation reserve
  - vi. Other components of equity

### **Examiner's comment**

The question is of two parts a and b, listing components of the financial statements and items included in statement of changes in equity respectively. Many candidates attempted the question, but some of them got it completely wrong.

The few that understands the question performed well.

### **SOLUTION 6**

(a) **Explain the term Artificial Intelligence (AI)**

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by computer systems. It involves the development of algorithms and systems that enable machines to perform tasks that would ordinarily require human intelligence. These tasks include learning (acquiring information and rules), reasoning (using rules to reach conclusions), problem-solving, perception (interpreting sensory input such as images and speech), and language understanding.

AI systems are designed to analyse large volumes of data, identify patterns, make decisions with minimal human intervention, and continuously improve their performance through experience – a subset known as Machine Learning.

(b) **Main branches of AI**

The main branches of AI are as follows:

- i. **Machine Learning:** Algorithms that enable computer to learn and make predictions based on data
- ii. **Robotics:** Designing and building robots that can perform tasks autonomously or semi – autonomously.
- iii. **Natural Language Processing:** The interaction between computers and humans through natural language.
- iv. **Computer Vision:** Enabling computers to interpret and make decisions based on visual data.
- v. **Speech Recognition:** Converting spoken language text
- vi. **Planning and Scheduling:** Algorithms for planning and optimising tasks and resources
- vii. **Expert system:** AI programs that simulate the decision-making ability of a human expert in a specific domain, using a knowledge base and inference rules (e.g. medical diagnosis systems).

(c) **Discuss THREE applications of AI in finance and accounts**

S/N	Branch	Description
1	Fraud Detection & Prevention	AI algorithms analyse transaction patterns in real time to identify unusual or suspicious activity that may indicate fraud. Machine learning models are trained on historical fraud data to flag anomalies, significantly reducing financial losses for banks and businesses. Examples include credit card fraud detection systems used by banks.
2	Automated Bookkeeping & Accounting	AI-powered accounting software (e.g. Xero, QuickBooks AI features) can automatically categorise transactions, reconcile accounts, generate invoices, and prepare financial reports with minimal human input. This improves accuracy, saves time, and allows accountants to focus on higher-value analytical work.
3	Financial Forecasting & Risk Assessment	AI models analyse historical financial data, market trends, and economic indicators to generate accurate financial forecasts and assess credit/investment risks. Banks use AI for loan default prediction; companies use it for budgeting and scenario planning. This improves decision-making quality and reduces uncertainty.

**Examiner's comment**

The question tested candidates' knowledge of Artificial Intelligence (AI), while many of the candidates could define AI, they did not understand its branches and this was the major pitfall.

They were able to discuss application of AI in finance and accounts.

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA****ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
MARCH 2026 EXAMINATIONS (PART II)****PUBLIC SECTOR ACCOUNTING**

**PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER**

**EXAMINATION INSTRUCTIONS**

1. All solutions should be in **blue** or **black** ink. Any solution in pencil will not be marked.
2. Read all instructions on each part of the paper carefully before answering the questions.
3. Ensure that you do not answer more than the number of questions required for **Section B (The Essay Section)**.
4. Check your pockets, purse and mathematical sets, etc, to ensure that you do not have prohibited items such as telephone handset, electronic storage device, wrist watches, programmable devices or any form of written material on or around you in the examination hall. You will be stopped from continuing with the examination and liable to further disciplinary actions including cancellation of examination result if caught.
5. Do not enter the hall with anything written on your docket.
6. Insert your examination number in the space provided above.

**WEDNESDAY, MARCH 25, 2026**

**DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO**

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA  
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
PART II EXAMINATIONS – MARCH 2026**

**PUBLIC SECTOR ACCOUNTING**

**Time Allowed: 3 hours**

**SECTION A: PART I          MULTIPLE CHOICE QUESTIONS          (30 MARKS)**

**ATTEMPT ALL QUESTIONS IN THIS SECTION**

**Write ONLY the alphabet (A, B, C, D or E) that corresponds to the correct option in each of the following questions/statements.**

1. In accordance with the Procurement Act 2007, procurements of goods and works by all procuring entities shall be conducted by
  - A. closed competitive bidding
  - B. private competitive bidding
  - C. closed market bidding
  - D. open competitive bidding
  - E. open market bidding
  
2. The document that the Supplies Division of every ministry or extra-ministerial office and other arms of government should maintain to ensure that all imported allocated inventories are paid for is called
  - A. import payment voucher
  - B. stores receipt voucher
  - C. stores purchase voucher
  - D. bills/Invoice control voucher
  - E. import bill voucher
  
3. The standard formula used to arrive at a balance between holding too much or too little inventory is referred to as
  - A. re-order level
  - B. economic order quantity
  - C. re-order lead-time
  - D. fixed quantity
  - E. maximum and minimum levels

4. Which of the following is **NOT** an outflow from Consolidated Revenue Fund (CRF)?
- A. Transfer to contingency fund
  - B. Consolidated revenue fund charges
  - C. Non-recurrent expenditure
  - D. Transfer to development fund
  - E. Redemption of treasury bills
5. Which of the following is **NOT** a function of the Budget Office of the Federation?
- A. Developing reasoned economic assumptions and forecast
  - B. Issuing budget guidelines to ministries and extra-ministerial departments
  - C. Compiling total revenue and expenditure estimates
  - D. Determining the amount to be included in the estimates submitted and ratified by the National Assembly
  - E. Drafting the budget speech
6. Which of the following is **NOT** a payment voucher?
- A. Payroll Summary Voucher (TF 211)
  - B. Recurrent Expenditure Voucher (TF 1)
  - C. Last Payment Certificate (TF 13)
  - D. Treasury Receipt Booklet (TF 6)
  - E. Capital Payment Voucher (TF 27)
7. Which of the following taxable and non-taxable revenues is **NOT** a source of federation accounts?
- A. Pay as you earn of Armed forces personnel
  - B. Royalties from oil field or well
  - C. Customs and excise duties
  - D. Companies' income tax
  - E. Stamp duties
8. Which of the following is **NOT** a source of government revenue?
- A. Statutory Allocation
  - B. Consolidated Revenue Fund (CRF) charges - Pensions and Gratuities
  - C. Aid & Grants
  - D. Capital Receipts
  - E. Value Added Tax

9. Which of the following officer is **NOT** in the Executive Arm of the Local Government Council?
- A. Executive Chairman
  - B. Secretary to the local government
  - C. Treasurer
  - D. Supervisor
  - E. Councillor
10. In line with IPSAS 33, the acronym or mnemonic PSE means
- A. Public sector entity
  - B. Public sector enterprise
  - C. Private sector entity
  - D. Private sector enterprise
  - E. Public service entity
11. The account with a created list of codes, which can be represented by numeric, alphabetic, or alphanumeric symbols for the purposes of tracking, managing and reporting budgetary and accounting items in an orderly, efficient and transparent manner is known as
- A. national Chart of Accounts
  - B. transcripts
  - C. departmental expenditure vote book
  - D. financial reporting format
  - E. organisation code of conduct
12. Which of the following is **NOT** a function of the Risk Management Standing Committee of Pension Fund Administration?
- A. To determine the risk profile of the investing portfolios of the pension fund administrator
  - B. Draw up programmes of adjustments in the case of deviation
  - C. Determine the level of reserves to cover the risk of the investment portfolios
  - D. Determine an optimal investment mix consistent with risk profile agreed by the board of the pension fund administration
  - E. Advise the pension fund Administrators in maintaining adequate internal control measures and procedures

13. The Accountant-General of the Federation and the Federal Capital Territory (FCT) treasury shall make payments of retirement benefits of employees exempted from the new Pension Reform Act 2014- S 5 (1)(b) directly into individual bank accounts and details of such payment shall be submitted to ..... and ..... of the federation and Federal Capital Territory established under sections 42 and 44 of this Act respectively.
- A. the Commission and the Pension Transitional Arrangements Directorate
  - B. the Commissioner and Pension Fund Directorate
  - C. Civil Service Commission and Budgetary Control Directorate
  - D. Permanent Secretary and Auditor General Office
  - E. President and Central Bank of Nigeria
14. Mechanism for dispute resolution where any employee or beneficiary of a retirement savings account is dissatisfied with a decision of the Pension Fund Administrator or Custodian includes the following, **EXCEPT**
- A. may request, in writing, that the Pension Fund Commission should review such a decision
  - B. may show dissatisfaction through letter of petition
  - C. may take the matter to the court of law
  - D. may carry the matter to the federal executive council
  - E. may request, in writing, that the Pension Fund Commission be summoned to court
15. The annual budget of the federal government must be accompanied by the following:
- i. copy of the underlying revenue and expenditure profile for the next next two years
  - ii. A copy of the cash flow statement
  - iii. A fiscal target broken down into monthly collection targets
- A. i and ii only
  - B. iii only
  - C. i and iii only
  - D. i, ii and iii
  - E. ii only

16. According to the IPSAS 1 - Presentation of Financial Statements, which of the following information should **NOT** be presented on the face of the Statement of Financial Position?
- A. Investment property
  - B. Intangible assets
  - C. Property, plant and equipment
  - D. Auditor general report
  - E. Inventories
17. With reference to IPSAS 2 - Statement of Cash Flow, which of the following is **NOT** part of cash flow from operating activities?
- A. Cash receipt from sale of goods and provision of services rendered by the entity
  - B. Cash payment to suppliers for goods and services provided
  - C. Cash payments to other public entities
  - D. Cash receipt from taxes, levies and fines
  - E. Cash receipt from rent of government properties
18. Which of the following is **NOT** a way the efficiency unit will execute its mandate?
- A. Reviewing the government spending pattern using data from the budget implementation report and other sources
  - B. Agree changes or process improvement to reduce wastage and make savings
  - C. Promoting a change in the culture of public spending by MDAs to one of prudence and savings
  - D. Collaborate with federal and state government to make changes in constitution
  - E. Identifying and migrating best practices in the public sector spending patterns and processes of the countries to Nigeria
19. In the public sector entities, financial ratios can be broadly classified into the following, **EXCEPT**
- A. Liquidity ratio
  - B. Solvency ratio
  - C. Management ratio
  - D. Profitability ratio
  - E. Efficiency ratio

20. The Chairman of Independent Corrupt Practices Commission (ICPC) shall hold office on aggregate when reappointed for a maximum of
- A. 2 years
  - B. 4 years
  - C. 10 years
  - D. 6 years
  - E. 3 years
21. Which of the following is an advantage of using Accounting Rate of Return to evaluate investment/project?
- A. It takes into consideration time value of money
  - B. It caters for risk and uncertainty
  - C. It considers profit of the project throughout the lifetime of the project
  - D. It uses cash flows rather than accounting profits
  - E. It ignores the fact that profits from different projects may accrue at an uneven rate
22. Which of the following is the auditor **NOT** expected to consider in determining the use of an expert?
- A. The engagement team's knowledge and previous experience of the matter being considered
  - B. The risk of material misstatement based on the nature, complexity and materiality of the matter being considered
  - C. The quantity and quality of other audit evidence expected to be obtained
  - D. Evaluate the professional competence of the expert; and
  - E. Ignore objectivity of the experts which may be impaired if the expert is employed by the auditee or related to the auditee
23. The accounting standards applicable to Government Business Enterprises (GBEs) is
- A. IPSAS
  - B. IAS
  - C. FIRS
  - D. SIRS
  - E. IFRS

24. Which of the following is an MDA that is **NOT** funded by the budget, but it is expected to pay 25% of its operating surplus of gross earnings to Consolidated Revenue Fund (CRF)?
- A. FAAN
  - B. NASRDA
  - C. NTA
  - D. SURE-P
  - E. NYSC
25. The disadvantages of payback period includes the following, **EXCEPT**
- A. it does not consider the time value of money
  - B. it ignores variations in the timing of cash inflows within the pay-back period
  - C. it is based on liquidity
  - D. cash inflows outside the payback period are ignored
  - E. it does not take into consideration risks and uncertainties
26. Which of the following is **NOT** a user of the National Chart of Account (NCOA)?
- A. Finance/Accounts officer in Ministries, Departments and Agencies (MDAs)
  - B. Legislators and other political leaders
  - C. Donors and other development partners
  - D. Budget/Planning Officers in Ministries, Departments and Agencies (MDAs)
  - E. Federated Agro-Allied Business Plc
27. Ensuring that cash tank or Safe with double control keys is one of the features of
- A. finance and reconciliation office
  - B. store office
  - C. cash office
  - D. personnel office
  - E. close Circuit office
28. Which of these is **NOT** a cash control measure adopted in the ministries and parastatals?
- A. Daily banking of all cash limits
  - B. Periodic surprise cash count (cash survey)
  - C. Investment of idle funds
  - D. Balancing of cash book
  - E. Non establishment of cash limits

29. The difference between the bank statement balance and that of the cash book may be ascribed to
- i. bank charges
  - ii. errors in posting
  - iii. standing orders given to the bank
  - iv. credit transfer
- A. i and iii Only
  - B. ii and iv Only
  - C. i, ii, iii and iv
  - D. i Only
  - E. ii and iii
30. The statement of changes in net assets available for Benefits shall present opening and closing balances and include line items that present the following, **EXCEPT**
- A. investment income
  - B. transfers from and to other plans
  - C. participants contribution
  - D. other expenses
  - E. other income

**SECTION A: PART II                      SHORT ANSWER QUESTIONS                      (20 MARKS)**

**ATTEMPT ALL QUESTIONS**

**Write the correct answer that best completes each of the following questions/statements.**

1. .... are activities that result in changes in the size and composition of the contributed capital and borrowings of an entity.
2. The ..... department in the office of Accountant General of the Federation manages the federation accounts, the consolidated revenue and other public funds.
3. The Commission that is responsible to compel any person or government institution to disclose Information relating to public revenue and expenditure is known as .....

4. The Body that has the power to prosecute directly without recourse to the Attorney General of the Federation's office is .....
5. The rates of contributions to the pension scheme by the military are .....and .....
6. The International Accounting Standard Committee (IASC) was re-organised and named to become an independent international standard setter by .....
7. An amount of cash advanced to government officers to meet up with urgent expenditure which is provided for in the budget but which vouchers cannot be prepared and presented immediately to the sub-accounting officer for payment is .....
8. The International Federation of Accountants (IFAC) was founded in the year .....
9. A guarantee in an amount not less than 10% of the contract value or an amount equivalent to the mobilisation fee requested by the supplier or contractor is called .....
10. IPSAS 12 does **NOT** apply for the measurement of inventories of ..... and .....
11. The office of the Accountant-General of the Federation is an ..... agency under the Ministry of Finance.
12. Specific principles, bases, conventions, rules and practices adopted by an entity in preparing and presenting financial statements is referred to as .....
13. National Chart of Accounts is prepared primarily for the implementation of uniform accounting system that is IPSAS compliant. (True or False)
14. Organisations with less than three employees as well as self-employed persons shall **NOT** be entitled to participate under the Pension Reform Act 2014 in accordance with guidelines issued by the Commission. (True or False)
15. MTEF is a medium-term high level strategic plan of the government, usually prepared for a minimum of ..... in Nigeria.
16. Confirmation for appointment and removal of the Auditor-General for the Federation is carried out by .....
17. Budget and budgetary control process and procedure at the local government finance is one of the measures of .....

18. The ..... is incurred for the provision and maintenance of public infrastructural amenities include road and bridge construction and administrative building contained.
19. .... is the documentary evidence of payment or receipt of money which is available for future reference, accounting and auditing purposes.
20. The government agency or organisation solely responsible for the management of Consolidated Revenue Funds Account is .....

**SECTION B:                      ATTEMPT ANY FOUR QUESTIONS                      (50 MARKS)**

**QUESTION 1**

- (a) Budgeting in government is made up of the procedure of budgeting, which consists of the practices, documentations, and norms, which govern the preparation, approval, implementation, and review of the budget.

You are supplied with the information below from the Ministry of Local Government and Chieftaincy Affairs that occurred in 2023

<b>ACTUAL EXPENDITURE</b>	<b>L\$'000</b>
Stationery	60,000
Fuel Consumption	25,000
Motor Vehicle Maintenance	10,000
Traveling & Transport	25,000
Hotel Accommodation	50,000
Others	60,000

The inflation factor is 20%.

**You are required to:**

Using the traditional or line items budgeting system, prepare the overhead cost budget of the Ministry for the relevant year. (8½ Marks)

- (b) A budget is normally prepared for one year. It is therefore a short-term plan. One of the primary objectives of budget is to measure the performance of an organisation.

**Required:**

State **four** uses of budgets.

(4 Marks)

**(Total 12½ Marks)**

## QUESTION 2

The Financial Memoranda for local government is a publication by the federal government which contains the administrative guidelines, the existing systems of checks and balances, as well as the roles of all the officers from the Chief Accounting Officer, the Chairman, to the officer at the lowest cadre.

### Required:

- a. State **FOUR** objectives of Financial Memorandum. (4 Marks)
  - b. State **SIX** contents of Local Government Financial Memorandum. (6 Marks)
  - c. State **FIVE** objectives of Financial Regulation. (2½ Marks)
- (Total 12½ Marks)**

## QUESTION 3

Adigbo State of Ewa extracted the following information from the treasury final accounts for the year ended December 31, 2024.

	<b>2024</b>	<b>2023</b>
	<b>₦'m</b>	<b>₦'m</b>
Tax Collected	1,313	1,150
Grant from federal Government	875	675
Revenue from Services	987	750
Interest received on fixed deposit	982	759
Rent received from government property	821	525
Proceed from sale of treasury bills	639	495
Proceed from sale of bonds	789	653
Purchase of equipment	700	650
Employee cost	1,450	1,210
Pension cost	350	290
Material supplies	150	120
Interest paid on loan	101	89
Other administrative expenses	301	207
Purchase of foreign currency	315	301
Proceed from sale of equipment	115	100
Loan received	340	240
Repayment of loan	140	120
Opening cash book balance January 1	4,375	2,015
Closing cash book balance December 31	7,729	4,375

**You are required to:**

Prepare cash flow statement for the state for the year ended December 31, 2024 using direct method. **(Show comparisons)** **(Total 12½ Marks)**

**QUESTION 4**

- (a) i. Define 'Public Properties'. (½ Mark)
- ii. Identify **FOUR** ways by which Public Properties can be created or acquired. (6 Marks)
- (b) In setting up of federal corporations, state **THREE** provisions of the laws relating to the audit of government enterprises. (6 Marks)
- (Total 12½ Marks)**

**QUESTION 5**

As part of the Federal Government of Nigeria reforms in 2004 in ensuring effective Public Financial Management, the government introduced the Treasury Single Account (TSA).

**You are required to:**

- a. Explain the Treasury Single Account (TSA). (2½ Marks)
- b. State **FIVE** objectives of the Treasury Single Account. (5 Marks)
- c. State **FIVE** roles of the office of the Accountant General of the Federation in implementing the Treasury Single Account (TSA). (5 Marks)
- (Total 12½ Marks)**

**QUESTION 6**

You are among the Associate Accounting Technicians (AAT) newly promoted to the rank of Principal Accountant in your organisation. The Director of Finance and Accounts has invited you to a workshop to present a lecture on the theme:

“Voucher as a tool for accounting information”. As part of your prepared lecture note for the workshop, **you are required to:**

- a. State **EIGHT** properties of a valid voucher as a tool for Accounting Information. (8 Marks)
- b. State **THREE** objectives of a valid voucher. (4½ Marks)
- (Total 12½ Marks)**

## **SECTION A: PART I**

### **MULTIPLE CHOICE SOLUTIONS**

1. D
2. D
3. B
4. E
5. D
6. D
7. A
8. B
9. E
10. A
11. A
12. D
13. A
14. D
15. C
16. D
17. E
18. D
19. D
20. C
21. C
22. E
23. E
24. A
25. C
26. E
27. C
28. E
29. C
30. D

#### **Examiner's comment**

This is a 30 marks Multiple Choice Questions, which requires that candidates write only the alphabet that corresponds to the correct options of the questions.

Most of the areas of the syllabus were covered.

All the candidates attempted the questions. Performance was good as more than 60% of the candidates scored more than 50% of the allocated marks. The commonest pitfalls of the candidates were their lack of preparation for the examination.

Candidates are advised to prepare adequately by ensuring they cover all the aspect of the syllabus. They are also advised to familiarize themselves with the Institute's Study Text.

## **SECTION A: PART II**

### **SHORT ANSWER SOLUTIONS**

1. Financing activities
2. Federation Accounts
3. Fiscal Responsibility Commission
4. EFCC / ICPC / NPF / NDLEA / NAAPTIP / Code of Conduct Bureau (CCB) (Any one point)
5. 12.5% of the basic salary and allowances by the government and 8% of the basic salary and allowances by the military staff
6. the International Accounting Standards Board (IASB)
7. Imprest
8. 1977
9. Performance bond / Bank guarantee
10. (a) Agricultural or forest products/Biological Assets  
(b) Commodity broker-traders  
(c) Mineral Resources  
(d) WIP of construction contract  
(e) Financial Instrument
11. Extra-ministerial agency
12. Accounting Policies
13. True
14. True
15. Three years
16. Senate
17. Internal control system
18. Capital expenditure or payments
19. Voucher
20. Office of the Accountant – General of the Federation

### Examiner's comment

This is a 20 marks Short Answer Questions that requires the candidates to write the correct answer that best completes each of the questions. Most of the areas of the syllabus were covered in the question.

All the candidates attempted the questions, and only about 40% of them scored above 50% of the total marks allocated.

The commonest pitfalls of the candidates was their poor understanding of the requirements of the examiner due to the inadequate preparation by some of them. Candidates are advised to cover every aspects of the syllabus. And they should also make use of the Institute's Study Text for future examinations.

## SECTION B

### SOLUTION 1

#### (a) Ministry of Local Government & Chieftaincy Affairs

##### Overhead Cost Budget for the year 2024 fiscal year

Description	Year 2023 Actual	Inflation Factor 20% L\$=000	=L\$=	Year 2024 Estimate
Stationery	60,000,000	60,000 x 20%	12,000,000	72,000,000
Fuel Consumption	25,000,000	25,000 x 20%	5,000,000	30,000,000
Motor Vehicle Maintenance	10,000,000	10,000 x 20%	2,000,000	12,000,000
Traveling & Transport	25,000,000	25,000 x 20%	5,000,000	30,000,000
Hotel Accommodation	50,000,000	50,000 x 20%	10,000,000	60,000,000
Others	60,000,000	60,000 x 20%	12,000,000	72,000,000
<b>TOTAL</b>	<b>230,000,000</b>		<b>46,000,000</b>	<b>276,000,000</b>

#### (b) USES OF GOVERNMENT BUDGETS

- i. **Planning:** Outlining goals and resource allocation for the upcoming year.
- ii. **Control:** Providing a benchmark to compare actual spending against planned spending.
- iii. **Communication:** Informing different departments of the government's priorities.
- iv. **Authorisation:** Serving as the legal authority to spend public funds.

- v. **Motivation:** A budget is a target to be achieved. The government motivates staff through promotions and improved conditions of service to assist in the full and successful implementation of the budget.
- vi. **Standard for measurement of performance:** Since a budget is a target, it is a measure of performance. What is achieved is recorded and compared with the set performance target. The process of implementation draws management attention to problem areas.
- vii. **Evaluation of economic and social policy:** Budgets are used to solve the social problems of inflation and unemployment.
- viii. **Cost reduction technique:** Evaluation of operations and procedures may result in cost savings.

### **Examiner's comment**

The question tests the candidates' knowledge and understanding on Budgeting in government. It requires the candidates, using the traditional or line items budgeting system, to prepare the overhead cost budget from given information. In the "b" part, it requires candidates to state uses of budgets.

About 80% of the candidates attempted the question. And about 60% of them scored above 50% of total marks obtainable.

The commonest pitfalls of the candidates were the lack of adequate preparation for the examination by some of them.

Candidates are advised to ensure that they cover every area of the syllabus. They should familiarise themselves with the past questions of previous diets examination and make use of the Institute's Study Text.

### **SOLUTION 2**

(a) **The objectives of the Local Financial Memoranda as follows:**

- i. To expressly highlight the implications of disbursing government fund and property without proper authority and approval;
- ii. To serve as administrative guidelines which facilitate day-to-day running of local governments;
- iii. To facilitate recording of local government financial transactions using the appropriate accounting method;
- iv. To serve as a learning tool for officers on first appointment or on transfer to a new section;

- v. To enhance coordination among local government departments, agencies, and other stakeholders; and
- vi. To ensure standardise processes and procedures across local government departments and agencies.

**(b) The contents of Local Government Financial Memoranda**

- i. The format of budget and budgetary control;
- ii. The financial responsibilities of the Chairman and other accounting officers of a local government;
- iii. The responsibilities of the local government Secretary, Treasurer and Heads of Departments;
- iv. The powers and functions of the Auditor General for Local Government;
- v. The various financial offences and their respective sanctions;
- vi. The means of revenue collection and control;
- vii. Main books of accounts kept in the local government; and
- viii. The custody, accounting and control of stores.

**(c) Objectives of Financial Regulations**

- i. To guide the day – to- day financial operation of government MDAs.
- ii. To ensure appropriate system of information flow from management to finance and accounts staff.
- iii. To ensure prudence in carrying out government business.
- iv. To provide common standard, procedures and guides by which auditors and treasury inspectors can ascertain that ministries are able to control and maintain up to date records of financial transactions.
- v. To promote fiscal accountability, management accountability and programme result accountability in government financial management and control.
- vi. To safeguard consumers' interests and prevent unfair practices.
- vii. To encourage competition and innovation in the financial sector.

### Examiner's comment

This question tests the candidate's knowledge and understanding of the Financial Memorandum. It requires the candidates to state the objectives and contents of Local Government Financial Memorandum, as well as to state the objectives of Financial Regulations.

About 68% of the candidates attempted the question and about 35% of them scored above 50% of marks obtainable.

The Commonest pitfall of the candidates was the poor understanding of the requirements of the examiner.

Candidates are advised to cover all areas of the syllabus. They should make adequate use of the Institute's Study Text and familiarize with the previous diets' examination questions.

### SOLUTION 3

#### LADIGBO STATE

	2024	2023
	₦ (M)	₦ (M)
<b>CASH FLOW FROM OPERATING ACTIVITIES</b>		
<b><u>RECEIPT</u></b>		
Tax Collected	1,313	1,150
Revenue from Services	987	750
Grant from federal government	<u>875</u>	<u>675</u>
	<u>3,175</u>	<u>2,575</u>
<b><u>PAYMENTS</u></b>		
Employee Cost	(1,450)	(1,210)
Pension	(350)	(290)
Material Supplies	(150)	(120)
Administrative Expenses	<u>(301)</u>	<u>(207)</u>
	<u>(2,251)</u>	<u>(1,827)</u>
Net Cash Flow from Operating Activities (A)	<u>924</u>	<u>748</u>
<b><u>CASH FLOW FROM INVESTING ACTIVITIES</u></b>		
Interest received on Fixed Deposit	982	759
Rent on government Property	821	525
Proceeds from Sale of Treasury Bill	639	495
Proceeds from Sale of Bonds	789	653
Proceeds from Sale of Equipment	115	100
Purchase of Equipment	<u>(700)</u>	<u>(650)</u>
Net Cash Flow from Investing Activities (B)	<u>2,646</u>	<u>1,882</u>

### **CASH FLOW FROM FINANCING ACTIVITIES**

Loan received	340	240
Loan repaid	(140)	(120)
Purchase of foreign Currency	(315)	(301)
Interest paid on Loan	<u>(101)</u>	<u>(89)</u>
Net Cash Flow from Financing Activities (C)	<u>(216)</u>	<u>(270)</u>
Net increase / (decrease) in cash and cash equivalent (a+b+c)	3,354	2,360
Cash and cash equivalent at the beginning of the year	<u>4,375</u>	<u>2,015</u>
Cash and cash equivalent at the end of the year	<u>7,729</u>	<u>4,375</u>

### **Examiner's comment**

The question tests the candidates' knowledge and understanding of Cashflow Statement. It requires the Candidates to prepare cashflow statement using direct method from a given information.

About 55% of the candidates attempted the question and about 25% of them scored above 50% of marks obtainable.

The Commonest pitfall of the candidates was their wrong interpretation of the requirements of the examiner. Some candidates did not show comparisons of the years involved, while some of them, did not separate into operating, investing or financial activities.

Candidates are enjoined to cover all aspects of the syllabus in future examinations. They should make adequate use of the Institute's Study Text as well as the previous diet's examination questions.

### **SOLUTION 4**

(a)i Public properties are those that are not privately owned and operated but are created, administered and financed by the government using tax payers' money on behalf of the members of the Public. Their primary objective is the provision of services rather than profit – making and control lies in the hands of the Public through government agencies.

#### **ii Ways by which Public Properties can be created**

##### **1. Construction by the Government**

The government builds assets such as roads, bridges, schools, hospitals, and public offices using public funds.

##### **2. Purchase from the Private Sector**

The government buys land, buildings, vehicles, equipment, or other assets needed for public service delivery.

3. **Donation or Gifts**  
Individuals, NGOs, corporations, or international bodies donate assets to the government (e.g., donated medical equipment, land for schools).
4. **Transfer from Other Government Entities**  
Assets may be transferred between ministries, departments, agencies, or tiers of government (e.g., federal to state).
5. **Acquisition through Legislation**  
Government acquires property by passing laws that vest ownership in the state (e.g., nationalisation of utilities).
6. **Acquisition by Compulsory Purchase (Eminent Domain)**  
Government acquires private property for public use after paying compensation (e.g., land for highways).
7. **Public-Private Partnership (PPP) Arrangements**  
Assets created under BOT, BOOT, or concession agreements eventually revert to government ownership.

(b) **AUDIT OF GOVERNMENT ENTERPRISES**

**The laws setting up most of the federal corporations state that:**

- i. An internal audit department should be established. The department should audit the corporation and copies of reports forwarded to the Auditor General for the Federation, for information only;
- ii. The annual accounts of the corporations must be audited by an external auditor;
- iii. Section 85(3) of the constitution states that the Auditor-General shall provide such bodies with;
  - A list of auditors to be appointed by them as external auditors and from which the bodies shall appoint their external auditors
  - Guidelines on the level of fees to be paid to external auditors; and
  - Comment on their annual accounts and auditor's reports thereon.

- iv. According to section 85 (125) sub-section 3(b) the Auditor-General has the power to comment on the annual accounts and external auditor's reports thereon and report to the legislature.
- v. Furthermore, Section 85 (125) sub-section 4 gives the Auditor General the power to conduct periodic checks of all government statutory corporations, commissions, authorities, agencies, including all persons and bodies establish by an Act of the National (State) Assembly.

### **Examiner's comment**

The question is in two parts, the "a" part tests the candidates' knowledge and understanding of public properties. It requires candidates to define public properties and to identify ways by which public properties can be created or acquired. While the "b" part required the candidates to state the provisions of the laws relating to the audit of government enterprises

About 60% of the candidates attempted the question and about 25% of them scored above 50% of the allocated marks.

The Commonest pitfall of the candidates was their lack of proper preparation for the examination and not able to cover most sections of the syllabus.

Candidates are enjoined to ensure that they prepare well for subsequent examinations, and endeavour to cover the syllabus. They should make adequate use of the Institute's Study Text.

### **SOLUTION 5**

#### **(a) Definition of Treasury Single Accounting (TSA)**

- i. The Treasury Single Account (TSA) is part of the Public Financial Management (PFM) Reforms approved in 2004.
- ii. The TSA is a bank account or set of linked accounts through which government transacts financial operations.
- iii. It is a unified structure that gives consolidated view of government cash resources with a view to strengthening effective budget implementation, check idle cash balances, make planning easy and allow for effective decision making.

**(b) Objectives of TSA**

- i. Ensuring that sufficient cash is available as and when needed to meet payment commitments;
- ii. Controlling the aggregate of cash flows within fiscal, monetary and legal limits;
- iii. Improving the management of Government's domestic borrowing programmes;
- iv. Enhancing operating efficiency through the provision of high-quality services at minimal costs;
- v. Investing of excess or idle cash;
- vi. Ensuring greater accountability in public expenditure.

**(c) Role of Office of Accountant-General of the Federation**

- i. Ensures effective implementation of e-collection reform.
- ii. Ensures proper monitoring of the e-collection gateway.
- iii. Ensures prompt reconciliation of all collections.
- iv. Provides MDAs with periodic report of collection.
- v. Supports MDAs, banks and payers on the operation of e-collection.
- vi. Ensures regular monitoring of all collections to ensure prompt remittance and accounting for collection.
- vii. Ensures continuous update of e-collection guidelines and processes.
- viii. Abides by the provisions of the MoU with stakeholders.

**Examiner's comment**

The question tests the candidates' knowledge and understanding of the Treasury Single Account (TSA).

It requires that candidates should

- (i) explain TSA
- (ii) state its objectives of the TSA as well as to state the roles of the office of the Accountant General of the federation in implementing the TSA

About 65% of the candidates attempted the question and about 55% of them scored above 50% of total marks obtainable.

The Commonest pitfall of the candidates was the inability of some candidates to correctly interpret the requirements of the examiner.

Candidates are advisable to prepare well in the future examinations and to make proper use of the Institute's Study Text.

## **SOLUTION 6**

### **(a) The properties of a valid voucher as a tool for accounting information**

The Properties or features or characteristic of a valid voucher as a tool for accounting information:

- i. Vouchers shall be made in ink or ballpoint pens or indelible pencils or shall be typewritten. All copies must be legible;
- ii. No erasure of any kind, whether in typescript or manuscript. Use of correcting fluid is not allowed;
- iii. A single thick horizontal line shall be drawn immediately before and immediately after the Naira (N) figure. Where it appears in words, space shall not be allowed  
Date of the voucher was raised, which indicates its life span;
- iv. Classification code or National Chart of Accounts (NCOA) for the capital expenditure;
- v. Payment amount in words;
- vi. Payment amount in figures;
- vii. Voucher number;
- viii. Description of payment for the financial transaction;
- ix. Name and address of payee or beneficiary or supplier or vendor;
- x. Supporting documents, such as:
  - Local purchase orders (LPO),
  - Invoices,
  - Store Receipt Vouchers (SRV),
  - Contract Agreements,
  - Bank Payment Receipt,
  - Management Authorisation and Approval, and
  - Contractor or supplier or vendor official cash /ban receipt
- xi. Authority, such as the signature of the officer controlling expenditure (OCE) and

- xii. The type of warrant (either recurrent or capital warrant) which will release the money or public funds;
- xiii. Signature of the cashier;
- xiv. Signature of the payee;
- xv. Voucher certification, which indicates the following, in a box:
  - Prepared By.....
  - Passed By .....
  - Entered into the vote book By .....
  - Passed by .....
  - Paid By.....
- xvi. Control Number.....
- xvii. Postal Stamp

**(b) Objectives or aims of a valid voucher**

The objectives of a valid voucher as a tool for accounting information include:

- i. Voucher as accounting evidence for receipt or payment for the financial transactions.
- ii. Voucher serves as future reference for receipt or payment for the financial transactions.
- iii. Voucher serve as control to regulate budget and budgetary activities.
- iv. A well-prepared voucher serves as accounting tool for financial management decision making.
- v. Voucher serve as accounting tool for financial performance evaluation or appraisal.
- vi. A well-prepared voucher serves as accounting tool for financial planning.

**Examiner's comment**

The question tests the candidates' knowledge and understanding of voucher as a tool for accounting information. It requires candidates to state properties of a valid voucher.

About 80% of the candidates attempted the question and about 75% of them scored above 50% of the total mark obtainable.

The Commonest pitfalls of some of the candidates was their poor preparation for the examinations.

Candidates are advised to cover all areas of the syllabus. They should familiarize themselves with the previous diet's past questions and should make adequate use of

the Institute's Study Text as well as other approved reference materials for future examinations of the Institute.

In General Remark, this is to state that the examination is balanced as it spreads across all the areas of the syllabus and the questions are of the standard expected for ATS2 PSA examinations.

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA****ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
MARCH 2026 EXAMINATIONS (PART II)****QUANTITATIVE ANALYSIS**

**PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER**

**EXAMINATION INSTRUCTIONS**

1. All solutions should be in **blue** or **black** ink. Any solution in pencil will not be marked.
2. Read all instructions on each part of the paper carefully before answering the questions.
3. Ensure that you do not answer more than the number of questions required for **Section B (The Essay Section)**.
4. Check your pockets, purse and mathematical sets, etc, to ensure that you do not have prohibited items such as telephone handset, electronic storage device, wrist watches, programmable devices or any form of written material on or around you in the examination hall. You will be stopped from continuing with the examination and liable to further disciplinary actions including cancellation of examination result if caught.
5. Do not enter the hall with anything written on your docket.
6. Insert your examination number in the space provided above.

**WEDNESDAY, MARCH 25, 2026**

**DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO**

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA  
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
PART II EXAMINATIONS – MARCH 2026**

**QUANTITATIVE ANALYSIS**

**Time Allowed: 3 hours**

**SECTION A: PART I                      MULTIPLE CHOICE QUESTIONS                      (30 MARKS)**

**ATTEMPT ALL QUESTIONS IN THIS SECTION**

**Write ONLY the alphabet (A, B, C, D or E) that corresponds to the correct option in each of the following questions/statements:**

1. Categorical data is also KNOWN as .....
- A. Numeric data
- B. Quantitative data
- C. Qualitative data
- D. Continuous data
- E. Discrete data
  
2. The following are examples of secondary data, **EXCEPT**
- A. Political data
- B. Observation data
- C. Financial data
- D. Oil and gas data
- E. Security data
  
3. A frequency polygon can be drawn from a .....
- A. Cumulative frequency curve
- B. Bar chart
- C. Pie chart
- D. Histogram
- E. Multiple bar chart
  
4. Which of the following is **NOT** a measure of partition?
- A. Quartiles
- B. Deciles
- C. Percentiles
- D. Decades
- E. Inter-quantiles
  
5. The variance of the following set of data: 6, 5, 7, 10, 2 is .....
- A. 4.4
- B. 4.8
- C. 5.8
- D. 6.4
- E. 6.8

6. Calculate the Mean Deviation of the following set of data 12, 10, 8, 6, 4.
- Zero (0)
  - 4.5
  - 3.5
  - 2.4
  - 1.5
7. The performances of five Mortgage banks are ranked by **TWO** different biometric bodies: A and B. Their decisions are given in the table below:

Rank A	2	3.5	5	3.5	1
Rank B	1	2	4	5	3

Calculate the rank correlation coefficient for the given data.

- 0.475
  - 0.525
  - 0.675
  - 0.745
  - 0.862
8. Which of the following is **NOT** a method for determining seasonal indices?
- Smoothing
  - Moving average
  - Least squares
  - Simple average
  - The link relative
9. The following table shows the prices in Naira and the quantities of some selected commodities for the years 2023 and 2025. Calculate the Laspeyre Price index, taking 2023 as the base year.

Commodity	2023		2025	
	Price	Quantity	Price	Quantity
W	8	12	15	8
X	6	10	10	4
Y	4	14	5	3

- 60.57%
  - 120.64%
  - 165.09%
  - 198.46%
  - 199.57%
10. Calculate the expected value of rolling a fair six-sided die.
- 0.5
  - 1.5
  - 2.5
  - 3.5
  - 4.5

11. Two events X and Y are said to be independent if and only if
- $P(X \cup Y) = P(X \cap Y) - P(X) - P(Y)$
  - $P(X \cup Y) = P(X^1 \cap Y^1)$
  - $P(X \cup Y) = P(X) + P(Y) - P(X) \times P(Y)$
  - $P(X \cup Y) = P(X) + P(Y) - P(X \cap Y)$
  - $P(X \cap Y) = P(X) + P(Y) + P(X \cup Y)$
12. The maximum probability of the willingness to risk a type I error is called .....
- Test statistic
  - Critical region
  - Confidence Limit
  - Level of significance
  - Residual
13. A seller allows a discount of 20% on a product and still makes a profit of 35%. Calculate the marked price of the product which costs ₦4,500 to the buyer.
- ~~₦3,625~~
  - ~~₦4,625~~
  - ~~₦5,625~~
  - ~~₦6,625~~
  - ~~₦7,625~~
14. Which of the following sets is a Null Set?
- All odd numbers
  - All even numbers
  - The set of integers consists of odd and even numbers
  - All students in ATSWA examination
  - The set of prime numbers divisible by 4
15. A company produces 500 units of a product. Its total fixed cost is GH¢10,000, and its total variable cost is GH¢20,000. Calculate the cost per unit.
- GH¢75
  - GH¢70
  - GH¢65
  - GH¢60
  - GH¢55
16. An annuity paid at the end of each payment period is called .....
- Annuity due
  - Certain annuity
  - Perpetual annuity
  - Ordinary annuity
  - Present annuity

17. The Revenue function of ATED Nig. Ltd. is given as follows:  $R = 1600x - 3x^3$ . Determine the value of  $x$  for maximum revenue.
- 11.33
  - 12.33
  - 13.33
  - 14.33
  - 15.67
18. The marginal revenue function of a manufacturing company is given by  $MR = 150x^2 - 6x - 10$ . Calculate the total revenue if 20 items are manufactured and sold.
- 198,600
  - 298,600
  - 398,600
  - 488,500
  - 549,455
19. The following are relevant to Operations Research, **EXCEPT**
- Estimation of project's cost
  - Risk management
  - Cost benefit analysis
  - Capital rationing
  - Optimal allocation of resources
20. An objective function,  $Z = 3x + 4y$ , subject to Labour and Materials constraints, has the values of  $x$  and  $y$  respectively as 2 and 3. The new objective function  $Z^1 = 4x + 3y$ , has the values  $x=3$  and  $y=4$ , If the material unit is increased by 1, calculate the shadow cost.
- 3
  - 4
  - 6
  - 7
  - 8
21. The amount by which the objective function increases as a result of availability of one unit less or more of the scarce resource is the ..... of binding constraints.
- Binding cost
  - Basic cost
  - Least cost
  - Shadow cost
  - Optimal cost
22. Which of the following is **NOT** associated with ordering cost?
- Administrative cost
  - Transport cost
  - Production set-up cost
  - Physical cost
  - Direct cost of production

23. An activity has the following Earliest Finish Time (EFT), Latest Finish Time (LFT), Earliest Start Time (EST), Latest Start Time (LST) and Duration (D) respectively as 10, 10, 4, 4, and 3. Find the Free Float (FF)?
- 4
  - 3
  - 2
  - 1
  - 0
24. The amount of time by which the duration of an activity can be extended without affecting the time available for succeeding activities or preceding activities, is called .....
- Total float
  - Critical flow
  - Total flow
  - Independent float
  - Free float
25. Which of the following statements is **FALSE** about the usefulness of group replacement approach?
- items have similar failure pattern
  - replacement costs are lower than when done in bulk
  - downtime or failure consequences are not significant
  - a group of identical items are replaced at the same time
  - downtime or failure consequences are significant
26. A classic linear programming technique that focuses on allocating resources to tasks in a way that minimizes overall cost or maximises profit is known as .....
- Sampling method
  - Assignment method
  - Replacement method
  - Least squares method
  - Inventory method
27. The table below shows the cost (L\$) of assignments. Determine the minimum cost (L\$) of carrying out all the assignments, using Hungarian method.

	Accountant			
Salesman	I	II	III	IV
A	15	13	14	17
B	11	12	15	13
C	13	12	10	11
D	15	17	14	16

- 49
- 59
- 69
- 79
- 89

28. The easiest, early, and fastest method of obtaining the initial basic feasible transportation cost in a typical transportation problem is .....
- A. North-West Corner Method
  - B. Simplex Method
  - C. Linear Program Method
  - D. Least cost Method
  - E. Vogel's Approximate Method
29. Which of the following is **NOT** an advantage of simulation?
- A. Simulation is suitable for analysing large and complex real-life problems
  - B. Simulation experiments make use of model not the system itself
  - C. Simulation experiments make use of the real system instead of the model
  - D. Simulation can be used as a pre-test service for situations where new products or policies are to be introduced
  - E. Simulation can also be used for sensitivity analysis on complex systems
30. The method of running simple simulations, using probabilities to assign random number ranges, is called .....
- A. Hungarian method
  - B. Monte-Carlo method
  - C. Linear Programming
  - D. Least squares method
  - E. Inventory method

## ATTEMPT ALL QUESTIONS

Write the correct answer that best completes each of the following questions/statements:

1. A scientific method that concerns data collection, presentation, analysis, interpretation or inferences about data when issues of uncertainties are involved, is called.....
2. The intersection of 'Less than' and 'More than' Ogives gives the value of the .....
3. Coefficient of Variation is defined as the ratio of ..... to ..... expressed as a percentage.
4. Spearman's Rank Correlation Coefficient equals ..... when the ranks are in perfect agreement, while it is ..... when the ranks are in perfect disagreement.
5. The concept of seasonal index is normally considered from the perspective of ..... and ..... models.
6. The following table shows the prices of some selected commodities in Naira for the years 2024 and 2025. Calculate the Simple Average of Relative Price Index (SARPI) taking 2024 as the base year.

Commodities	Price in 2024	Price in 2025
A	60	90
B	40	80
C	50	150

7. Obtain the expected value of the data in the table below:

$x$	0	1	2	3
$p(x)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

8. A one-sided test is a test carried out when the ..... is in one direction.
9. A storekeeper bought 57 used scissors for ₦120,000 and sold each of them at a loss of 5%. The selling price for each of the used scissors is .....
10. Given that  $n(A) = 30, n(B) = 20, n(A \cup B) = 25$ , then  $n(A \cap B)$  is .....
11. A demand is inelastic if  $|\eta|$  is ....., where  $\eta$  is the elasticity of demand.

12. If a producer is willing to sell a product for GH¢20 but sells it for GH¢25, and the quantity sold is 10, the producer surplus is .....
13. Operations Research is the scientific method of allocating .....resources to competing activities in an .... way.
14. The value of P in the following linear programming problem is .....

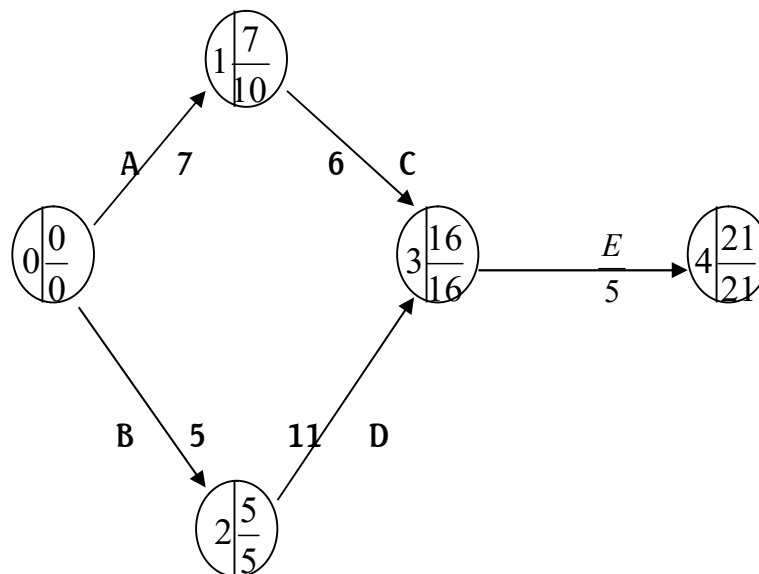
Minimize  $P= 20x + 30y$  with the following constraints:

$$3x + y \geq 60$$

$$x + 2y \geq 40$$

$$x, y \geq 0$$

15. The demand for material items B120 is 10,000 units per year. The item costs ₦500 per unit, and the holding cost per unit is 2% of the purchase cost per year. The cost of placing an order for the item is ₦100. The annual holding cost for material item B120 is .....
16. The network diagram below shows all activities with their durations in weeks:



The activities on the critical path are..... and their combined duration is..... weeks.

17. The two types of replacement policies, for an item that fails suddenly, are ..... and .....
18. In transportation problems, the created dummy origin (row) or dummy destination (column) introduced to balance an unbalanced transportation problem, does not attract any .....

19. The initial basic feasible transportation cost for the following transportation problem is .....

	Market								Capacity
	1		2		3		4		
Plant									
1	29	3	1	8	18	5	2	4	50
2	-	3	-	4	-	3	20	2	20
3	-	4	30	3	-	9	-	9	30
Demand	29		31		18		22		-

20. A vendor who wishes to optimise his profits, has his possible supplies and respective probabilities as given in the table below:

Possible supply	200	250	300	350	420	530
probability	0.10	0.20	0.30	0.05	0.15	0.20

Use the following Monte Carlo random numbers: 30, 06, 85, 70, 68, 15, 10, 03,90 and 45 to simulate a ten-day period. Hence, the supply forecast for the ninth day is .....

**SECTION B:****ATTEMPT ANY FOUR QUESTIONS****(50 MARKS)****QUESTION 1**

The scores of some students, in a Cost Accounting paper, are tabulated below:

Score	30-39	40-49	50-59	60-69	70-79	80-89
Number of Students	5	8	7	10	6	4

Calculate the following:

- (a) the 3<sup>rd</sup> quartile (4 Marks)  
 (b) the 5<sup>th</sup> decile (4 Marks)  
 (c) the 90<sup>th</sup> percentile (4½ Marks)  
**(Total 12½ Marks)**

**QUESTION 2**

For the given data in the table below, calculate the Coefficient of Skewness, using the two possible methods.

Marks	40-50	50-60	60-70	70-80	80-90
Frequency	10	22	24	6	8

**(Total 12½ Marks)****QUESTION 3**

- a. The table below shows two types of Graduate Professionals together with their employability status.

	Employed	Unemployed
Bankers	120	40
Accountant	80	260

One of the Graduate Professionals is to be selected for a training programme. Calculate the probability that the chosen Graduate is an

- (i) Employed Accountant. (3 Marks)  
 (ii) Unemployed Banker. (3½ Marks)
- b. There are 60 male workers in a company of 150 employees. What is the probability of selecting a worker who is either a male or female worker?  
 (6 Marks)  
**(Total 12½ Marks)**

#### QUESTION 4

If the demand function for a commodity is  $y = 130 + 4x - x^2$ , find the Consumers' surplus when:

(a)  $x_0 = 4$  (5½ Marks)

(b)  $y_0 = 30$  (7 Marks)

**(Total 12½ Marks)**

#### QUESTION 5

The table below lists all the activities and their durations which are necessary for a project execution together with the necessary immediate predecessors.

(a) Draw a network diagram, based on Arrow-On-Node (A-O-N) diagram, to represent the project. (5 Marks)

(b) Calculate (i) the Earliest Finish Time (EFT) for all the activities (5 Marks)  
(ii) the Latest Start Time (LST) for activities C and D. (2½ Marks)

**(Total 12½ Marks)**

Activity	Immediate Predecessors	Activity duration (days)
A	-	2
B	A	3
C	A	4
D	A	5
E	B	6
F	C, D	3
G	D	4
H	B	7
I	E, F, G	2
J	G	3

### QUESTION 6

The table below shows the unit transportation costs, quantities supplied and quantities demanded:

	Warehouse			
Mill	1	2	3	Supply
A	6	8	4	60
B	4	9	3	100
C	1	2	6	150
Demand	140	120	50	310

- a. Use the following transportation methods to determine the initial basic feasible transportation cost for the problem:
- i. North West Corner Rule; (4 Marks)
  - ii. Least Cost Method; and (4 Marks)
  - iii. Vogel's Approximate Method. (4 Marks)
- b. Identify which of the three methods gives the least cost. (½ Mark)

**(Total 12½ Marks)**

## USEFUL FORMULAE

$$Q_3 = L_{q_3} + \left[ \frac{\frac{3N}{4} - Cf_b}{f} \right] C$$

$L_{q_3}$  = lower class limit of 3rd quartile class,

Where  $N = \sum f$ ,  $C$  = class interval,  $Cf_b$  = cum. freq. before the freq. of the  $Q_3$  class  
 $f$  = freq. of the  $Q_3$  class

$$D_5 = L_{D_5} + \left[ \frac{\frac{5N}{10} - Cf_b}{f} \right] C$$

$D_5$  = lower class limit of  $D_5$  class,

$N = \sum f$ ,  $C$  = class interval,  $Cf_b$  = cum. freq. before the freq. of the  $D_5$  class  
 $f$  = freq. of the  $D_5$  class

$$P_{90} = L_{p_{90}} + \left[ \frac{\frac{90N}{100} - Cf_b}{f} \right] C$$

$P_{90}$  = lower class limit of  $P_{90}$  class,

$N = \sum f$ ,  $C$  = class interval,  $Cf_b$  = cum. freq. before the freq. of  $P_{90}$  class  
 $f$  = freq. of the  $P_{90}$  class

$$\text{Mean} = \frac{\sum fx}{\sum f} \quad (\text{frequency distribution})$$

$$\text{Mode} = L_{mo} + \left( \frac{d_1}{d_1 + d_2} \right) C$$

$L_{mo}$  = lower class limit of modal

$d_1$  = freq. of modal class – freq. just immediately before it

$d_2$  = freq. of modal class – freq. just immediately after it

$C$  = class interval

$$\text{Median} = L_m + \left( \frac{N/2 - cfb}{f} \right) C$$

$L_m$  = lower class limit of the median class,

$N = \sum f$ ,  $C =$  class interval,  $Cf_b =$  cum. freq. before the freq. of median class

$f =$  freq. of the median class

$$S.D = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} \text{ or } \quad (\text{frequency distribution})$$

$$\sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} \quad (\text{frequency distribution})$$

$$\text{Coefficient of Skewness} = \frac{\bar{x} - \text{mode}}{S.D} \quad (\text{frequency distribution})$$

$$\text{Coefficient of Skewness} = \frac{3(\bar{x} - \text{median})}{S.D} \quad (\text{frequency distribution})$$

**Quadratic Equations :** If  $ax^2 + bx + c = 0$  is the general quadratic, the two solutions (roots) are given by:

$$x = -b \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

## PROBABILITY

$A \cup B = A$  or  $B$ ,  $A \cap B = A$  and  $B$  (overlap)

$P(B | A) =$  probability of  $B$ , given  $A$

**Rules of Addition:**

If  $A$  and  $B$  are mutually exclusive:  $P(A \cup B) = P(A) + P(B)$

If  $A$  and  $B$  are not mutually exclusive:  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

**Rule for Multiplication:**

If  $A$  and  $B$  are independent:  $P(A \cap B) = P(A) \times P(B)$

TABLE 1: LOGARITHMS OF NUMBERS

$x \rightarrow \log x$

x										Difference									
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	0013	0043	0086	0128	0170	0212	0253	0294	0334	0374	4	8	12	17	21	25	29	33	37
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	11	15	19	23	26	30	34
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	7	10	14	17	21	24	28	31
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	27
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	8	11	14	17	20	22	25
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	5	8	11	13	16	18	21	24
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	2	5	7	10	12	15	17	20	22
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	16	19	21
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	4	7	9	11	13	16	18	20
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7
x	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9

TABLE 1 (contd)'. LOGARITHMS OF NUMBERS

log\*

x	0	1	2	3	4	5	6	7	8	9	Differences								
											1	2	3	4	5	6	7	8	9
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8723	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2		3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	0	1	1	2	2	3	3	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	0	1	1	2	2	3	3	4	4
x	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9

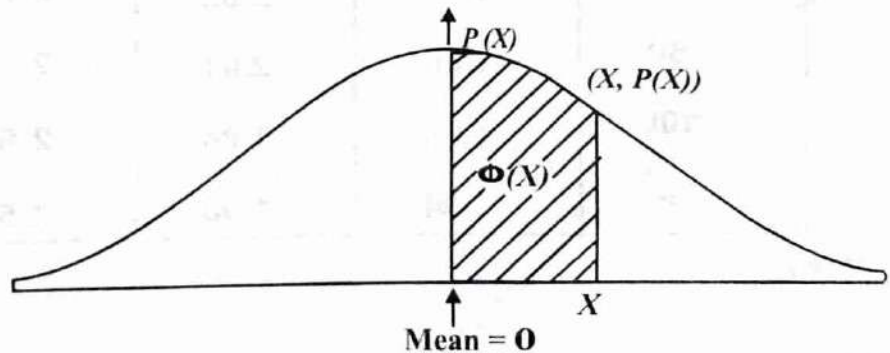
TABLE 2: NORMAL DISTRIBUTION PROBABILITIES

x	x → Φ(x) = ∫₀ˣ P(x)dx									
	0	1	2	3	4	5	6	7	8	9
0.0	0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
0.2	0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133
0.9	3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	4938	.4940	.4941	.4943	.4945	.4941	.4948	.4949	.4951	.4952
2.6	4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000

differences unreliable

use x  $\frac{\sin x}{\cos x}$

$$P(X) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2} x^2}$$



Values in the table give the probability Φ(X) that a Normally distributed random variable (X) with zero mean and unit variance will have a value between 0 and X.

## **SECTION A: PART I**

### **MULTI CHOICE SOLUTIONS**

1. C
2. B
3. D
4. D
5. E
6. D
7. A
8. A
9. C
10. D
11. C
12. D
13. C
14. E
15. D
16. D
17. C
18. C
19. A
20. D
21. D
22. D
23. B
24. D
25. C
26. B
27. A
28. A
29. C
30. B

## Workings

Q5.

$X$ : 6, 5, 7, 10, 2

Mean =

$$\text{Mean } \bar{x} = \frac{6+5+7+10+2}{5} = \frac{30}{5} = 6$$

$$\begin{aligned} \text{Variance} &= \frac{\sum (x - \bar{x})^2}{n} = \frac{(6-6)^2 + (5-6)^2 + (7-6)^2 + (10-6)^2 + (2-6)^2}{5} \\ &= \frac{34}{5} \end{aligned}$$

$$= 6.8 \quad (\text{E})$$

Q6.

$X = 12, 10, 8, 6, 4$

$$\text{Mean} = \frac{\sum x}{n} = \frac{12+10+8+6+4}{5} = \frac{40}{5} = 8$$

$$\begin{aligned} \text{MD} &= \frac{\sum |x - \bar{x}|}{n} = \frac{|12-8| + |10-8| + |8-8| + |6-8| + |4-8|}{5} \\ &= \frac{4+2+0+2+4}{5} \\ &= \frac{12}{5} = 2.4 \quad (\text{D}) \end{aligned}$$

Q7.

$R_A$	$R_B$	$d = R_A - R_B$	$d^2$
2	1	1	1
3.5	2	1.5	2.25
5	4	1	1
3.5	5	-1.5	2.25
1	3	-2	4

$$\sum d^2 = 10.5$$

$$\text{Rank Correlation Coefficient} = 1 - \frac{6 \sum d^2}{n(n^2 - 1)} = 1 - \frac{6(10.5)}{5(25 - 1)} = 1 - \frac{63}{120} = 0.475 \quad (\text{A})$$

Q9.

$p_o$	$q_o$	$p_1$	$q_1$	$p_o q_o$	$p_1 q_o$
8	12	15	8	96	180
6	10	10	4	60	100
4	14	5	3	56	70
				<b>212</b>	<b>350</b>

$$\text{Laspeyre price index} = \frac{\sum p_1 q_o}{\sum p_o q_o} \times \frac{100}{1}$$

$$\text{Laspeyre} = \frac{350}{212} \times 100 = 165.09\% \quad (\text{C})$$

Q10.

$$E(X) = \sum xP(x)$$

$$= 1 \times \frac{1}{6} + 2 \times \frac{1}{6} + 3 \times \frac{1}{6} + 4 \times \frac{1}{6} + 5 \times \frac{1}{6} + 6 \times \frac{1}{6}$$

$$= \frac{1}{6} + \frac{1}{3} + \frac{1}{2} + \frac{2}{3} + \frac{5}{6} + 1$$

$$= \frac{21}{6} = \frac{7}{2} = 3.5 \quad (\text{B})$$

Q13. Let x be the marked price

Let y be the selling price

Discount = 20% of x

Therefore,

$$x = y + 0.2x$$

but the buyer buys the product for ₦4,500. This means the selling price is

₦4,500.

i.e.  $x = 4500 + 0.2x$ , given  $0.8x = 4500/0.8$  yielding  $x = ₦5,625$

Therefore, the required Marked Price is ₦5,625.

Note that the 35% profit given has nothing to do with the Marked Price (C)

Q15.

$$\begin{aligned}\text{Cost per unit} &= \frac{(\text{Variable Cost} + \text{Fixed Cost})}{\text{Total Units}} \\ &= \frac{10,000 + 20,000}{500} \\ &= \frac{30,000}{500} \\ &= \text{GH}\text{\textcircled{60}}\end{aligned}$$

Q17.

$$R = 1600x - 3x^3$$

$$\frac{dR}{dx} = 0 \Rightarrow 1600 - 9x^2 = 0$$

$$x^2 = \frac{1600}{9}$$

$$x = \pm \sqrt{\frac{1600}{9}} = \pm 13.33$$

$$x = 13.33 \quad \text{since } x \text{ cannot be negative}$$

$$\frac{d^2R}{dx^2} = -18x$$

$$\text{At } x = 13.35,$$

$$\text{Then, } \frac{d^2R}{dx^2} = -18 \times 13.33 = -240$$

Since this is negative, then the value of  $x$  that yields the maximum revenue is 13.33 (C)

**Q18.**

$$\begin{aligned}
 TR &= \int MR dx = \int_0^{20} (150x^2 - 6x - 10) dx = \left[ \frac{150x^3}{3} - \frac{6x^2}{2} - 10x \right]_0^{20} \\
 &= [50x^3 - 3x^2 - 10x]_0^{20} \\
 &= 50(20 \times 20 \times 20) - (3 \times 20 \times 20) - (10 \times 20) \\
 &= 400,000 - 1,200 - 200 \\
 &= 398,600 \qquad \qquad \qquad \text{(C)}
 \end{aligned}$$

Therefore, for 20 items, the Revenue is 398,600

**Q20.**

$$Z = 3 \times 2 + 4 \times 3 = 18$$

$$Z^1 = 3 \times 3 + 4 \times 4 = 25$$

$$\text{Shadow cost} = 25 - 18 = 7 \qquad \qquad \qquad \text{(C)}$$

$$\text{Q23. } FF = LFT - EST - D = 10 - 4 - 3 = 3 \qquad \qquad \qquad \text{(B)}$$

**Q27.** The given table

	Accountant			
Salesman	I	II	III	IV
A	15	13	14	17
B	11	12	15	13
C	13	12	10	11
D	15	17	14	16

Subtracting the minimum of each row from the other entries of each row, gives;

Row Iteration	Accountant			
Salesman	I	II	III	IV
A	2	0	1	4
B	0	1	4	2
C	3	2	0	1
D	1	3	0	2

Subtracting the minimum of each column from the other entries of each column, gives;

Column Iteration	Accountant			
Salesman	I	II	III	IV
A	2	0	1	3
B	0	1	4	1
C	3	2	0	0
D	1	3	0	1

At this point, the matrix cannot be reduced any further either using row or column reductions.

Therefore, optimality point has now been reached.

Thus, the assignments are as follows:

Assign Accountant II to Salesman A;

Assign Accountant I to Salesman B;

Assign Accountant IV to Salesman C; and

Assign Accountant III to Salesman D.

Therefore, the minimum cost =  $13 + 11 + 11 + 14 = 49$  (A)

### Examiner's comment

The MCQs are well spread across the syllabus and they test both knowledge and application. The MCQ section is well designed to test candidates' ability to:

- recall definitions and core concepts,
- identify the correct method or formula,
- carry out short numerical computations, and
- distinguish closely related ideas across Statistics, Business Mathematics and Operations Research.

The section aligns well with the syllabus requirement that Section A should cover the entire syllabus.

All the questions are compulsory. About 88.6% of all the candidates obtained marks in excess of 40%. The lowest and highest marks recorded are respectively 1 and 29, on the average.

## SECTION A: PART II

### SHORT ANSWER SOLUTIONS

1. Statistics
2. Median
3. Standard deviation, mean (in that order)
4. +1, -1 (in that order)
5. Additive and Multiplicative (in any order)
6. 216.67%
7. 1.5
8. Alternative hypothesis
9. ₦2000
10. 25
11. Less than one or  $< 1$ .
12. ₦50
13. Scarce or limited, optimal (in that order)
14. 680
15. ₦2240
16. B, D, and E, 21 weeks (in that order)
17. Individual replacement policy and Group replacement policy (in any order)
18. Transportation cost/cost
19. 323
20. 530

### Workings

Q6.

$p_o$	$p_1$	$\frac{p_1}{p_o}$
60	90	$90/60 = 1.5$
40	80	$80/40 = 2$
50	150	$150/50 = 3$
		6.5

$$SARPI = \frac{\sum \frac{p_1}{p_o}}{n} \times \frac{100}{1} = \frac{6.5}{3} \times \frac{100}{1} = 216.67\%$$

Q7.

<b>x</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>P(x)</b>	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

$$E(X) = \sum xP(x)$$

$$E(X) = 0\left(\frac{1}{8}\right) + 1\left(\frac{3}{8}\right) + 2\left(\frac{3}{8}\right) + 3\left(\frac{1}{8}\right) = \frac{0}{8} + \frac{3}{8} + \frac{6}{8} + \frac{3}{8} = \frac{12}{8} = \frac{3}{2} = 1.5$$

Q9.

CP = N120,000 for 57 items

Discount = 5%

$$\text{Cost of each item} = \frac{120,000}{57} = 2105.26$$

$$\text{But, the discount} = \frac{5}{100} \times 2105.26 = 105.263$$

Therefore, selling price = N(2105.26 – 105.26)

= N2,000

Therefore, the selling price for each of the scissors is ~~N~~2,000

ALITER

$$CP = \del{N}120,000$$

$$Loss\% = 5\%$$

$$\frac{Loss}{100} = \frac{CP - SP}{CP}$$

$$Loss \times CP = 100CP - 100SP$$

$$100SP = 100CP - Loss \times CP$$

$$\therefore SP = \frac{100CP - Loss \times CP}{100}$$

$$= \frac{CP(100 - Loss)}{100}$$

$$= \frac{CP(100 - 5)}{100}$$

$$\therefore SP = \frac{CP \times 95}{100} = \frac{120,000 \times 95}{100} = \text{N}114,000$$

$$\therefore \text{Selling price for each} = \frac{SP}{57} = \frac{114,000}{57} = \text{N}2,000$$

**Q10.**

$$n(A \cap B) = n(A) + n(B) - n(A \cup B)$$

$$= 30 + 20 - 25 = 25$$

**Q12.**

$$\begin{aligned} \text{Producer's Surplus} &= (25 - 20) \times 10 \\ &= 5 \times 10 \\ &= \text{N}50 \end{aligned}$$

**Q14.**

**P = 20x + 30y** to be minimized. Points for drawing the graph are obtained as follows:

$$\text{for } 3x + y = 60$$

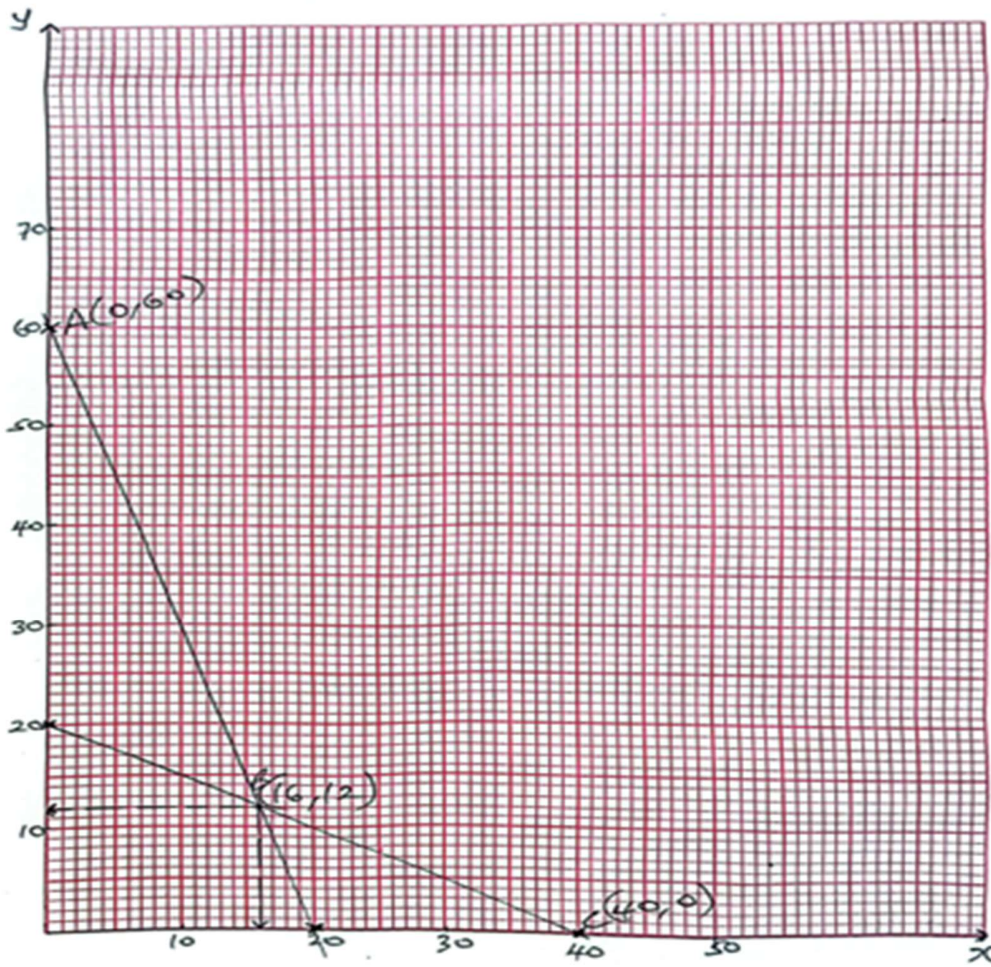
$$\text{when } x = 0, y = 60$$

$$\text{when } y = 0, x = 20$$

$$\text{for } x + 2y = 40$$

$$\text{when } x = 0, y = 20$$

$$\text{when } y = 0, x = 40$$



$$A(0, 60), \quad P = 20(0) + 30(60) = 0 + 1,800 = 1,800$$

$$B(16, 12), \quad P = 20(16) + 30(12) = 320 + 360 = 680$$

$$C(40, 0), \quad P = 20(40) + 30(0) = 800 + 0 = 800$$

$$\Rightarrow \quad P = 680 \quad (\text{minimum})$$

Q15.

$$\begin{aligned} Q &= \sqrt{\frac{2C_0D}{C_H}} = \sqrt{\frac{2 \times 100 \times 10,000}{2\% \times 500}} \\ &= \sqrt{\frac{2,000,000}{10}} = \sqrt{200,000} \\ &= 447.2 \\ &= 448 \end{aligned}$$

$$\begin{aligned} \text{Therefore, annual holding cost} &= \frac{Q}{2} \times C_H \\ &= \frac{448}{2} \times \frac{2}{100} \times 500 \\ &= \mathbf{4,480} \end{aligned}$$

Q16.

Path 1: A,C and E with duration = 7+6+5=18 weeks

Path 2: B, D and E with duration = 5+11+5= 21 weeks

∴ The critical activities are B, D, and E and the combined duration is 5 + 11+5 = 21weeks.

Q19.

	Market 1	Market 2	Market 3	Market 4	Capacity
Plant					
1	29    3	1    8	18    5	2    4	50
2	-    3	-    4	-    3	20    2	20
3	4	30    3	-    9	-    9	30
Demand	29	31	18	22	100

The initial basic feasible transportation cost is =

$$\begin{aligned} &= (29 \times 3) + (1 \times 8) + (18 \times 5) + (2 \times 4) + (20 \times 2) + (30 \times 3) \\ &= 323 \end{aligned}$$

Q20.

Possible supply	Probability	Cum. Prob	R-N (Interval)
200	0.10	0.10	00 – 09
250	0.20	0.30	10 – 29
300	0.30	0.60	30 – 59
350	0.05	0.65	60 – 64
420	0.15	0.80	65 – 79
530*	0.20	1.00	80 - 99

From the table above, the supply forecast for the ninth day is 530 and it falls within the interval 80 – 99.

### Examiner's comment

The SAQ section tests a suitable mixture of definition, interpretation, method selection, short computation, and applied reasoning.

The four listed requirements from the candidates under MCQs, equally apply here. The syllabus is fairly covered.

On the average, the lowest and highest marks are respectively 1 and 15. About 58% of the candidates scored marks in excess of 40 %.

### SECTION B

#### SOLUTION 1

(a)

Score	Freq	Cum. Freq (cf)
30-39	5	5
40-49	8	13
50-59	7	20
60-69	10	30
70-79	6	36
80-89	4	40
-	40	-

$$Q_3 = L_{q_3} + \left[ \frac{\frac{3N}{4} - Cf_b}{f} \right] C$$

Where,

$$\frac{3N}{4} = \frac{3 \times 40}{4} = 30$$

$$f = 10, Cf_b = 20, L_{q_3} = 59.5, C = 69.5 - 59.5 = 10$$

$$Q_3 = 59.5 + \left[ \frac{30 - 20}{10} \right] \times 10$$

$$\therefore Q_3 = 69.5$$

(b)

$$D_5 = L_{D_5} + \left[ \frac{\frac{5N}{10} - Cf_b}{f} \right] C$$

Where;

$$\frac{5}{10} \times 40 = 20, f = 7, Cf_b = 13, L_{D_5} = 49.5, C = 10$$

$$D_5 = 49.5 + \left[ \frac{20 - 13}{7} \right] \times 10$$

$$= 49.5 + 10$$

$$\therefore D_5 = 59.5$$

(c) 
$$P_{90} = L_{p_{90}} + \left[ \frac{\frac{90N}{100} - Cf_b}{f} \right] C$$

Where,

$$\frac{90}{100} \times 40 = 36, Cf_b = 30, LP_{90} = 69.5, C = 10, f = 6$$

$$P_{90} = 69.5 + \left[ \frac{36 - 30}{6} \right] \times 10$$

$$= 69.5 + 10$$

$$\therefore P_{90} = 79.5$$

### Examiner's comment

#### Area of the syllabus covered

**Statistics – Measures of location (grouped and ungrouped data)**, specifically the calculation of quartiles, deciles, and percentiles from grouped data. The syllabus explicitly requires candidates to state and calculate measures of partition such as quartiles, deciles, and percentiles.

#### What the question tests

This question tests candidates' ability to:

- construct and use cumulative frequencies correctly;
- identify the appropriate partition class;
- apply the grouped-data formulae for the 3rd quartile, 5th decile, and 90th percentile;
- use class boundaries and class width appropriately; and
- present statistical computations in an orderly form.

About 75% of the candidates attempted this question with about 90% scoring marks between 8 and 12.5. The lowest and highest scores are 4 and 12.5 respectively. The pitfall of the candidates was their inability to apply correct formulae for quartiles, deciles and percentiles.

### SOLUTION 2

Marks	$f$	$x$	$fx$	$x - \bar{x}$	$(x - \bar{x})^2$	$f(x - \bar{x})^2$	CF
40-50	10	45	450	-17.74	293.7796	2937.796	10
50-60	22	55	1210	-7.14	50.9796	1121.5512	32
60-70	24	65	1560	2.86	8.1796	196.3104	56
70-80	6	75	450	12.86	169.3796	992.2776	62
80-90	8	85	680	22.86	522.5796	4180.6368	70
-	70		4350			9428.572	

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{4350}{70} = 62.14$$

$$\text{Mode} = L_{mo} + \left( \frac{d_1}{d_1 + d_2} \right) C$$

$$d_1 = 24 - 22 = 2, d_2 = 24 - 6 = 18, L_{mo} = 60, C = 10$$

$$\text{Mode} = 60 + \left( \frac{2}{2+18} \right) 10 = 60 + 1 = 61$$

$$\text{Median} = L_{me} + \left( \frac{N/2 - Cf_b}{f} \right) C$$

$$\text{where, } L_{me} = 59.5, C = 10, N/2 = 35, f = 24, Cf_b = 32$$

$$\text{Median} = 59.5 + \left( \frac{35 - 32}{24} \right) 10$$

$$= 59.5 + \frac{3}{24} \times 10$$

$$= 59.5 + 1.25$$

$$= 61.25$$

$$S.D = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$$

$$= \sqrt{\frac{9428.572}{70}} = \sqrt{134.69} = 11.61$$

### ALITER FOR STANDARD DEVIATION PART

Class interval	$f$	$x$	$fx$	$x^2$	$fx^2$	CF
40 – 50	10	45	450	2025	20,250	10
50 – 60	22	55	1,210	3025	66,550	32
60 – 70	24	65	1,560	4225	101,400	56
70 – 80	6	75	450	5625	33,750	63
80 – 90	8	85	680	7225	57,800	70
	$\sum f = 70$		$\sum fx = 4,350$		$\sum fx^2 = 279,760$	

$$\begin{aligned} \text{Standard Deviation, SD} &= \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2} \\ &= \sqrt{\frac{279,760}{70} - \left(\frac{4,350}{70}\right)^2} \\ &= \sqrt{3,996.43 - 3,861.73} \\ &= 11.61 \end{aligned}$$

Method 1:

$$\text{Coefficient of Skewness} = \frac{\bar{x} - \text{mode}}{S.D} = \frac{62.14 - 61}{11.61} = 0.098$$

Method 2:

Coefficient of Skewness

$$= \frac{3(\bar{x} - \text{median})}{S.D} = \frac{3(62.14 - 61.25)}{11.61} = \frac{3(0.89)}{11.61} = \frac{2.67}{11.61} = \frac{2.67}{11.61} = 0.23$$

### Examiner's comment

#### Area of the syllabus covered

This question falls mainly under **Statistics** – Measures of variation/dispersion/spread, specifically skewness, but it also draws on measures of location because candidates must first obtain the grouped mean, median, and mode before calculating the coefficient of skewness. The syllabus specifically lists skewness under measures of dispersion/spread.

### What the question tests

This question tests candidates' ability to:

- (a) compute the grouped mean;
- (b) determine the grouped median;
- (c) estimate the grouped mode;
- (d) calculate standard deviation for grouped data; and
- (e) apply the two Pearson coefficients of skewness correctly, the first using the mode and the second using the median.

About 85% of the candidates attempted the question. About 80% of the candidates that attempted the question obtained marks between 8 and 12.

The major identified pitfall encountered was the inability of the candidates to obtain the lower-class boundaries for calculating the measures. Candidates are advised to study the relevant portion of the INSIGHT that deals with the calculation of mean, median and mode from grouped data. All these are needed for calculating Skewness using the two approaches.

### SOLUTION 3

(a)

	Employment (E)	Unemployment (U)	Row Total
Bankers (B)	120	40	160
Accountants (A)	80	260	340
Column Total	200	300	500

(i)  $P(A \cap E) = \frac{80}{500} = 0.16$

(ii)  $P(B \cap Y) = \frac{40}{500} = 0.08$

(b) Number of workers = 150

Number of Male workers = 60

Number of Female workers = 150 - 60 = 90

P(Male workers selected)

$$= \frac{60}{150} = 0.4$$

Also,

P(Female workers selected)

$$= \frac{90}{150} = 0.6$$

Therefore,

$$\begin{aligned}\Pr(\text{either } M \text{ or } F) &= P(M \cup F) = P(M) + P(F) \\ &= 0.4 + 0.6 \\ &= 1.0\end{aligned}$$

### **Examiner's comment**

#### **Area of the syllabus covered**

This question is from **Statistics – Probability**, especially the determination of probabilities from tabular data and simple event situations. The syllabus requires candidates to explain and determine expected probabilities and work with types of events.

#### **What the question tests**

This question tests candidates' ability to:

- (a) read a two-way table correctly;
- (b) determine probabilities from frequencies;
- (c) identify a specific subgroup, such as employed accountants or unemployed bankers;
- (d) handle a simple exhaustive event statement such as "male or female worker."

This is a poorly attempted question. Less than 45% of the candidates attempted the question. 40% of this figure were able to make a little impact. The lowest and highest scores were 8 and 12½ respectively.

Many of these candidates had difficulty in understanding the probability involved.

Candidates should study more on probability analysis in relevant text books, most especially the ICAN INSIGHT.

## SOLUTION 4

(a) when  $x_0 = 4$   
 $\therefore y_0 = 130 + 4(4) - 4^2$   
 $= 130 + 16 - 16$   
 $= 130$

Consumers' surplus  $= \int_0^4 (130 + 4x - x^2) dx - x_0 y_0$   
 $= \left( 130x + \frac{4x^2}{2} - \frac{x^3}{3} \right)_0^4 - 4(130)$   
 $= 130(4) + 2(4^2) - \frac{4^3}{3} - 520$   
 $= 520 + 32 - 21.33 - 520$   
 $= 10.67$

(b) when  $y_0 = 30$

*i.e.*  $130 + 4x - x^2 = 30$   
 $100 + 4x - x^2 = 0$   
 $x^2 - 4x - 100 = 0$

But  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Then  $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-100)}}{2(1)}$

$$x = 4 \pm \frac{\sqrt{16 + 400}}{2}$$

$$x = 4 \pm \frac{\sqrt{416}}{2}$$

$$x = 4 \pm \frac{20.4}{2} = x = -8.2 \text{ or } 12.2$$

But  $x_0$  cannot be negative,  $x_0 = 12.2$

$$\begin{aligned}\therefore \text{Consumers' surplus} &= \int_0^{12.2} (130 + 4x - x^2) dx - x_0 y_0 \\ &= \left[ 130x + 2x^2 - \frac{x^3}{3} \right]_0^{12.2} - 12.2(30) \\ &= 130(12.2) + 2(12.2^2) - \frac{12.2^3}{3} - 366 \\ &= 1586 + 297.68 - 605.28 - 366 \\ &= 912.4\end{aligned}$$

### **Examiner's comment**

#### **Area of the syllabus covered**

This question is from **Business Mathematics** – Integration, specifically the determination of consumers' surplus. The syllabus expressly states that candidates need to apply integration to determine consumers' surplus.

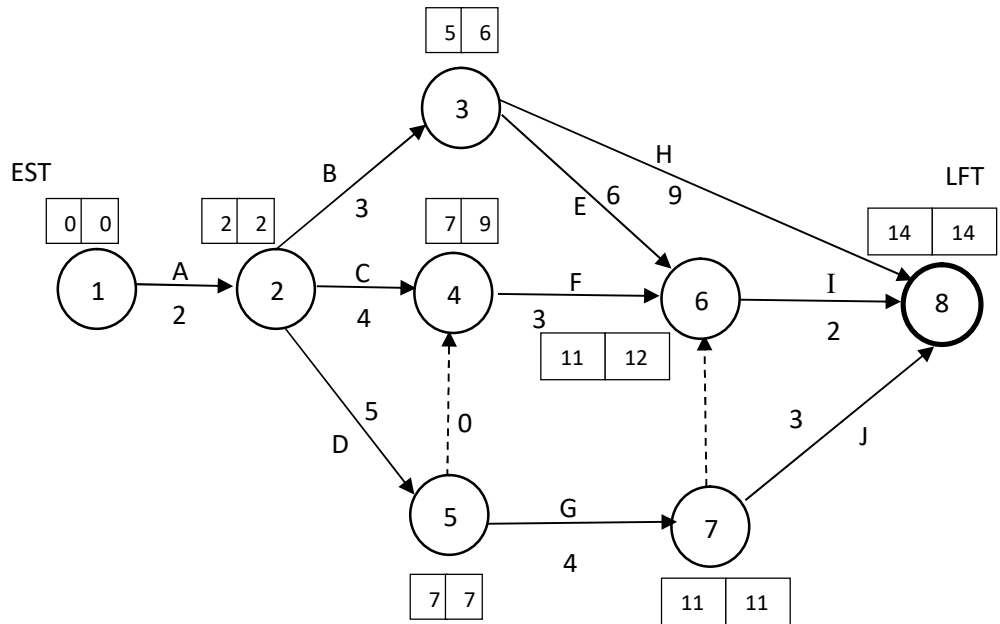
#### **What the question tests**

This question tests candidates' ability to:

- (a) interpret a demand function;
- (b) identify the relevant market price/quantity conditions;
- (c) set up the correct definite integral for consumer's surplus;
- (d) integrate a polynomial demand function correctly; and
- (e) simplify the result accurately.

About 70% of the candidates attempted the question and demonstrated good understanding but lacked the ability to solve the resulting quadratic equation derived from the function. The average score was 5.

**SOLUTION 5**



Where,

EST = Earliest Start Time,

LFT = Latest Finish Time

EFT = Earliest Finish Time

LST = Latest Start Time

b(i) For forward pass, calculate the Early Start Time (EST) and Early Finish Time (EFT) values for each activity.

e.g for activity B, we sum the duration of Activity A and duration of Activity B together i.e.,

$2 + 3 = 5$  and so on for all activities.

For backward pass, this involves calculating Late Start Time (LST) and Late Finish Time (LFT) by working backward from the project's end.

NOTE: For forward pass, pick the maximum

For Backward pass, pick the minimum

Activity	EFT
A	2
B	5
C	7
D	7
E	11
F	11
G	11
H	14
I	14
J	14

(b) (ii)

Activity	LST
C	5
D	2

### **Examiner's comment**

#### **Area of the syllabus covered**

This question is from **Operations Research** – Network analysis. The syllabus requires candidates to draw an Arrow-on-Node (AON) network, determine the critical path together with its duration, and calculate other parameters such as Earliest Finish Time (EFT) and Latest Start Time (LST).

#### **What the question tests**

This question tests candidates' ability to:

- (a) convert a list of activities and predecessors into an A-O-N network diagram;
- (b) interpret precedence relationships correctly;
- (c) carry out forward-pass calculations for early times;
- (d) carry out backward-pass calculations for late times; and
- (e) extract required project-control values for named activities.

This question was poorly attempted. About 30% of the candidates attempted it. The average score was 5. The major pitfall identified was the inability of the candidates to create appropriate dummies.

**SOLUTION 6**

(a) (i) NWC Method

	Warehouse						
Mill	1		2		3		Supply
A	<del>60</del>	6	-	8	-	4	60 - 60 = 0
B	80	4	20	9	-	3	100 - 80 = 20 20 - 20 = 0
C	-	1	100	2	50	6	150 - 100 = 50 50 - 50 = 0
Demand	140 - 60 = 80 80 - 80 = 0		120 - 20 = 100 100 - 100 = 0		50 - 50 = 0		

Therefore, the initial basic feasible transportation cost is calculated as follows

N-W Method:

$$\begin{aligned}
 TC &= (60 \times 6) + (80 \times 4) + (20 \times 9) + (100 \times 2) + (50 \times 6) \\
 &= 360 + 320 + 180 + 200 + 300 \\
 &= 1360
 \end{aligned}$$

(ii) L. C Method:

	Warehouse						
Mill	1		2		3		Supply
A	-	6	60	8	-	4	60 - 60 = 0
B	-	4	50	9	50	3	100 - 80 = 20 20 - 20 = 0
C	140	1	10	2	-	6	150 - 100 = 50 50 - 50 = 0
Demand	140 - 140 = 0		120 - 60 = 60 60 - 10 = 50 50 - 50 = 0		50 - 50 = 0		

$$TC = (140 \times 1) + (60 \times 8) + (50 \times 9) + (10 \times 2) + (50 \times 3)$$

$$= 140 + 480 + 450 + 20 + 150$$

$$= \text{N}1240$$

(iii) Vogel's approximate Method:

		Warehouse					Row factors			
Mill		1	2	3		Supply	1	2	3	
A		(10) 6	-	8 (50) 4		60-50=10 10-10=0	2	2	2	2
B		(100) 4	-	9 - - 3		100-100=0	1	1	1	-
C		(30) 1	(120) 2	-	6	150-120=30 30-30=0	1	5*	-	-
Demand		140-30=110	120-120=0	50-50=0						
	1	3	6*	1						
Column	2	3	-	1						
Penalty	3	2*	-	1						
Factor		6*								

Therefore, the initial basic feasible transportation cost is calculated as follows;

$$TC = (10 \times 6) + (50 \times 4) + (100 \times 4) + (30 \times 1) + (120 \times 2)$$

$$TC = 60 + 200 + 400 + 10 + 240$$

$$TC = \text{N}930$$

(b) It is clear from the above that the Vogel's Approximate Method gives least cost.

### Examiner's comment

#### Area of the syllabus covered

This question is from **Operations Research – Transportation**, specifically the initial basic feasible transportation cost using North-West Corner Method (NWCM), Least Cost Method (LCM), and Vogel's Approximate Method (VAM).

#### What the question tests

This question tests candidates' ability to:

- (a) recognize a balanced transportation problem;
- (b) allocate supplies and demands systematically under NWCM;

- (c) obtain a feasible solution using the Least Cost Method;
- (d) apply VAM using row/column penalties; and
- (e) compare the resulting initial transportation costs to identify the least one.

About 80% of the candidates attempted this question and demonstrated very good understanding of the question. The average score was 10. The main pitfall identified was the inability of the candidates to differentiate between the Least Cost and Vogel's methods.

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA****ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
MARCH 2026 EXAMINATIONS (PART II)****INFORMATION TECHNOLOGY****PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER****EXAMINATION INSTRUCTIONS**

1. All solutions should be in **blue** or **black** ink. Any solution in pencil will not be marked.
2. Read all instructions on each part of the paper carefully before answering the questions.
3. Ensure that you do not answer more than the number of questions required for **Section B (The Essay Section)**.
4. Check your pockets, purse and mathematical sets, etc, to ensure that you do not have prohibited items such as telephone handset, electronic storage device, wrist watches, programmable devices or any form of written material on or around you in the examination hall. You will be stopped from continuing with the examination and liable to further disciplinary actions including cancellation of examination result if caught.
5. Do not enter the hall with anything written on your docket.
6. Insert your examination number in the space provided above.

**TUESDAY, MARCH 24, 2026****DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO**

**THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA  
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA  
PART II EXAMINATIONS - MARCH 2026**

**INFORMATION TECHNOLOGY**

**Time Allowed: 3 hours**

**SECTION A: PART I          MULTIPLE CHOICE QUESTIONS          (30 MARKS)**

**ATTEMPT ALL QUESTIONS IN THIS SECTION**

**Write ONLY the alphabet (A, B, C, D or E) that corresponds to the correct option in each of the following questions/statements.**

1. Which of the following is **NOT** a differentiating factor of sub-systems?
  - A. Function
  - B. Space
  - C. Time
  - D. Automation
  - E. Value
  
2. Which of the following is **NOT** a basic element of control in a business system?
  - A. Controlling
  - B. Planning
  - C. Collecting facts
  - D. Comparison
  - E. Corrective Action
  
3. Which of the following is **NOT** true about information?
  - A. Information is an organised and sorted fact
  - B. It serves as an output from the computer system
  - C. Analysis of data is done to obtain information
  - D. Information is the second level of knowledge
  - E. Information is not significant
  
4. Which of the following is **NOT** a feature of the first generation of computers?
  - A. They supported machine language only
  - B. They were very costly
  - C. They generate a lot of heat
  - D. They are portable
  - E. They were very unreliable for data processing

5. Which of the following is **NOT** a type of microcomputer?
- A. Desktop Computers
  - B. Mini Computer
  - C. Workstation
  - D. Pen Computers
  - E. Laptop Computers
6. Which of the following is an indirect input device?
- A. Optical Character Reader (OCR)
  - B. Chip and Pin Reader
  - C. Optical Mark Reader (OMR)
  - D. Magnetic Stripe Reader
  - E. Barcode
7. Which of the following is **NOT** a function performed by a mouse?
- A. Click
  - B. Right Click
  - C. Double Click
  - D. Turn On
  - E. Drag & Drop
8. Which of the following is an advantage of display equipment?
- A. Allows easy access to a vast amount of data
  - B. Output cannot be removed from the screen
  - C. The amount of output that can be handled at any one time is limited by the size of the screen and by the rate at which one can flip through screen-sized pages
  - D. One cannot output with a pencil or pen
  - E. One must be physically present at the display device site to see the output it provides
9. Which of the following is **NOT** an example of magnetic storage media?
- A. Video tape recorder
  - B. Winchester disk
  - C. Streaming Tape
  - D. Cartridge disk
  - E. Magnetic CD

10. SVGA is an acronym for
- A. Special Video Graphic Adapter
  - B. Special Video Graphic Array
  - C. Super Visual Graphic Adapter
  - D. Super Video Graphic Array
  - E. Special Visual Graphic Array
11. The following operations are performed by the Control Unit (CU), **EXCEPT**
- A. Receives instruction in a program one at a time from the main memory
  - B. Interprets the instructions
  - C. Sends out control signals to the peripheral devices
  - D. Store instructions
  - E. Coordinate all the activities
12. Which of the following is **NOT** a function of an operating system?
- A. Resource Sharing
  - B. Memory Management
  - C. Filing System
  - D. Input and Output handling
  - E. Compilation
13. Utility programs perform the following operations, **EXCEPT**
- A. File Copy
  - B. Sorting
  - C. File Maintenance
  - D. Branching
  - E. Housekeeping operations
14. Which of the following **CANNOT** be done by a database system?
- A. Data processing
  - B. Avoid data duplication
  - C. Make data independent of the programs which use it
  - D. Ensure consistency in an organisation's use of data
  - E. Avoid data redundancy
15. Which of the following is **NOT** a feature of high-level programming languages?
- A. It is easier to write and understand
  - B. It is machine dependent
  - C. It is problem oriented
  - D. It is a procedure-oriented language
  - E. It speeds up the program, testing, and error correction

16. Which of the following is **NOT** an example of branching control structures?
- A. If-Then
  - B. If Statement
  - C. For Loop
  - D. If-Then-Else
  - E. Case
17. Which of the following can only be used as a secondary key?
- A. Customer number in a customer ledger record
  - B. Stock code number in a stock record
  - C. Employee PIN in payroll record
  - D. Matriculation number of a student
  - E. State of origin of the customer
18. Which of the following is **NOT** a resource used in Office Automation?
- A. Typewriter
  - B. Word Processing
  - C. Desktop Publishing
  - D. Facsimile
  - E. Teleconferencing
19. A processing technique in which all processing is done in a single place and results are later distributed to the various departments is called
- A. Batch processing
  - B. Remote Job Entry processing
  - C. Centralised processing
  - D. On-line processing
  - E. Distributed processing
20. The processing technique in which each department does its own processing using its own IT staff within the department is called
- A. On-line processing
  - B. Real time processing
  - C. Centralised processing
  - D. Decentralised processing
  - E. Distributed processing
21. An Interconnection of a number of computers, telephones, and other shared devices in various ways so that users can process and share information is called
- A. Internet
  - B. Computer network
  - C. Communication
  - D. Intranet
  - E. Extranet

22. The following are the disadvantages of networks, **EXCEPT**
- A. There is compatibility of equipment in the network
  - B. There is duplication of data on files of different computers on the network
  - C. There is difficulty in administration and control especially for large combination
  - D. Failure of the server
  - E. Cable break may stop the entire network
23. HTTP is an acronym for
- A. Hypertext Transfer Protocol
  - B. Hypertext Transfer Package
  - C. Hypertext Total Protocol
  - D. Hypertext Total Package
  - E. Hypertext Total Packet
24. The 3rd layer of the OSI model is
- A. Physical
  - B. Network
  - C. Session
  - D. Transport
  - E. Application
25. Internet can be used for the following, **EXCEPT**
- A. Dissemination of information
  - B. Product/service development
  - C. Transaction processing
  - D. Relationship enhancement
  - E. generate result on stand-alone system
26. One-off cost of an Information System (IS) project includes the following, **EXCEPT**
- A. Cost of hardware, software and other equipment
  - B. Cost of producing documentation
  - C. Training cost
  - D. Cost of installing the system
  - E. Maintenance cost
27. Which of the following is **NOT** an operating cost of an Information System (IS) project?
- A. Staff Salaries
  - B. Cost of installing the system
  - C. Overheads
  - D. Maintenance
  - E. Insurance and Financing

28. Fact finding method used to investigate the existing system include the following, **EXCEPT**
- A. Interview
  - B. Questionnaire
  - C. Observations
  - D. Organisation Chart
  - E. report writing
29. Which of the following must be avoided during the conduct of an interview?
- A. Plan for the interview
  - B. Make appointments and be committed to meeting them
  - C. Use technical jargon
  - D. Listen carefully since the exercise is meant to be used to learn about the system in use
  - E. Use the local terminology appropriate to the type of job
30. Who is the right person to write the feasibility study report?
- A. Administrative Officer
  - B. Project Manager
  - C. Programmer
  - D. Data Processing Manager
  - E. System Analyst

**SECTION A: PART II**

**SHORT ANSWER QUESTIONS**

**(20 MARKS)**

**ATTEMPT ALL QUESTIONS**

**Write the correct answer that best completes each of the following questions/statements.**

1. The attribute of information quality that ensures it performs to its intended purpose is .....
2. The core technology that enabled the miniaturisation of fourth-generation computers is .....
3. A processing approach that relies on using a computing facility placed in a single site is .....
4. The global infrastructure that interconnects computers and networks worldwide is .....

5. The network topology that connects all nodes to a central hub for communication is .....
6. The type of network that transmits data using radio frequency or infrared signals is .....
7. A transmission medium that uses pulses of light to carry data signals is .....
8. The mode of data transmission that allows simultaneous bidirectional communication is .....
9. The networking device that connects two separate network segments to function as a single network is .....
10. The conceptual framework that defines the standardised protocols for network communication is .....
11. A single hypertext document residing on a website is .....
12. A term that describes an online platform for publishing personal or topical content in chronological order is .....
13. The process of navigating or exploring online resources on the internet is .....
14. A traditional structured approach to system development which follows a sequential and phased methodology is .....
15. A system development technique that involves rapidly creating a working model for user feedback is .....
16. The branch of computer science concerned with simulating human intelligence is .....
17. The term for a programming language written in the programmer's language is .....
18. The term for describing an error in a program is .....
19. A programming term that describes repeating actions is .....
20. The term for a named storage location in programming is .....

**SECTION B:****ATTEMPT ANY FOUR QUESTIONS****(50 MARKS)****QUESTION 1**

- (a) Enumerate **FIVE** essential attributes of information for management decision making process. (2½ Marks)
- (b) Convert the following binary numbers to decimal number equivalent.
- i. 10011.011101
  - ii. 10111101 (4 Marks)
- (c) State **THREE** features of each of the following generations of computers.
- i. Second generation computers.
  - ii. Fifth generation computers. (6 Marks)

**(Total 12½ Marks)****QUESTION 2**

- (a) i. What is computer output on Microfilm/Microfiche? (1½ Marks)
- ii. Enumerate **THREE** benefits of computer output on microfilm. (3 Marks)
- (b) i. What are controls in any organisation? (2 Marks)
- ii. Enumerate **FOUR** functions of controls in a typical organisation. (4 Marks)
- (c) Enumerate **TWO** features of a graph plotter as an output device. (2 Marks)

**(Total 12½ Marks)****QUESTION 3**

- (a) State the major function of each of the following application software and give **ONE** example in each case.
- i. Word processor software
  - ii. Spreadsheet software
  - iii. Graphic software
  - iv. Database software
  - v. Web browser (7½ Marks)
- (b) Enumerate **FIVE** requirements for a multi-user application. (5 Marks)

**(Total 12½ Marks)**

#### QUESTION 4

- (a) What is Remote Job Entry? (1½ Marks)
- (b) Enumerate **FOUR** benefits and **TWO** lapses of real-time processing method. (6 Marks)
- (c) i. What is digitised middleman? (1 Mark)
- ii. List **FOUR** examples of digitised middlemen in e-commerce platforms. (2 Marks)
- iii. State **FOUR** modes of e-commerce payments in use today. (2 Marks)
- (Total 12½ Marks)**

#### QUESTION 5

- (a) What are Network devices? (1½ Marks)
- (b) State **TWO** functions performed by each of the following network hardware devices.
- i. Router
- ii. Repeater
- iii. Wireless Adapter (6 Marks)
- (c) Enumerate **THREE** benefits and **TWO** lapses of social media for social and business communication. (5 Marks)
- (Total 12½ Marks)**

#### QUESTION 6

- (a) State **FIVE** characteristics of big data. (2½ Marks)
- (b) i. List **FOUR** signs which indicate that a computer or network has been infected by virus? (2 Marks)
- ii. State **FOUR** steps taken to remove virus from a computer. (2 Marks)
- (c) Define the following terms:
- i. Data Analytics
- ii. Internet of Things (IOT) (3 Marks)
- (d) State **TWO** distinctions between cybercrime and cyber security. (3 Marks)
- (Total 12½ Marks)**

## **SECTION A: PART I**

### **MULTIPLE CHOICE SOLUTIONS**

1. E
2. A
3. E
4. D
5. B
6. E
7. D
8. A
9. E
10. D
11. D
12. E
13. D
14. A
15. B
16. C
17. E
18. A
19. C
20. D
21. B
22. A
23. A
24. B
25. E
26. E
27. B
28. E
29. C
30. E

### **Examiner's comment**

This section comprises of (30) thirty multiple-choice questions which is compulsory for all candidates. The questions cover all segments of the syllabus.

The performance of the candidates was a little above average. In subsequent examinations, candidates are advised to read the Institute's study pack.

## **SECTION A: PART II**

### **SHORT ANSWER SOLUTIONS**

1. Relevance
2. VLSI (Very Large Scale Integration)/Microprocessor
3. Centralised processing/Centralised computing
4. Internet
5. Star topology
6. Wireless Network
7. Fibre Optic/Optical fiber cable
8. Full Duplex
9. Bridge
10. OSI (Open System Interconnection) Model
11. Webpage
12. Web blog/ Website blog/blog
13. Browsing/Surfing the web
14. Waterfall Model/ SDLC
15. Prototyping
16. Artificial Intelligence
17. High-level Language (HLL)
18. Bug
19. Loop/Iteration
20. Variable

### **Examiner's comment**

This section contains (20) twenty short-answer questions and is also compulsory for all the candidates. These questions cover the entire syllabus. The performance of candidates in this section was far below average as most of them scored below 50% of the total marks.

## **SECTION B**

### **SOLUTION 1**

- a. Essential attributes of information include:
  - i. It must be accurate and free from errors
  - ii. Verifiable
  - iii. It must be timely
  - iv. Must be organised
  - v. Must be meaningful

- vi. Must be useful
- vii. It must be cost effective
- viii. It must be complete
- ix. Must be objective
- x. Flexibility
- xi. Must be simple
- xii. Communicated to the right person/channel
- xiii. Availability
- xiv. Concise
- xv. Allow users to make effective decision
- xvi. Consistency
- xvii. Understandable/ Clear
- xviii. It must be current

bi. 10011.011101

**Solution:**

**Integer part: 10011**

$$\begin{array}{r}
 4 \ 3 \ 2 \ 1 \ 0 \\
 1 \ 0 \ 0 \ 1 \ 1 \ 2 = (1 \times 2^4) + (0 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \\
 \quad \quad \quad (1 \times 16) + (0 \times 8) + (0 \times 4) + (1 \times 2) + (1 \times 1) \\
 \quad \quad \quad 16 \quad + \ 0 \quad + \ 0 \quad + \ 2 \quad + \ 1 \\
 \quad \quad \quad = 19
 \end{array}$$

**Fractional part: 011101**

$$\begin{array}{r}
 -1 \ -2 \ -3 \ -4 \ -5 \ -6 \\
 0 \ 1 \ 1 \ 1 \ 0 \ 1_2 \\
 (0 \times 2^{-1}) + (1 \times 2^{-2}) + (1 \times 2^{-3}) + (1 \times 2^{-4}) + (0 \times 2^{-5}) + (1 \times 2^{-6}) \\
 0 + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + 0 + \frac{1}{64} \\
 \underline{16 + 8 + 4 + 1} \\
 \quad \quad \quad 64 \\
 \frac{29}{64} = 0.453125
 \end{array}$$

**Answer = 19.453125<sub>10</sub> ≈ 19.45<sub>10</sub>**

or

0 →	0 × 2 <sup>-1</sup> →	0 × 0.5	=	0.000000
1 →	1 × 2 <sup>-2</sup> →	1 × 0.25	=	0.250000
1 →	1 × 2 <sup>-3</sup> →	1 × 0.125	=	0.125000
1 →	1 × 2 <sup>-4</sup> →	1 × 0.0625	=	0.062500
0 →	0 × 2 <sup>-5</sup> →	0 × 0.03125	=	0.000000
1 →	1 × 2 <sup>-6</sup> →	1 × 0.015625	=	0.015625
				<b>0.453125</b>

Merge the two: 19.453125

bii. 1 0 1 1 1 1 0 1 to decimal number

7 6 5 4 3 2 1 0

1 0 1 1 1 1 0 1<sub>2</sub>

$(1 \times 2^7) + (0 \times 2^6) + (1 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0)$

$(1 \times 128) + (0 \times 64) + (1 \times 32) + (1 \times 16) + (1 \times 8) + (1 \times 4) + (0 \times 2) + (1 \times 1)$

$128 + 0 + 32 + 16 + 8 + 4 + 0 + 1$

Answer = 189<sub>10</sub>

ci. **Features of Second Generation Computers include:**

1. The computer uses transistors
2. More reliable compared to first generation computers
3. Smaller in size compared to first generation computers
4. Generate less heat compared to first generation computers
5. Consumed less electricity compared to first generation computers
6. This generation of computers used magnetic core as internal memory
7. Programming were done using low level language (Assembly language)
8. Use magnetic tapes instead of punched cards for storage, input and output.
9. Support early high-level languages like FORTAN and COBOL
10. They were more affordable and easier to maintain than first generation computers
11. They were still mainly used for scientific and business applications

cii. **Features of Fifth Generation Computers (Present and beyond) include:**

1. They are based on Artificial Intelligence (AI) technologies.
2. They support natural language processing (ability to understand human language).
3. They use parallel processing and superconductor technology for high speed.
4. They are capable of learning, reasoning, and decision-making.
5. They include advanced technologies like robotics, machine learning, and expert systems.
6. They are extremely fast, powerful, and highly reliable.
7. They are designed to handle complex problems such as speech recognition and intelligent systems.
8. They use ULSI, that is, Ultra Large Scale Integration Technology.
9. More user friendly interfaces with multimedia features.
10. They feature advanced, high capacity storage solutions such as SSDs, Cloud storage.
11. They are compact and very portable such as laptops, tablets and smartphones.

### **Examiner's comment**

Question one tests candidates' knowledge of differentiating between generations of computer as well as the understanding of how to compute number bases. The question demanded from the Candidates the process of converting binary numbers to decimal number equivalent. Many could not answer the floating-point number correctly. 95% of the candidates attempted this question. The performance was above average.

For future examination, students are advised to make effective use of ICAN study pack.

### **SOLUTION 2**

- ai. Computer Output on Microfilm (COM) is an output device that stores the output as miniature photographic images. It is a technology that allows data from a computer to be directly recorded onto microfilm, by passing the need for paper printouts. This method is used to store and archive large amounts of data in a compact, space saving format and it offered faster data retrieval.
- aii. **Benefits of COM include:**
1. It significantly reduces cost associated with paper printing, handling and storage space.
  2. Microfilm is a highly compact storage medium, allowing large amount of information to be stored.
  3. It is immune to hacking and cyber attacks, offering secure way to store vital information.
  4. Longevity in that it is a reliable medium for long-term archiving.
  5. COM allows for faster data retrieval compare to paper records.
  6. Allows for the storage of vast amounts of data in a small physical space
  7. The automation of data transfer to COM reduces manual handling of documents.
  8. Data can be transferred to microfilm directly from computer tapes much faster than printing to paper.
  9. High quality microfilm can be easily read with a viewer and multiple copies can be made.
- bi. Controls are the processes, procedures and systems that organisation use to guide, regulate and protect their operations in order to stay on-track towards their goals. They help to monitor performance, detect deviations and correct errors so that organisational goals are achieved efficiently.
- bii. **Functions of controls in a typical organisation include:**
1. Control helps in deciding or planning the goals to be achieved by the organisation which can serve as guides during the activities of the company
  2. It is helpful during the data collection process, as it ensures that the correct data is gathered and that its accuracy guaranteed

3. Comparison of the goals set with the actual results or output in order to detect possible variance and reasons for its occurrence
  4. Control helps in taking corrective action so that the set objectives can be achieved
  5. It ensures the achievement of organizational goals
  6. It helps the organization to stay on track toward achieving its set objectives.
  7. It helps in measuring organisational performance
  8. It detects variations by identifying differences between expected results and actual results.
  9. It encourages employees to follow rules, policies, and procedures.
  10. It helps in improving organisation's efficiency
  11. It helps in minimizing losses, fraud, and misuse of organizational resources
  12. It supports decision making by providing managers with accurate information
  13. It helps in waste reduction
  14. It helps in identifying risks and effectively manage the risk
- c. **Features of graph plotter as an output device include:**
1. It produces high quality output/images through the use of series of small dots
  2. It is used for special purposes such as engineering
  3. It can produce multiple colours
  4. It produces high precision drawings
  5. It supports large format printing e.g maps, posters, signs, etc
  6. It uses inkjet printer technology on a much large scale

**Examiner's comment**

This question tests candidates on the knowledge of computer on Microfilm, and its benefits. It also required the students to describe controls and as well states the function of controls in a typical organisation.

Less than 40% of the candidates attempted the question with a performance record of slightly above fifty percent. The performance of candidates on the (a) part of the question was not encouraging.

Students are advised to make use of ICAN study materials.

### SOLUTION 3

a. Function and example of Application software include:

S/N	APPLICATION SOFTWARE	FUNCTION	EXAMPLE
i.	Word processor software	Used for creating, editing, formatting, and printing text documents such as letters, reports, and assignments.	Microsoft Word, Google documents, Notepad, Apple pages, Corel word perfect, Wordpad, Open office writer, Wordstar, Wordperfect
ii.	Spreadsheet software	Used for organizing data in tables, performing calculations, data analysis, and creating charts/graphs.	Microsoft Excel, Google spreadsheet, Smartsheet, Open office calc, Visicalc, Supercalc
iii.	Graphic software	Used for creating, editing, and designing flyers, images, drawings, and visual Content	CorelDraw, Adobe photoshop, Adobe illustration, GIMP, Canva, PaintNET, Inkscape, Sketch
iv.	Database software	Used for creating, and managing database, storing, retrieving, and manipulating large amount of data	Microsoft Access, Oracle, Postgre SQL, MongoDB, MySQL, Microsoft SQL Server, File Maker, SQ Lite, etc.
v.	Web browser	It gives users access to the internet and used for accessing, retrieving, and viewing information on the internet	Google Chrome, Internet Explorer, Microsoft Edge, Safari, Mozilla Firefox, Opera mini, Netscape Navigator, Mosaic, Dolphim Browser.

b. Requirements for a multi-user application include:

1. Data security, that is, protection of people's data from unauthorized access
2. User authentication, which means that users identity must be verified by the system
3. Data in a multi user application must be accurate and remain consistent which is Data Integrity
4. Backup and recovery system
5. It must be able to grow as volume of data increases and handles many users
6. Network connection capability
7. Database management system (DBMS)

8. Fast response time
9. User authorization
10. Concurrency control
11. Logging and audit trail
12. Resource management
13. User interfaces for different category of users
14. Session management

### **Examiner's comment**

This question tests the candidates understanding of the major function of different application software and requirements for multi-user application. The question is a familiar question to the candidates, hence many of them attempted the question.

About 75% of the candidates attempted the question. The performance of the candidates in this question was good. However, candidates can still perform better by studying ahead of examination through the use of study pack.

### **SOLUTION 4**

- a. Remote Job Entry (RJE) refers to processing (batch) where jobs are entered at a remote terminal from the computer and transmitted to computer online (via telecommunication link) or offline using external storage system.

OR

RJE is a computing process where jobs are submitted from a remote location to a main computer for processing and the results are then returned to the remote site using communication link.

- bi. **Benefits of Real-time processing include:**

1. Computer output is instantaneously made available
2. The output from real-time processing can be used to influence immediate/active transaction
3. It avoid the use of consuming and unnecessary paperwork
4. It enables users to see the cumulative effects of all transactions for decision making
5. It avoids costly and time-consuming data preparation and control operations.
6. It provides up-to-date information allowing for instant analysis and informed decision making
7. Real-time monitoring allows for early detection of issues and immediate action to prevent negative impact.
8. By analyzing data in real-time, businesses can adjust operations to meet current demands
9. It can analyze transactions and identify suspicious activity enabling businesses to detect and prevent fraud
10. Real-time monitoring can identify security breaches and vulnerabilities allowing for prompt action to mitigate risks.

**bii. Lapses of Real-time processing include:**

1. Real-time requires specialized, high performance hardware and software that are expensive to acquire and maintain
2. Designing and implementing real-time system is complex requiring expertise and higher development costs
3. If it is not properly optimized, it can lead to slow processing time, delays and even system crashes.
4. Dealing with sensitive data on real-time raises significant security and privacy concerns
5. The speed of real-time processing can increase the risk of errors if data is not validated or handled correctly
6. Real-time systems primarily focus on current data, which can limit the ability to analyze historical trends and patterns
7. Data integrity issues can arise from errors in user input, affecting the reliability of the processed information
8. It may be challenging integrating real-time systems with existing infrastructure
9. There is no adequate time for the clerical checking and authorization of input data
10. The intensive light from the monitor of real-time systems affects the eyes of users
11. Business or users' activities can be affected in case of system breakdown

ci. Digitized Middleman also called digital intermediary is a company or platform that uses the internet to connect buyers and sellers thereby facilitating transactions and charging a commission or fee.

OR

It can be defined as online platform or system that acts as an intermediary between buyers and sellers using digital technology to facilitate transactions.

**ii. Examples of digitized middlemen in e-commerce include:**

1. Amazon
2. eBay
3. Alibaba
4. Jumia
5. Konga
6. Jiji
7. Airbnb
8. Upwork
9. Flutterwave store
10. Uber/Uber eats
11. Etsy
12. OLX
13. Bolt, etc

iii. **Forms of e-commerce payments include:**

1. Credit card
2. Debit card
3. Smart card
4. Cash on delivery (COD)
5. Cryptocurrency payment (e.g. Bitcoin)
6. Bank transfer or online transfer
7. Prepaid/Gift card
8. E-wallet
9. Netbanking
10. Mobile payment
11. Amazon pay
12. Buy now, pay later(BNPL), etc

**Examiner's comment**

This question tests candidates' knowledge of real-time processing method and the involvement of digitized middlemen in e-commerce platforms. This question, most especially the digitized middlemen in e-commerce is a general and popular topic on current, economic and social issues in information technology and that resulted in the reason why many of the candidates attempted the question. Over 70% of the candidates attempted the question with an average performance that is slightly above average. The candidates should study ICAN materials ahead of examination.

**SOLUTION 5**

- a. Network devices are the essential hardware components that enable communication and data transfer between devices on a network thereby facilitating seamless connectivity and information exchange.

**OR**

Network devices can be defined as hardware components or equipment used to connect computers and other devices together in a network in order to be able to communicate, share data, and access resources available in a network

bi. **Functions of Router include:**

1. Router link different networks (LANs, WANs) together
2. It manages all forms of network traffic
3. Many routers incorporate wireless capabilities, allowing devices to connect to the network via Wi-Fi
4. Enable creation of wireless LANs and facilitate the use of mobile devices
5. It determines the most efficient path for the data to reach its destination
6. Routers acts as firewalls, protecting the local network from unauthorized access and malicious traffic
7. It performs Network Address Translation (NAT) which translates private IP addresses (used on LAN) to a public IP addresses (used on internet)

**bii. Functions of Repeater include:**

1. Repeater is used to boost the strength of a weak signal, compensating for signal loss due to distance or interference
2. It amplify and recreate the signal, removing noise and distortion, ensuring that the signal is clear and reliable
3. It ensure that the regenerated signal is like the original, minimizing data corruption or loss
4. Used for both wired and wireless networks and can support different interfaces like Ethernet, Fiber optic and coaxial cables

**biii. Functions of wireless adapter include:**

1. Wireless adapter ensure that devices can connect to various wireless networks
2. Provide the freedom to connect to networks without connection with physical cables
3. Allow access to connect to wireless network even when they are not within range of a wired connection
4. If a device built-in wireless adapter is outdated or not performing well, USB or PCI wireless adapter can provide a faster and more stable connection
5. Connect to a wireless access point or router using an antenna instead of a cable allowing devices like laptops to access wireless networks
6. It translates digital from a computer into radio signals over the air and vice versa
7. It handles the necessary protocol management

**ci. Benefits of social media include:**

1. It allows for instant and global communication with friends, family and colleagues regardless of physical distances
2. Facilitates the formation of new connections and the expansion of network personally and professionally
3. It is a powerful tool for business to increase brand awareness, reach new customers and drive website traffic
4. Platform like LinkedIn provide avenues for professional networking and career development
5. Enables targeted advertising, allowing business to reach specific areas and interests leading to more effective marketing
6. It can raise awareness about important issues, promote social changes and empower marginalized communities
7. Connect people with shared interest, creating niche communities and foster a sense of belonging
8. Foster collaboration and communication among students and educators, enhancing learning experience
9. Businesses can use social media to humanize their brand, build trust and establish a strong online presence

10. It offers opportunities for customer engagement, feedback and relationship building which can foster loyalty
11. Provide access to a vast amount of information and news allowing users to stay informed about current events and global issues
12. It serves as a source of entertainment of various forms
13. It is very convenient and easy to access
14. It creates avenue to analyse competitors activities by accessing their social media pages
15. It is a cost effective means for online marketing and advertising.

cii. **Lapses of social media/networking include:**

1. It causes distraction thereby lowering productivity
2. There is spread of misinformation
3. Compromise privacy and data vulnerabilities
4. Promote superficial connections
5. Social media can be addictive
6. Enables bullying and harassment
7. Promote social isolation
8. Causes depression and anxiety
9. Help spread scams and frauds
10. It is prone to security challenges such as hacking and eavesdropping
11. It can expose organization activities to competitors
12. Reputation damage through negative feedback.

**Examiner's comment**

This question tests candidates on the understanding of various Network devices as well as importance and obstacles of social media in social and business communication. It also tests candidates on the use and importance of network hardware devices. 70% of the candidates attempted this question and the performance is good.

Candidates are advised to study ahead of examination and as well use the study pack of ICAN effectively.

**SOLUTION 6**

a. **Characteristics of big data**

1. Volume, which refers to increasing size of data generated from sources like social media.
2. Velocity, that is, the speed at which data is generated, collected and processed, requiring real time analytics to remain relevant.
3. Variety: This highlights the diversity of data types, including structured, semi structured and unstructured data.
4. Veracity which refers to the trustworthiness, quality and accuracy of the data. Big data can be messy, uncertain and inconsistent, requiring cleaning to be useful.

5. **Value:** This indicates the potential for converting massive datasets into meaningful insights that can improve decision-making, optimize business or drive profit.
6. **Variability:** This refers to inconsistency in data flows, such as spikes in volume or changing meanings of data over time.
7. **Visualisation** which refers to the ability to represent complex, massive data sets in a visual format. (charts, graphs, maps) to make them understandable and interpretable by humans.
8. **Validity** which concentrates on ensuring that the data is accurate, correct and suitable for the intended analysis, maintaining data governance standards.
9. **Volatility** which refers to the lifespan of the data
10. **Vulnerability:** This highlights the security risks.

**bi. Signs to show that a computer has been infected by virus include:**

1. Computer takes a long time to start up or performance is slow or unpredictable
2. The computer frequently crashes or generate error messages
3. Computer and its application behave erratically such as not responding to clicks or open files on its own
4. If the computer has a hard disk drive, it constantly spins or make noise
5. Email messages are corrupted or mass emails are being sent from your account
6. Pop-up messages constantly interrupt the user
7. Computer's available storage is unexpectedly reduced
8. Files and other data on the computer have gone missing
9. Increase in the number of files on the disk
10. Increase in the number of bad sectors on the disk
11. Network shut down
12. Alteration of the system clock

**bii. Steps to remove virus infections from computer:**

1. Immediately disconnect from the internet
2. Restart the computer in safe mode
3. Run a full system antivirus scan
4. Quarantine/remove the virus

**ci.** Data Analytics is the process of examining raw data to discover trends, pattern and insights that can be used to make informed decision and solve problems. It involves collecting, cleaning, transforming and modeling data to extract – meaningful information for decision making.

**cii.** Internet of Things (IoT) is the network of physical objects that are embedded with sensors, software and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.

OR

It refers to the network of physical objects (devices, vehicles, appliances etc) that are embedded with sensors, software and network connectivity, allowing them to collect and exchange data with other devices and systems over the internet.

d. **Distinctions between cybercrime and cybersecurity include:**

S/N	CYBERCRIME	CYBERSECURITY
1	It is illegal activities carried out through the use of computers or the internet	It protects computers, networks, and data from attacks
2	It is carried out by hackers or cyber Criminals	It is implemented by system security Expert
3	The intention is to steal, damage, or disrupt systems	The intention is to prevent attacks and protect information from unauthorized Access
4	It is a threat to information system	It is a defense method
5	It can lead to loss of data and other resources	It can lead to protection of data, system, network and other resources

**Examiner's comment**

This question tests candidates' knowledge in identifying various signs of detecting if computer or network has been infected by virus and steps to follow in removing such virus from the computer. The question also addresses the areas of issues in computer security and modern system development.

Over 40% of the candidates attempted the question with overall performance less than average. The candidates are hereby encouraged to make effective use of ICAN study pack.