THE INSTITUTE OF CHARTERED ACCOUNTANTS OF NIGERIA

INSIGHT

SEPTEMBER 2025 ATSWA EXAMINATION

PART II

Question Papers, Suggested Solutionsand Examiners' Comments

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THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA

ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
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FINANCIAL ACCOUNTING

PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER

EXAMINATION INSTRUCTIONS

1. All solutions should be in 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 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, SEPTEMBER 23, 2025

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 – SEPTEMBER 2025

FINANCIAL ACCOUNTING

Time Allowed: 3 hours

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

ATTEMPT ALL QUESTIONS

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 errors will **NOT** result in a difference in trial balance and the creation of a suspense account?

   A. A transaction entered either as two debits or as two credits
   B. A complete reversal of entries
   C. A single debit entry or single credit entry is made in the books of account
   D. A transposition error
   E. An arithmetical error in the trial balance

2. The trial balance of NGX Ltd shows a total debit balance of ₦1,665,390 and a total credit balance of ₦1,631,594. A review of the nominal ledger accounts revealed that ₦16,898 cash sales in the month of December had been debited to both bank account and to sales account. What is the double entry required to correct this error?

   A. Debit sales ₦16,898, Credit suspense account ₦16,898
   B. Debit suspense account ₦16,898, Credit sales account ₦16,898.
   C. Debit suspense account ₦33,796 credit sales ₦33,796
   D. Debit sales ₦33,796 Credit suspense account ₦33,796
   E. Debit cash account ₦33796 Credit sales ₦33,796.

3. A sole trader withdrew business inventory for its own use. The goods cost ₦255,000 but no entries were made in the ledger. The trial balance will be

   A. Understated by ₦255,000
   B. Overstated by ₦255,000
   C. Overstated by ₦510,000
   D. Understated by ₦510,000
   E. Correctly stated

4. Which book of prime entry is most likely to be used to correct an error that has been made in the accounts by recording a purchase from a supplier as ₦450,000 instead of ₦405,000.

A. Purchase day book
B. Purchases return day book
C. Cash book
D. Journal
E. Sales day book

5. Which of the following accounts could appear in either the debit column or credit column of a trial balance?

A. Bad debt
B. Bank
C. Drawings
D. Sales
E. Cost of sales

6. In professional ethics, what is the primary purpose of a "confidentiality agreement"?

A. To maximise profit
B. To ensure transparency
C. To protect sensitive information
D. To promote competition
E. To maximise wealth of stakeholders

7. Which of the following is a single user operating system?

A. Windows
B. Ms - DOS
C. MAC
D. CPU
E. https

8. Which of the following is a major function of system software?

A. File management
B. Translation of machine language into machine code
C. Collection of files
D. Arrangement of files in ascending order
E. Conversion of data into figures

9. Data created by the user is called

A. qualitative data
B. primary data
C. quantitative data
D. secondary data
E. multiple data

10. Which of the following statement about URL is true? It is

A. a computer software program
B. a type of web server
C. an acronym for unlimited resources for learning
D. a computer system module that facilitates computing
E. the address of document or 'page' on the World Wide Web

11. Which of the following is **NOT** an advantage of a sole proprietorship?

A. Full control by the owner
B. Easy to set up
C. Limited liability
D. Taxed as personal income
E. Confidentiality of operations

12. Company A issues 2,000,000 shares of ₦50 each at a premium of ₦15 per share. What is the total amount credited to the share premium account?

A. ₦15,000,000
B. ₦30,000,000
C. ₦50,000,000
D. ₦65,000,000
E. ₦100,000,000

13. Partner X retires from a firm. The goodwill of the firm is valued at ₦300,000. The profit-sharing ratio was 4:3 between X and Y respectively. How much goodwill should Y pay X if goodwill is recorded and settled immediately?

A. ₦42,857
B. ₦128,571
C. ₦171,429
D. ₦225,000
E. ₦300,000

14. Which of the following is a major challenge when implementing AI-driven financial reporting systems?

A. Unlimited data storage capacity
B. High transparency of AI algorithms
C. Ensuring data quality and availability
D. Decreased need for cyber security
E. Automatic regulatory compliance

15. The primary purpose of the statement of financial position is to

A. show the profitability of a business over a period
B. provide information about cash inflows and outflows
C. present a company's assets, liabilities, and equity at a specific point in time
D. detail changes in shareholders' equity
E. summarise revenue and expenses

16. Which of the following best describes the purpose of a control ledger in accounting?

A. To track only cash transactions and reconcile bank statements
B. To summarise and control the individual balances in subsidiary ledgers
C. To replace the need for maintaining individual customer or supplier accounts
D. To record non-financial performance indicators alongside financial data
E. To record journal entries prior to posting to the general ledger

17. Which of the following is a measure of a company's short-term liquidity?

A. Return on equity
B. Debt-to-equity Ratio
C. Current ratio
D. Gross Profit Margin
E. Interest Coverage Ratio

18. Which of the following is **NOT** one of the fundamental principles of the professional code of ethics for accountants?

A. Integrity
B. Objectivity
C. Faithful representation
D. Professional competence and due care
E. Confidentiality

19. Revenue is L$500 million and Gross Profit is L$200 million. What is the Gross Profit Margin?

A. 30%
B. 35%
C. 40%
D. 45%
E. 50%

20. A machine was purchased for ₦12,000,000 on January 1, 2022. It has a useful life of 5 years and no residual value. What is the annual depreciation using straight-line method?

A. ₦1,800,000
B. ₦2,000,000
C. ₦2,200,000
D. ₦2,400,000
E. ₦2,500,000

21. The proprietor of Vital Enterprises paid ₦1,000,000 by cheque from private purse into the business bank account. How will the transaction affect the equity in the statement of financial position of the business?

A. Decreases liability and increases bank balance
B. Decreases bank balance and increases liability
C. Increases assets and decreases equity
D. Increases bank balance and increases equity
E. Decreases assets and increases equity

22. The necessary accounting entries required to record the loss on assets on cessation of a partnership is.....

A. Dr. Realisation account; Cr. Assets account
B. Dr. Realisation account; Cr. Partners' capital account
C. Dr. Loss on assets account; Cr. Partners' capital account
D. Dr. Assets account; Cr. Revaluation account
E. Dr. Assets account; Cr. Realisation account

23. The necessary journal entries required to record decrease in the value of liabilities in the books of partnership business on admission of a new partner is to

A. Dr. Partners' capital account; Cr. Liabilities account
B. Dr. Liabilities account; Cr. Partners' capital account
C. Dr. Liabilities account; Cr. Revaluation account
D. Dr. Liabilities account; Cr. Realisation account
E. Dr. Revaluation account; Cr. Liabilities account

24. The balance carried down (c/d) on the debit side of the subscription's accounts in the books of XYZ cultural organisation reveals members

A. who may become insolvent in future.
B. whose subscriptions have fallen due and yet to honour their financial obligations
C. who have prepaid their subscriptions
D. who have paid life membership subscriptions
E. who are the financiers of the cultural organisation

25. The mark-ups of Darah enterprises were ⅓ and ¼ on cost of sales in respect of commodities X and Y.
What are the profit margins percentages of these commodities?

	X	Y
A.	25%	20%
B.	33⅓%	25%
C.	17%	33⅓%
D.	20%	25%
E.	33⅓%	17%

26. The accounting assumption that supports the historical cost principle of recording an element in the books of account is

A. money measurement assumption
B. periodicity assumption
C. going concern assumption
D. duality assumption
E. objectivity assumption

Use the following information to answer questions 27 and 28

Ajadi and Umeh are in partnership with the following relevant information for the year ended December 31, 2024

	Ajadi	**Umeh**
	₦	₦
Fixed capital	3,000,000	5,000,000
Interest on Capital per annum	45,000	75,000
Drawings for the year	600,000	800,000
Interest on drawings	12,000	16,000
Profit or loss sharing ratio	2	3

The net profit for the year ended December 31, 2024 is ₦5,600,000

27. What is the distributable profit for the year ended December 31, 2024?

A. 5,000,000
B. 5,500,000
C. 5,508,000
D. 5,600,000
E. 5,628,000

28. What is the net income realised by Ajadi from the partnership?

A. 2,170,200
B. 2,203,200
C. 2,215,200
D. 2,236,200
E. 2,248,200

29. In partnership amalgamation, the necessary account entries required to record the value of assets not to be taken over by the new business in the books of the old business is.....

A. Dr. Capital account; Cr. Revaluation account
B. Dr. Assets account; Cr Revaluation account
C. Dr. Realisation account; Cr. Assets account
D. Dr. Capital account; Cr. Assets account
E. Dr. Assets account; Cr. Realisation account

30. Opening inventory, purchases, carriage inwards and closing inventory are financial accounting information which can be used to compute

A. working capital
B. stock turnover ratio
C. cost of sales
D. trading account
E. acid test ratio

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. Total assets minus total liabilities are usually called net asset which is also referred to as ..... or .....
2. The list of accounts created by a business to be used to organise its financial transactions into identified categories of elements of financial statements is .....
3. The document that is issued by a business when a customer returns goods and the business agree to it, is .....
4. Shares issued to existing shareholders at a price lower than the market price is .....
5. The purpose of profit or loss appropriation account is .....
6. A breach of confidentiality may be acceptable when .....
7. A "smart contract" on a blockchain is best described as .....
8. At year-end, the adjustment required to update the allowance for doubtful debts is based on the estimated percentage of .....
9. If goods are shipped FOB destination and the shipment has not arrived by year-end, the inventory should not be reported in the seller's books until ownership is .....
10. An example of a secondary profitability or efficiency ratio is .....
11. Two common year - end adjustments when preparing financial statement of an entity are ..... and .....
12. IFRS 18 is a new accounting standard that is expected to replace .....

13. The attractive force which brings in patronage and distinguished an old established partnership business from a newly established partnership business with the capacity of the old business to earn profit in future is .....

Use the following information to answer questions 14 and 15.

An extract from the incomplete records of Vasta Enterprises is

Purchases:	₦2,945,000
Goods available for sale:	₦4,395,000
Cost of goods sold:	₦3,945,000

The business maintains a margin of 25% on sales.

14. The sales amount of the business is .....

15. The closing inventory of the business is .....

16. At cessation of partnership business, realisation expenses can be over or underestimated. The necessary accounting entries required to write off excess realisation expenses from the partnership books is .....

17. The main reason why historical cost is used as a medium of recognising elements in the books of account is .....

18. One of the qualitative characteristics of financial statements that describe the need to define transaction or event in terms of commercial reality is .....

19. In accordance with provisions of IAS 8, two examples of accounting estimates are ..... and .....

20. The accounting principle or convention that demands caution from an Accountant in recognising revenue is .....

SECTION B: ATTEMPT ANY FOUR QUESTIONS (50 MARKS)

QUESTION 1

a. Define the term petty cash and explain how it is related to the imprest systems. (3 Marks)

b. Explain the purpose of the following documents:

i. Goods received notes, (1 Mark)
ii. Sales invoice, and (1 Mark)
iii. Credit note. (1 Mark)

c. A fire that occurred on March 31, 2025 destroyed some of the inventory of Adanna Nigeria Ltd. Some of the inventory records of the company were lost. However, the accounting officer of the company was able to retrieve the following information:

Inventory at March 1, 2025	₦635,000
Purchase for March 2025	₦1,265,000
Sales for March 2025	₦1,755,000
Inventories salvaged in good condition at March 31 2025	₦380,000

The marketing department of the company makes a standard gross profit on sales of 30%. The Insurance company of Adanna Nigeria Ltd has a standard agreement to pay only 60% of verified losses only.

Required:

Calculate the cost of the inventory lost to fire and determine the amount to be paid by the insurance company. (6 ½ Marks)

(Total 12½ Marks)

QUESTION 2

a. State **FIVE** reasons a profitable company may still experience cash flows issues. Illustrate each reason with an example. (7½ Marks)

b. A retailer buys L$150,000 worth of inventory but only sells L$50,000 of it this month at a 40% profit margin. No credit sales.

Required:

Calculate the profit and cash amount (5 Marks)

(Total 12½ Marks)

QUESTION 3

a. Identify **TWO** main possible safeguards which can reduce or eliminate ethical threats to an acceptable level, giving two examples of each of the safeguards. (5 Marks)

b. Omoge Awelewa, an AATWA holder, worked as an accounting officer in the final accounts department of Kasamadupe Nigeria Ltd. She was asked by her boss to falsify the accounts to increase the company's profit. This was achieved primarily by capitalising some costs rather than treating them as operating expenses. Although, Omoge considered resigning due to the pressure to falsify records, she chose to remain with the company. She was subsequently promoted to the managerial post with higher salary after achieving her boss's objective.

Required:

i. List **THREE** factors which might have influenced Omoge to make fraudulent entries. (3 Marks)

ii. Identify any **THREE** other courses of action that Omoge could have taken. (4½ Marks)

(Total 12½ Marks)

QUESTION 4

Omega Ltd has the following share capital structure and recent transactions:

Authorised share capital: 10,000,000 shares of ₦50 each.

Issued and fully paid shares: 5,000,000 shares of ₦50 each.

The company declares a rights issue of 1 new share for every 5 shares held at ₦55 per share (₦50 par + ₦5 premium).

A Shareholder holding 10,000 shares, and fully subscribed to the rights issue, failed to pay the final call of ₦10 per share on the original shares.

The company forfeits 2,000 shares from this shareholder for non-payment of the final call. These forfeited shares are reissued at ₦45 per share fully paid.

The company also issued 500,000 bonus shares.

Required: Calculate the

a. Amount of money raised from the rights issue. (2½ Marks)

b. Shareholder's total cash paid on fortified shares and calls in arrears before forfeiture. (2 Marks)

c. Amount of cash received from the reissue of forfeited shares and the balance on the forfeited shares account after reissue. (3 Marks)

d. Total number of shares outstanding after all transactions. (3 Marks)

e. Company's share capital and share premium balances after all transactions. (2 Marks)

(Total 12½ Marks)

QUESTION 5

The statement of financial position of Marathon Limited as at December 31

	2023 ₦'000	2024 ₦'000
Ordinary shares of ₦1 each	8,000	13,000
6% preference shares of ₦1 each	2,000	2,000
Share premium	2,900	3,900

Reserves	6,400	5,400
Profit or loss	3,200	4,480
8% redeemable loan notes	2,500	900
Trade payable	7,040	7,980
Income tax due within next year	680	2,360
Proposed dividend	920	520
	33,640	40,540
Premises at valuation	7,700	10,140
Plant and machinery (net)	8,840	11,460
Motor vehicle (net)	1,980	2,420
Investment at cost (all quoted)	3,140	2,080
Inventories	6,560	7,680
Trade receivables	4,020	6,340
Bank balance	1,220	420
Preliminary expenses	180	-
	33,640	40,540

Additional information

i. During the year, script issues out of reserve was made of one fully paid ordinary share for every four held at the beginning of the year.
ii. Preference shareholders were paid their full dividends for the year in July that year.
iii. Debentures were redeemed at 110. Premium on redemption was immediately written off to profit or loss accounts.
iv. Machineries item with a book value of ₦900,000 was sold for ₦760,000.
v. A fairly used motor vehicle of ₦800,000 was acquired during the year.
vi. Quoted investments were sold at a profit of ₦620,000.
vii. Total depreciation on non-current assets was ₦840,000.
viii. No premises were bought during the year.
ix. Ordinary shares dividend for 2023 was paid in 2024.

Required:

a. Determine cash generated from operations before working capital changes. (6½ Marks)

b. Determine cash generated from operations after working capital changes. **(Show all workings)** (6 Marks)

(Total 12½ Marks)

QUESTION 6

The books of Igbamide Enterprises and Ogomide Enterprises contain the following information:

Igbamide Enterprises

Statement of financial position as at September 30, 2024

	₦'000	₦'000
Non-current assets		
Freehold premises		17,800
Furniture and fittings		1,800
		19,600
Current assets		
Inventory	4,000	
Trade receivables	1,600	
Bank balance	400	
	6,000	
Current liabilities		
Trade payables	(2,180)	3,820
Capital employed		23,420
Financed by: Capital		23,420

Ogomide Enterprises

Statement of financial position as September 30, 2024

	₦'000	₦'000
Non-current Assets		
Motor vehicles		80,000
Office equipment & fittings		2,000
		82,000
Current Assets		
Inventory	3,000	
Trade receivables	2,000	
Bank balance	100	
	5,100	
Current liabilities		
Trade payables	(3,600)	1,500
		83,500
Capital Employed		83,500
Financed by: Capital		

On October 1, 2024 Igbamide and Ogomide enterprises decided to come together on the following terms:

i. Inventories of the two businesses to be reduced by 5%
ii. Allowance for doubtful debts to be made at 2½% on trade receivables of the two businesses
iii. Igbamide to keep and dispose of its furniture & fittings, while the office equipment of Ogomide is to be revalued at ₦3,000,000
iv. Igbamide to be credited with goodwill of ₦1,000,000
v. Igba-ogode enterprises will be the name of the new business

Required:

Prepare the revaluation accounts in the books of Igbamide and Ogomide Enterprises and Post amalgamation statement of financial position as at October 1, 2024. **(Total 12½ Marks)**

SECTION A: PART 1

MULTIPLE CHOICE SOLUTIONS

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

TUTORIALS

Q12. 2,000,000 x ₦15 = ₦30,000,000

Q13. $^4/_7$ x ₦300,000 = ₦171,429

Q19. $\frac{\text{Gross Profit}}{\text{Revenue}} \times 100\% = \frac{200,000}{500,000} \times 100\% = 40\%$

Q20. $\frac{₦12,000,000}{5} = ₦2,400,000$

Q25. X = 0.33/1.33 =25%
Y = 0.25/1.25 = 20%

Q27. ₦5,600,000 + (12,000 + 16,000) – (45,000 +75,000) = ₦5,508,000

Q28. $^2/_5$ x 5,508,000 + 45,000 -12,000 = ₦2,236,200

Examiner's comment

The questions covered the entire syllabus. All the candidates attempted the question being compulsory and their performance was good.

Their major pitfall was their inability to prepare well for the examination. Candidates are therefore advised to prepare well for the future ATSWA examinations.

SECTION A: PART II

SHORT ANSWER SOLUTIONS

1. Equity, Shareholders fund, Net worth, Capital or Accumulated fund
2. Chart of accounts
3. Credit note
4. Right issue at a discount
5. To appropriate or distribute profit among partners
6. Disclosure is required by law or authorised by the client
7. A self executing agreement with coded terms
8. Outstanding receivables expected to be uncollectible or closing balance of receivables
9. Transferred
10. Returns on capital employed (ROCE)
11. Prepayments, accruals, depreciation, bad debt allowance provision
12. IAS 1
13. Goodwill
14. ₦5,260,000
15. ₦450,000
16. DR. Realization expenses account. CR. Realisation account
17. It is objective or not subjective and also verifiable
18. Substance over form
19. Accounting estimates, estimating useful lives of PPE, allowance for doubtful debts, inventory obsolence and fair value of financial assets and liabilities
20. Prudence (conservatism)

TUTORIALS

Q14. Sales N 3,945,000 x 1.333%=₦5,260,000

Q15. Goods available for sale – Cost of goods sold
₦4,395,000 – ₦3,945,000 = ₦450,000

Examiner's comment

These are short answer questions spread across the whole syllabus.

All the candidates attempted the questions because they are compulsory. Their performance was very low.

The major pitfall of the candidates was that many of them did not prepare well for the examinations.

Candidates are advised to always prepare for future ATSWA examinations.

SECTION B

SOLUTION 1

a. **Petty cash:** This is the cash held by a business to pay for small items of expenses in situations where it is more convenient to pay in notes and coins than to pay through bank account. Petty cash might be used to pay for the following: transport fare, office expenses etc.

Imprest system: This is a very common petty cash system. Under this system a set amount is established say (₦50,000). This set amount is called imprest. At any particular time, the petty cash balance plus the amounts on invoices and notes (petty cash vouchers) should sum to the imprest. Periodically the invoices are removed and replaced by cash to re-establish the imprest in cash. It is a system of controlling and monitoring the petty cash expenses.

b. i. **Goods received notes**: This is a document produced when goods are received.

It is produced after goods have been checked against delivery notes and what has actually been received. Goods received notes is normally sent to staff. Who will check that what has been received is what was ordered and that the invoice agrees with what was received.

ii. **Sales invoice**: This is a document that is use to request payment from customers for goods received. Invoices normally show the date, details of transaction and payment terms.

iii. **Credit note:** This is a document issued when a customer return goods and the business agrees to the returned goods. It is the net amount of all invoices issued less cash received by the business up to a point in time.

c. **Calculation of inventory lost to fire and insured amount received**

	₦
Inventory as at March 1, 2025	635,000
Purchases for the month	1,265,000
Closing inventory for the month of March	(380,000)
Cost of sales plus cost of lost inventory	1,520,000
Cost of sales (1,755,000 x (100-30)%	(1,228,500)
Inventory loss to fire	**291,500**

Amount receivable from insurance company = 291,500 x 60% = ₦174,900

Examiner's comment

The question test candidates' knowledge on petty cash, imprest system, goods received notes, sales invoice, credit note and calculation of inventory lost to fire.

About 90% of the candidates attempted the question and their performance was good as about 80% of them scored above the average mark allocated to the question.

SOLUTION 2

1. Timing Differences Between Revenue and Cash Collection
   - **Accounts receivable**: If a company sells goods or services on credit, it may take weeks or months to collect payment, creating a cash shortfall in the meantime.
   - **Revenue recognition vs. cash**: Profit is recorded when earned, not when cash is received.
2. High Inventory Levels
   - **Cash tied up in stock**: Purchasing or producing inventory requires cash upfront, but that cash is not recovered until the inventory is sold and the sale is collected.
   - **Slow-moving inventory**: Excess or unsold inventory delays cash inflows.
3. Large Capital Expenditures
   - **Big investments**: Spending on equipment, facilities, or technology drains cash, even if the assets increase long-term profitability.
4. Debt Repayments
   - **Loan principal payments**: These reduce cash but don't show up on the income statement, so they don't affect profit.
   - **High interest costs**: Interest is a real cash expense that reduces available cash flow.

5. Delayed Payables
   - **Paying suppliers quickly:** If the company pays suppliers faster than it collects from customers, it may run into a cash shortfall even while profitable.

6. Dividends or Owner Withdrawals
   - **Distributions to shareholders or owners**: These reduce available cash even if the business remains profitable.

7. Tax Payments
   - **Large tax bills:** Taxes are often paid in lump sums and can significantly reduce available cash, especially if not well-planned.

8. Overexpansion
   - **Growing too fast:** Rapid growth often requires increased spending (hiring, marketing, new locations) before new revenue fully materializes.

9. Poor Cash Flow Management
   - Lack of forecasting: Without accurate cash flow planning, even a profitable company can run out of cash.
   - **Inefficient operations:** Delays in invoicing or collections can strain cash.

10. Non-cash profit
    Accounting profits e.g. (unrealised gains, accruals) did not generate real cash inflows.

11. One-Time Expenses or Shocks
    - **Unexpected costs**: Legal settlements, equipment breakdowns, or emergency repairs can consume large amounts of cash quickly.

b. i. Profit = L$50,000 - L$30,000 = L$20,000
   ii. Cash flow = L$50,000 - L$150,000 = -L$100,000

Workings:

Cost of goods sold (COGS): 60% of L$50,000 = L$30,000

Therefore:

Profit = L$50,000 - L$30,000 = L$20,000
Cash spent on inventory: L$150,000
Cash received from sales: L$50,000

Therefore:

Cash flow = L$50,000 - L$150,000 = -L$100,000 (Deficit)

Examiner's comment

The question test candidates' knowledge on a profitable company that still experience cashflow issues and calculation of profit margin on inventory sales.

About 85% of the candidates attempted the question and their performance was good as about 70% of those who attempted the question scored above the average mark allocated.

The candidates' major pitfall was their inability to prepare well for the examination.

SOLUTION 3

a. **Main safeguards to reduce or eliminate ethical threats**

i. Safeguards created by profession, legislation and regulations. Examples include:

- Educational training,
- Corporate governance regulations,
- Professional standards etc.

ii. Safeguards in work environment, examples include:

- Having strong internal control systems,
- Having appropriate disciplinary process in place
- Having whistle blowing procedure in place etc

iii. Safeguard at the firm level (employer controls)

- Strong internal policies such as conflict-of-interest disclosures, whistle blowing hotlines and rotation of duties
- Training and continuing professional development (CPD) programs to keep employees

b. i. **Factors that might have affected Omoge to make the fraudulent entries**

- The request was made by her boss or management pressure
- Financially she might have felt the pressure to keep her job or fear of job loss
- Potential prospects of being rewarded through promotion and pay rise
- Inability to decide how to deal with the situation
- Weak ethical culture

ii. **Other course of action that she could have taken**

She could have:

- Refused to make the adjustments.
- Brought the matter to the attention of other senior staff such as the internal auditor of the company

- Resigned
- Sought advice from her relevant professional body
- Sought legal advice; or
- Report the matter to relevant regulatory authorities if any

Examiner's comment

The question test candidates' knowledge on professional ethics and factors that might influence an accountant to make fraudulent entries.

About 75% of the candidates attempted the question and their performance was only average.

The candidates' major pitfall was their inability to read and prepare well for the examination.

SOLUTION 4

a. Amount raised from the rights issue
Existing shares = 5,000,000

Rights issue ratio = 1 for 5 → New shares = 5,000,000 ÷ 5 = 1,000,000 shares Issue price = ₦55 (₦50 par + ₦5 premium)

Total amount raised by company:
= 1,000,000 × ₦55 = ₦55,000,000

b. Shareholder's total cash paid and calls in arrears before forfeiture
Original shares held = 10,000

Share nominal = ₦50 (paid fully originally)

Final call unpaid per share = ₦10

Calls in arrears = 10,000 × ₦10 = ₦100,000
Assuming all previous payments on original shares fully paid except final call.

Cash paid on original shares before final call = 10,000 × (₦50 - ₦10) = 10,000 ×₦40 = ₦400,000
Amount raised from the shareholder (who owns 10,000 shares):
New shares for shareholder = 10,000 × ($^1/_5$) = 2,000 shares
Amount = 2,000 × ₦55 = ₦110,000

Cash paid on rights issue = ₦110,000
Total cash paid before forfeiture:

b i. ₦400,000 + ₦110,000 = ₦510,000

ii. Calls in arrears: ₦100,000

c. Cash received from reissue of forfeited shares and forfeited shares account balance
Forfeited shares = 2,000 shares

Final call unpaid per share = ₦10 → Forfeited amount = 2,000 ×₦10 = ₦20,000

i. Shares reissued at ₦45 per share fully paid → Cash received = 2,000 ×₦45 = ₦90,000

ii. Balance on forfeited shares account after reissue

Amount paid by 1st subscriber 2,000 x ₦45	=	90,000
Less: Outstanding amount yet to be paid 2,000 x ₦10 =		20,000
Balance		70,000

d.

Existing shares	5,000,000
Number of right issue	1,000,000
Forfeited shares	(2,000)
Shares reissued	2,000
Bonus issue	500,000
Total number of shares outstanding	6,500,000

e. i. Share capital and share premium balances after all transactions
Original share capital = 5,000,000 × ₦50 = ₦250,000,000
Rights issue share capital = 1,000,000 × ₦50 = ₦50,000,000

Bonus shares share capital = 500,000 × ₦50 = ₦25,000,000
Total share capital:
= ₦250,000,000 + ₦50,000,000 + ₦25,000,000
= ₦325,000,000

ii. Share premium on rights issue = 1,000,000 × ₦5 = ₦5,000,000

Gain on forfeiture and reissue	70,000
Bonus issue (500,000 x ₦50)	(25,000,000)
	(19,930,000)

Examiner's report

The question test candidates' knowledge of issuance of shares with right issue, bonus issue, forfeited and reissue of forfeited shares. About 30% of the candidates attempted the question. The performance was poor.

The major pitfall was the candidates' inability to calculate the value of the reissue shares.

SOLUTION 5

Marathon Limited

		₦'000	₦'000
a.	Profit for the year	(2,440)	5,620
	Adjustment for non-cash items:		
	Profit on revaluation (premises)		
	Depreciation for the year	840	
	Profit on sale of investment	(620)	
	Loss on sale of machinery	140	(2,080)
	Cash generated from operation before working capital changes		3,540

Workings:

P or L appropriation account

	₦'000		₦'000
Taxation	2,360	Balance b/d	3,200
Dividends:		Profit for the year	5,620
Ordinary	520		
Preference	120		
Reserve	1,000		
Premium of deb.	160		
Preliminary exp.	180		
Balance c/d	4,480		
	8,820		8,820

Premises (revaluation surplus) ₦10,140,000 - ₦7,700,000 = ₦2,440,000
Loss on sale of machinery: ₦900,000 - ₦760,000 = ₦140,000
Redemption of loan notes
Cost of loan notes ₦100 x 16,000 = ₦1,600,000
Premium ₦10 x 16,000 = ₦160,000

b.	Cash generated from operation before working capital changes		3,540
	Working Capital changes:		
	Increase in inventories	(1,120)	
	Increase in trade receivables	(2,320)	
	Increase in trade payables	940	(2,500)
	Cash generated from operation after working capital changes		1,040

Examiner's comment

The question test candidates' knowledge on cash generation from operations before and after working capital changes.

About 5% of the candidates attempted the question and performance was very poor.

Candidates' major pitfall was shallow knowledge of working capital changes and their inability to interpret the question.

SOLUTION 6

a.

Revaluation - Igbamide

	₦'000		₦'000
Inventory (5% *4,000)	200.00	Capital –Igbamide	2,040.00
Allowance for doubtful debt (2.5% *1)	40.00		
Furniture and fittings	1,800,00		
	2,040.00		2,040.00

OR

Revaluation - Igbamide

	₦'000		₦'000
Inventory	4,000.00	Inventory (95%*4)	3,800.00
Receivables	1,600.00	Receivables (97.5)	1,560.00
Furniture and fittings	1,800.00	Furniture and fittings	-
		Capital – Igbamide	2,040.00
	7,400.00		7,400.00

Revaluation - Ogomide

	₦'000		₦'000
Inventory (5% *3,000)	150.00	Office equipment	1,000.00
Allowance for doubtful debt (2.5% *2)	50.00		
Capital – Ogomide	800.00		-
	1,000.00		1,000.00

OR

Revaluation - Ogomide

	₦'000		₦'000
Inventory	3,000.00	Inventory (95%*4)	2,850.00
Receivables	2,000.00	Trade receivable	1,950.00
Office equipment	2,000.00	Office equipment	3,000.00
Capital – Igbamide	800.00		
	7,800.00		7,800.00

b. **Igba-ogodo Enterprises**
Statement of Financial position as at March 31, 2022

Assets	**₦'000**
Non-Current Asset	
Freehold premises	17,800
Motor vehicle	80,000
Office equipment	3,000
Goodwill	1,000
Total Non-Current Asset	**101,800**
Current Assets	
Inventory (3,800 + 2,850)	6,650
Trade receivables (1,560 + 1,950)	3,510
Bank (400 + 100)	500
Total current assets	**10,660**
Total assets	**112,460**
Equity	**L$'000**
Capital -Igbamide (23,420 - 2,040 + 1,000)	22,380
Capital -Ogomide (83,500 + 800)	84,300
Closing Capital	**106,680**
Current Liabilities	
Trade payables (2,180 + 3,600)	5,780
Total Current Liabilities	**5,780**
Total equity & Liabilities	**112,460**

Examiner's comment

The question test candidates' knowledge of revaluation of assets and liabilities after amalgamation of two enterprises and the preparation of statement of financial position. Performance of the candidates was average, as out of about

40% of the candidates that attempted the question, only about 50% of them scored above the average mark allocated to the question.

Candidates' major pitfall was the interpretation of the question as majority of them did not understand the requirement.

Candidates are, therefore, advised to read wide and prepare well for future ATSWA examinations.

AT/252/PII.6 **Examination No.....**

THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA

ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
SEPTEMBER 2025 EXAMINATIONS (PART II)

PUBLIC SECTOR ACCOUNTING

PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER

EXAMINATION INSTRUCTIONS

1. All solutions should be in 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 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, SEPTEMBER 24, 2025

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 – SEPTEMBER 2025

PUBLIC SECTOR ACCOUNTING

Time Allowed: 3 hours

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

ATTEMPT ALL QUESTIONS

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

1. The Act of National Assembly that provides for the prudent management of the nation's resources, encouraging and ensuring accountability and transparency in the handling of the nation's resources is the

   A. Pension Reform Act, 2007
   B. Economic and Financial Crime Commission Act, 2007
   C. Procurement Act, 2007
   D. Fiscal Responsibility Act, 2007
   E. Finance(Control and Management) Act, 1958

2. The Retirement Benefits Plan is dealt with by the International Public Sector Accounting Standard,IPSAS

   A. 2
   B. 4
   C. 39
   D. 11
   E. 49

3. The transcript prepared by a..... should be forwarded to the treasury with the certificate of cash and bank balances, schedule of vouchers pre-listed, schedule of contract awarded and bank reconciliation statement.

   A. sub-accounting unit
   B. sub-self-accounting unit
   C. cash office unit
   D. self accounting unit
   E. reconciliation unit

4. The Act that governs the management and operation of government funds, regulate the accounting system, the books of accounts to be kept and the procedures to be followed in the preparation of accounts and financial statement is

   A. Financial Reporting Council Act 2011
   B. Money Laundering (Prohibition) Act 1955
   C. Pension Reform Act of 2014
   D. Finance (control and management) Act of 1958, CAP.F.26 Laws of the Federation 2004
   E. Code of Conduct Bureau and Tribunal Act 1991

5. The recording of various vouchers according to the classification which show serial numbers and gross amount is

   A. posting
   B. scheduling
   C. pre-listing
   D. originating
   E. balancing

6. Financial statements based on cash basis IPSAS financial reporting format are structured representation of

   I. the financial position of an entity
   II. the overhead position of an entity
   III. the financial performance of an entity
   IV. the balance sheet of an entity

   A. I only
   B. I and IV only
   C. II and IV only
   D. I, II and IV only
   E. I and III only

7. According to Armed Forces Act No. 103 of 1979, the following are the rates of contributions to the scheme by the military staff

   A. 12.5% and 8% of the basic salary and allowances by the government and military staff
   B. 8% and 10% of the basic salary and allowances by the government and military staff
   C. 7.5% and 8% of the basic salary and allowances by the government and military staff
   D. 10% and 18% of the basic salary and allowances by the government and military staff
   E. 12% and 7.5% of the basic salary and allowances by the government and military staff

8. Not later than 7 working days from the day the employee is paid his salary, the employer shall remit an amount comprising the employee's contribution under the Pension Reform Act 2014 and the employer's contribution to the .....specified by the Pension Fund Administrator of the employee.

A. Pension Fund Customer
B. Pension Fund Custodian
C. Pension Fund Account
D. Pension Fund Director
E. Retirement Savings Account

9. A budget is a financial and or quantitative statement prepared and approved prior to a defined period for the purpose of attaining a given objective. However, in the case of government, budgets are used for the following, **EXCEPT**

A. As a guide for the present and future.
B. To plan, control and estimate the amount of receipts and expenditure during a specified period.
C. To distribute limited resources.
D. To motivate managers towards the achievement of quick promotion.
E. To inform managers about the operations and results of their areas of responsibility.

10. Which of the following is the power of the Auditor-General for the Federation?

A. Power to request information and explanation necessary for his duties
B. Power to prepare the financial statement
C. Power to formulate the fiscal policy of the government
D. Power to publish the financial statement in the official gazette
E. Power to approve payment of salary

11. Which of the following is **NOT** a component of revenue voucher?

A. National Chart of Accounts Code
B. Balance available
C. Received from
D. Date
E. Receipts No

12. Which of the followings is **NOT** a type of Fund?

A. General fund
B. Capital project fund
C. Special fund
D. Contingency fund
E. Government fund

13. Which of the following is **NOT** the statutory responsibility of Local Governments in Nigeria?

A. Formulation of economic policies, which will bring about rapid development in local government areas
B. Establishment and maintenance of cemeteries, destitute homes and provision of basic needs to the aged who are infirmed
C. Issuance of licenses in respect of motorcycles, cars, bicycles and keeping of pets
D. Issuance of license in respect of television and radio stations
E. Registration of all births, marriages and deaths

14. Which of the following is the Chief Executive Officer of the Local Government?

A. Secretary to the Local Government
B. Treasurer
C. Chairman
D. Head of Personnel Management
E. Supervisor

15. What is the purpose of the "Deemed cost approach" in IPSAS 33?

A. To determine fair value
B. To calculate carrying amount
C. To recognise transitional adjustments
D. To impair assets
E. To provide relief from retrospective application

16. In line with IPSAS 22, disclosure of Information about the General Government Sector, the following terms are used, **EXCEPT**

A. Public Financial Corporation Sector (PFC)
B. General Government Sector (GGS)
C. Government Business Enterprises (GBEs)
D. Public Non-financial Corporation Sector (PNFC)
E. Private Limited Liability Companies Sector (PLLC)

17. Which of the following is **NOT** a control function of the funds department in the office of Accountant General of the Federation?

A. Loan servicing
B. Collate and analyse the internal audit report from all the ministries and agencies
C. Cash backing and cash management
D. Managing the federation accounts, the Consolidated Revenue Fund (CRF) and other public funds
E. Regular reconciliation of government accounts with banks

18. The ratio which is used to determine how much a government business enterprise is financed by borrowing funds is

A. working capital ratio
B. acid test ratio
C. efficiency ratio
D. gearing ratio
E. profitability ratio

19. A leverage ratio that indicates the extent to which government entities finance their assets through total debt is

A. current ratio
B. solvency ratio
C. working capital ratio
D. debts to total assets ratio
E. stock turnover ratio

20. Which of the following is **NOT** a qualification for the appointment of a member ofthe Commission as outlined by the Fiscal Responsibility Act 2007?

A. All members of the Commission shall be person of unquestionable integrity
B. All members must possess qualification of not less than 10 years cognate post qualification experience
C. The Chairman and other members of the Commission other than the ex-officio members shall be appointed by the President subject to confirmation by the Senate
D. The Chairman and members of the Commission representing the six geo-political zonesshall be a full-time member
E. One or two of the members must have served as Senator of the Federal Republic of Nigeria

21. In public sector audit, SAI stands for

A. Supreme Accounting Institute
B. Secretary of Audit Institution
C. Sectional Audit Intervention
D. Supreme Audit Institution
E. Strategic Audit Institution

22. Which of the following is **NOT** an advantage of payback period investment appraisal method?

A. The method is popular with project evaluation where liquidity predominates over profitability
B. It serves as a useful screen to evaluate all projects
C. The approach uses cash flows rather than accounting profits to appraise
D. It may be used as a safeguard against risk, particularly if the latter increases as pay-back period lengthens
E. It ignores variations in the timing of cash inflows within the pay-back period

23. The disadvantages associated with the use of net present value (NPV) includes the following

I. timing of cash flows is considered
II. there is the obligation for management to determine the appropriate cost of capital
III. to use
IV. Maximises shareholder wealth
V. there is the assumption that the cash inflows will come as predicted which may not necessarily be so

A. I – II
B. I – III
C. II – IV
D. I – IV
E. I only

24. Which of the following is **NOT** a scope of internal audit function?

A. Vouching of payroll and third-party claims
B. Auditing of store movements and records
C. Conducting internal investigations and evaluation for management
D. Constant review and appraisal of the existing internal control measures
E. Guide members of the PAC in improper direction of its session

25. Which of the following does **NOT** play any role in the GIFMIS platform?

A. Desk officer
B. Reviewer
C. First approval
D. Planner
E. Final approval

26. A real or legal person that provides supply of goods, contracting of works or consultant is

A. Provider
B. Legal entity
C. Contractor
D. Supplier
E. Realtor

27. Inventories which are marked or stamped as "government property" may not besold, **EXCEPT** when specifically authorised by the

A. Auditor-General
B. Honourable Minister
C. Chief store officer
D. Accountant-General
E. Permanent Secretary

28. All payments made under authority of, or on behalf of, self- accounting units by Accounting Officers of other units or departments must be backed by Chequers and/or cash, and shall be classified to the appropriate

A. Expenditure head of estimates
B. Expenditure sub-head of estimates
C. Revenue head of estimates
D. Revenue sub-head of estimates
E. Cash transfer account

29. For movement of accounting staff between Ministries, Extra-ministerial offices and other arms of government, Financial Regulations, Treasury Accounting Manual and Treasury Circular must be approved by the

A. Accountant-General in consultation with the Auditor-General
B. Auditor-General in consultation with the accountant-General
C. Accountant-General in consultation with the Minister of Finance
D. Auditor-General in consultation with the Minister of Finance
E. Minister of Finance in consultation with the accountant-General

30. Which of the following is **NOT** a feature of a valid online payment or receipt (e-payment and e-receipt) voucher?

A. Signature of the paying imprest holder
B. Date of the voucher and voucher number or control number
C. Name and address of payee and amount (in words and figures)
D. Description of payment, (that is job done or service rendered)
E. Classification code (or chart of accounts), that is Head/Subhead

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. With reference to IPSAS 1, surplus or deficit for the period from the statement of financial Performance should also be presented on the face of statement of .....

2. The ratio expressed in days or months, that allow analysts to determine if the average collection period from debtors is good or not is .....

3. ..... of Nigeria was established to develop and publish accounting and financial reporting standards to be observed in the preparation of financial statements of public interest entities.

4. A pension having terms that specify the amount of pension benefits to be provided at a future date or after a certain period of time is .....

5. Among users of public sector accounting information, those who are interested in evaluating the credit worthiness of an entity are.....

6. Two basic objectives of procurement in the public sector are .....and.....

7. The cash basis IPSAS is structured in such a way that it meets with two requirements namely ..... and .....

8. An employer who fails to deduct or remit the monthly contributions of an employee within the time stipulated shall, in addition to making the remittance already due, be liable to a penalty to be stipulated by the Commission. This shall not be less than ..... of the total contribution that remains unpaid for each month or part of each month the default continues.
9. The segment in the National Chart of Accounts structure for budgeting that identifies the entity that is responsible for the public funds' projection is .....

10. The administrative head of the executive arm at the Local GovernmentCouncil is *……*

11. The *……* is the public fund used for the payment of Statutory Officers personnel cost and other allowances.

12. *…….* and *……*are **TWO** main types of Journal Vouchers.

13. The National Council on Public Procurement established the Public Procurement Act 2007. **(TRUE OR FALSE)**

14. The report of Board of Survey on cash and stamps are usually embodiedin*……*

15. The users of public accounting information whose primary interest lies in evaluating the credit rating of a borrowing nation is *……..*

16. ERGP stands for *……*

17. The acronym GIFMIS is*……*

18. An independent appraisal activity within an organisation for the review of accounting, financial and other operations as basis for services to management is *……*

19. The two major platform which the federal government use in the payment of staff salaries and allowances are*……* and *…….*

20. *……* audit is a "one-off" assignment arising from a special request for investigation to be made.

SECTION B: ATTEMPT ANY FOUR QUESTIONS (50 MARKS)

QUESTION 1

(a) List **FIVE** functions of the National Pension Commission as stated in S.23 of the Pension Reforms Act, 2014. (7½ Marks)

(b) Statement of financial performance shows income and expenses incurred by a government business entity (GBE). List**FIVE**lineitems contained in the statement of financial performance. (5 Marks)

(Total 12½ Marks)

QUESTION 2

The International Public Sector Accounting Standards Board (IPSASB) was formed to develop and issue under its own authority International Public Sector Accounting Standards (IPSASs).

Required:

(a) State the main objective of the International Public Sector Accounting Standards Board (IPSASB). (2 Marks)

(b) State the membership of International Public Sector Accounting Standards Board (IPSASB). (2½ Marks)

(c) The Board adopts a due process for the development of IPSASs that provided the opportunity for comments by interestedparties including IFAC member bodies. Enumerate four stages of the due process for project execution. (8 Marks)

(Total 12½ Marks)

QUESTION 3

(a) Define ratio analysis (3½ Marks)

(b) State **THREE** advantages and **THREE** disadvantages of Ratio Analysis (9 Marks)

(Total 12½ Marks)

QUESTION 4

The following information had been extracted from the books of Premere State Water Board, for the year ending December 31, 2024.

	₦'000
Accumulated depreciation	52,444
Sales	122,311
Purchases	89,784
Billing and water connections	2,062
Non-Current assets expenditures	93,210
Trade receivables	16,200
Staff Training and Welfare	713
Inventory and Work-in-Progress	2,104
Rates, Rents and Insurance	2,622
Estimated Unread consumptions	8,402
Administrative and general expenses	1,647
Water Council Grants	26,113
Board members expenses	932
Bank and Cash balance	2,148

Depreciation for the year	3,463
Deferred payment (installation not yet due)	6,722
Interest and financing expenses	4,423
Trade and other payables	17,692
Profits on contracting and sales of pipes account	453
Reserves	22,496
Rentals on Water meters application	1,050
Distribution cost	7,422
Consumer Service	2,998

Note: Depreciation for the year 2024 was ₦3,463,000.

Required:

Prepare in vertical form:

(a) Statement of financial performance for Premere State Water Board for the year ended December 31, 2024. (5 Marks)

(b) Statement of financial position for Premere State Water Board as at December 31, 2024. (7½ Marks)

(Total 12½ Marks)

QUESTION 5

Isashi Local Government Council is considering investing in one of three available projects of 'X', `Y', and 'Z'. The following information are available:

	Project X ₦	Project Y ₦	Project Z ₦
Initial investment sums	30,000	40,000	40,000
Residual Value	2,000	2,000	2,000
Cash inflows: Year 1	12,000	20,000	2,000
Year 2	14,000	20,000	12,000
Year 3	16,000	2,000	20,000
Year 4	18,000	2,000	40,000

Assume the cost of capital to be 15%.

Required:

(a) Compute the Net Present Value for each of the projects. (10½ Marks)

(b) What is the decision rule when using the Net Present Value method for projectappraisal? (1 Mark)

(c) From your computation in "a", which of the project(s) should be selected? (1 Mark)

(Total 12½ Marks)

QUESTION 6

The Treasurer of the IDEDO Local Government provides you with the IPSAS trial balance for the month of July 2025, as follows:

Descriptions	**₦' Million Debit**	**₦' Million Credit**
Liquid Assets	4,000	
Investment	6,000	
Advance	3,500	
Cash and bank balance	2,500	
Health and environment	1,500	
Work and housing	1,500	
Capital projects	3,000	
Education	2,000	
Public funds		2,000
General revenue accounts		1,500
Deposit		3,500
External and internal loans notes		2,000
Statutory allocation		8,500
Fees, fines, and royalty		3,000
Earnings and sales		2,000
Rate		1,500
	24,000	**24,000**

Required:

(a) Statement of financial performance (6 Marks)

(b) Statement of financial position ($6^1/_2$ Marks)

(Total 12½ Marks)

SECTION A: PART I

MULTIPLE CHOICE SOLUTIONS

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

Examiner's comment

This consist of 30 multiple choice questions that requires the candidates to write only the alphabet (A, B, C, D or E) that corresponds to the correct option in each of the question/statements. This is a compulsory question that covers the entire syllabus.

There were100% attempts on the question. About 65% of the candidates scored 50% of the total marks obtainable. The Commonest pitfalls was the poor preparation by some candidates.

SECTION A: PART II

SHORT ANSWER SOLUTIONS

1. Changes in Net Assets/Equity
2. Debt to Sales Ratio/Debtor Turnover Ratio/Average Age of Receivables
3. Financial Reporting Council of Nigeria
4. Defined Benefit Pension Plan
5. Banks/Financial institutions/Lenders/Creditors.
6. Value for money, Quality, Timeliness and Risk Management
7. Accountability and Fiscal Compliance
8. 2%
9. Administrative segment
10. The Council Chairman or Executive Chairman
11. Consolidated Revenue Funds Charges
12. (i) Supplementary Journal Voucher (SJV) and
    (ii) Principal Journal Voucher. (PJV)
13. False
14. Treasury Form 42
15. Financial Institution/Rating Agencies
16. Economic Reform and Governance Project (ERGP)
17. Government Integrated Financial Management Information System
18. Internal Audit
19. GIFMIS and REMITA/IPPIS
20. Ad-hoc or Special Audit

Examiner's comment

This consist of 20 short answer questions that requires candidates to write the correct answer that best completes each of the questions/statements. This is a compulsory question that covers each area of the syllabus. There were 100% attempts on the question.

About 40% of the candidates scored 50% of the total marks obtainable. The commonest pitfalls were the lack of adequate preparation by some candidates for the examination.

Candidates are advised to always cover every area of the syllabus. They should also make use of Institute's Study Text and other reference materials.

SECTION B

SOLUTION 1

1a. **Functions of the Commission**

The functions of the Pension Commission as stated in S.23 of the Act are to:

a. Regulate and supervise the scheme established under this Act;
b. Issue guidelines for the investment of pension funds;

c. Approve, license, regulate and supervise Pension Fund Administrators, Custodians and other institutions relating to pension matters as the Commission may from time to time determine;
d. Establish standards, rules and guidelines for the management of the pension funds under this Act;
e. Ensure the maintenance of a National Data Bank on all pensionmatters;
f. Carry out public awareness and education on the establishment and management of the scheme;
g. Promote capacity building and institutional strengthening of pension fund administrators and custodians;
h. Receive and investigate complaints of impropriety levelled against any pension fund administrator, custodian or employer or any of their staff or agents; and
i. Perform such other duties, which, in the opinion of the commission, are necessary or expedient for the discharge of its functions under the Act.

b. **The line items contained in the Statement of Financial Performance are as follows:**

(a) Revenue from operating activities;
(b) Surplus or deficit from operating activities;
(c) Finance costs;
(d) Share of net surpluses or deficits of associates and joint ventures accounted for using the equity method;
(e) Surplus or deficit from ordinary activities;
(f) Extraordinary items;
(g) Minority interest share of net surplus or deficit; and
(h) Net surplus or deficit for the period.

Examiner's comment

The question tests the candidates' knowledge and understanding of the functions of the National Pension Commission as stated in S.23 of the Pension Reforms Acts 2014, as well as line items contained in the statement of financial performance by a government business entity (GBE).
About 70% of the candidates attempted the question and about 20% of them scored 50% of the total marks obtainable.

The commonest pitfalls were the inability of some candidates to differentiate between functions of the commission from that of the Pension Fund Administrators.

Candidates are enjoined to endeavour to cover every area of the syllabus. They should also make adequate use of the Institute's study Text and previous diets' examination questions.

SOLUTION 2

a. **Objective of the IPSASB**

The main objective of the IPSASB is to serve the public interest by developing high quality public sector financial reporting standards. IPSASs are the authoritative requirements established by the authoritative publications including studies, research reports and occasional papers that deal with public sector financial reporting issues.

b. **Membership of the IPSASB**

The IPSASB consists of 18 members, of which 15 are drawn from IFAC member bodies, and the remaining three are public members with expertise in public sector financial reporting. The IFAC Board on the recommendation of the IFAC Nominating Committee appoints all members of the IPSASB, including the chair and deputy chair.They typically include representatives from a variety of backgrounds and sectors, such as:

- Ministries of Finance/Treasury Departments(preparers)
- Government Audit Institutions
- Public Practice(auditors)
- Academia
- Public members

The composition is designed to ensure abroad international perspective and a balance of public sector experience.

c. **The IPSASB Due process stages for project execution are:**

i) Study of national accounting requirements and practice and exchange of viewsabout the issues with national standard-setters;
ii) Consideration of pronouncement issued by:
   a. The International Account Standard Board (IASB);
   b. National Standard setters, regulatory authority and other authoritative bodies;
   c. Professional accounting bodies; and
   d. Other organizations interested in financing reporting in the public.
iii) Formation of Steering Committees (SC), Projects Advisory Panels (PAPS) or subcommittees to provide input to the IPSASB on a project;
iv) Publication of an exposure draft for public comment usually for at least four (4) months. This provides an opportunity for those affected by IPSASB's pronouncements and are finalized and approved by IPSAS. The exposure draft will include a basis for conclusion;
v) Consideration of all comments received within the comment period on discussion documents and exposure drafts, and to make modifications proposed Standards as considered appropriate in the light of the IPSASBs;

vi) Publication of an IPSAS which includes a basis for conclusions that explains thesteps in IPSASB's due process and how the Board reached its conclusions.

Examiner's comment

The question tests the candidates' knowledge and understanding of the International Public Sector Accounting Standards Board (IPSASB). It required the candidates to state the main objectives of the Board, membership and stages of the due process for project execution.

About 55% of the candidates attempted the question and only about 40% of them scored 50% of the total marks obtainable.

The commonest pitfalls were the failure by some candidates to differentiate between the International public Sector Accounting Standards Board (IPSASB) and International Public Sector Accountancy Standards (IPSASs).

Candidates are advised to cover every area of the syllabus. They should also familiarise themselves with the previous diets' examination questions.

SOLUTION 3

a. Ratio Analysis is the expression of one figure as a ratio of another in order to determine the Weakness or strength in an entity's financial affairs at a particular period of time. It is the process of calculating financial ratios, which are mathematical indicators calculated by comparing key financial information appearing in financial statements of a public sector entity and analyzing those to find out reasons behind the entity's current financial position and its recent financial performance,and develop expectation about its future outlook.

b. **Advantages and limitations of ratio analysis**

Advantages of Ratio Analysis

1. Simplifies Complex Financial Data: Ratios condense large, complicated financial figures into simple, understandable percentages or comparisons, making interpretation quicker and easier for all stakeholders.

2. Facilitates Comparative Analysis (Benchmarking): It enables a company's performance to be easily compared against:

    - Its own historical performance (trend analysis).
    - Competitors in the same industry (cross-sectional analysis).
    - Industry averages or norms.

3. Reveals Efficiency and Performance: Ratios clearly measure operational efficiency (e.g. inventory turnover, asset utilization) and profitability (e.g. net profit margin, Return on Equity), highlighting strengths and weaknesses for management.

4. Assesses Liquidity and Solvency: They provide crucial insight into the firm's ability to meet its short-term obligations (liquidity ratios like Current Ratio) and its long-term financial stability and debt-paying capacity (solvency ratios like Debt-to-Equity).

5. Aids Strategic Decision-Making and Forecasting: Ratios help management, investors, and creditors make informed decisions regarding investment, financing, and operational strategies, as well as providing a foundation for financial planning and future forecasting.

Limitations/Disadvantages of Ratio Analysis

1. Reliance on Historical Data: Ratios are based on past financial statements and accounting data, which may not be a reliable indicator of future performance due to changing economic and business conditions.

2. Lack of Context and Industry Differences: A ratio considered excellent in one industry (e.g. utility companies) may be poor in another (e.g. technology startups). Without proper industry context direct comparisons can be misleading.

3. Affected by Accounting Policies: Differences in accounting methods (e.g. FIFO vs. LIFO inventory valuation, different depreciation methods) between companies or from one year to the next can distort ratios, making comparisons unreliable.

4. Ignores Qualitative Factors: Ratio analysis focuses purely on quantitative financial data and does not account for non-financial factors critical to success, such as the quality of management, employee morale, brand reputation, or new product innovation.

5. Vulnerable to "Window Dressing": Management can manipulate financial statements (e.g. temporarily holding off on paying creditors at year-end to inflate the current ratio) to make ratios look artificially better, providing a misleading picture of the firm's true financial health.

6. The required financial statements for Premier State Water Board are prepared below in a vertical format, with all figures expressed in N'000 (Nigerian Naira in thousands).

Examiner's comment

The question tests the candidates' knowledge and understanding of ratio analysis. It required candidates to define ratio analysis and to state advantages and disadvantages of ratio analysis.

About 60% of the candidates attempted the question and about 35% of them scored 50% of the total marks obtainable.

The commonest pitfalls were the inability of some candidates to correctly state the advantages and disadvantages of Ratio Analysis.

Candidates are enjoined to make good use of the Institutes' Study Text and to familiarise themselves with the previous diets' examination questions.

SOLUTION 4

a. **Premere State Water Board**
Statement of Financial Performance for the Year Ended December 31, 2024

	₦'000	₦'000
Sales Revenue		122,311
Less: Purchases of Water		(89,784)
Gross Profit		32,527
Profits on Contracting & Sales of Pipe Account	453	
Rentals on Water Meters Application	1,050	1,503
Total Revenue (A)		**34,030**
Less: Expenditures		
Billing and Water Connections	2,062	
Staff Training and Welfare	713	
Rates, Rents and Insurance	2,622	
Administrative & Genera Expenses	1,647	
Board Members' Expenses	932	
Distribution Cost	7,422	
Consumer Service	2,998	
Interest and Financing Expenses	4,423	
Depreciation for the Year	4,633	
Total Expenditures (B)		**27,452**
Surplus for the Year (A-B)		**6,578**

Statement of Financial Position as at December 31, 2024

Assets	
Non-Current Assets	**₦'000**
Non-Current Asset Expenditures	93,210
Less: Accumulated Depreciation (52,444 + 3,463)	(55,907)
NET BOOK VALUE	**37,303**
Current Assets:	
Trade Receivables	16,200
Stock/Inventory and Work-in-Progress	2,104
Estimated Unread Consumptions	8,402
Deferred Payment	6,722
Bank and Cash Balance	2,148

Total Current Assets	**35,576**
Total Assets	**72,879**
Current Liabilities	
Trade and other payables	**17,692**
Net Assets	**55,187**
Funded by	
Water Council Grant	26,113
Reserves	22,496
Surplus for the Year	6,578
Total Equity	**55,187**

Examiner's comment

The question tests the candidates' knowledge and understanding of preparation of financial performance and financial position in vertical form from a given scenario. About 80% of the candidates attempted the question and about 70% of them scored 50% of the total marks obtainable.

The commonest pitfalls by some candidates were transposing of some entries meant to appear in the financial position to financial performance. Furthermore, some candidates failed to adhere to the requirements of the question by preparing in "T" form, thus, losing some marks.

Candidates are enjoined to strictly adhere to requirements of the Examiner. They should also make adequate use of the Institute's Study Text.

SOLUTION 5

a. **ISASHI LOCAL COUNCIL AREA:**

PROJECT APPRAISAL USING NET PRESENT VALUE (NPV)

	Year	DCF@1 5%	PROJECT X	PV	PROJECT Y	PV	PROJECT Z	PV
			₦	₦	₦	₦	₦	₦
Initial	0		(30,000)		(40,000)		(40,000)	
Investment		1		(30,000.00)		(40,000.00)		(40,000.00)
Cash Inflow:	1		12,000		20,000		2,000	
		0.86957		10,434.78		17,391.30		1,739.13
	2		14,000		20,000		12,000	
		0.75614		10,586.01		15,122.87		9,073.72
	3		16,000		2,000		20,000	
		0.65752		10,520.26		1,315.03		13,150.32
	4		18,000		2,000		40,000	
		0.57175		10,291.56		1,143.51		22,870.13
Residual	4		2,000		2,000		2,000	
Value		0.57175		1,143.51		1,143.51		1,143.51
			NPV		NPV		NPV	
				12,976.12		**(3,883.78)**		**7,976.82**

b. The decision rule when using the NPV method for project appraisal is:

1. **Acceptance Rule:** Accept a project if its NPV is **positive** (NPV>0). A positive NPV indicates that the project is expected to generate a return greater than the required cost of capital, thereby increasing the value of the organization.

2. **Rejection Rule:** Reject a project if its NPV is **negative**(NPV<0).A negative NPV means the project is expected to generate a return less than the cost of capital, decreasing the value of the organization.

3. **Mutually Exclusive Projects:** If the choice is between several projects (mutually exclusive projects), the one with the **highest positive NPV**should be selected.

c. Project X should be selected because it has a higher Positive Net Present Value of **₦12,976.12**

Project	Net Present Value (N'000)	Decision
X	**12,976.12**	Accept (NPV>0)
Y	**(3,883.78)**	Reject (NPV<0)
Z	**7,976.82**	Accept (NPV>0)

Examiner's comment

The question tests the candidates' knowledge and understanding of project appraisal using the Net Present Value method. About 60% of the candidates attempted the question. About 55% of them scored 50% of the total marks obtainable.

The commonest pitfalls was the inability of some candidates from correctly computing the Net Present Value for given projects.

Candidates are enjoined to ensure they cover all areas of the syllabus. They should also get familiar with previous diets' examinations.

SOLUTION 6

a.

IDEDO Local Government
Statement of Financial Performance for the month ended July31, 2025

	₦'000	₦'000
Revenue		
Statutory Allocation		8,500
Fees, Fines, and Royalties		3,000
Earnings and Sales		2,000
Rate		1,500
Total Revenue		**15,000**
Expenditures:		
Health and Environment	1,500	
Work and Housing	1,500	
Education	2,000	
Total Expenditures		**(5,000)**
Surplus for the Period		**10,000**

(b) **Statement of Financial Position as at July 31, 2025**

Particulars	₦'M	₦'M
ASSETS		
Non-Current Assets:		
Investment	6,000	
Capital projects	3,000	
Total Non-Current Assets		**9,000**
Current Assets:		
Liquid Assets	4,000	
Advance (Receivable)	3,500	
Cash and bank balance	2,500	
Total Current Assets		**10,000**
TOTAL ASSETS		**19,000**
LIABILITIES AND NETASSETS		
Non-Current Liability:		
External and internal loans notes	2,000	
Current Liability:		
Deposit	3,500	
Total Liabilities		**5,500**
Total Net Assets		**13,500**
Financed by:		
Public funds		2,000
General revenue accounts (Reserves/Retained Surplus)		1,500
Add: Surplus for the Period		10,000
		13,500

Examiner's comment

The question tests the candidates' knowledge and understanding of the Local Government accounting in line with the IPSAS provisions. It specifically required the candidates to deduce the value of the statement of financial performance as well as statement of financial position from the IPSAS trial balance given.

About 70% of the candidates attempted the question. About as statement scored 50% of the total marks obtainable.

Candidates are enjoined to cover every areas of the syllabus. They should make adequate use of the Institute's Study Text.

GENERAL

The paper presented a deep test of knowledge and a well spread coverage of the syllabus. The standard of the questions was high commensurate with the level of the examinations.

AT/252/PII.7 Examination No.....

THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA

ABWA
The Association of Accountancy Bodies in West Africa

ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA SEPTEMBER 2025 EXAMINATIONS (PART II)

QUANTITATIVE ANALYSIS

PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER

EXAMINATION INSTRUCTIONS

1. All solutions should be in 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 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, SEPTEMBER 24, 2025

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 – SEPTEMBER 2025

QUANTITATIVE ANALYSIS

Time Allowed: 3 hours

SECTION A: PART I MULTIPLECHOICE QUESTIONS (30 MARKS)

ATTEMPT ALL QUESTIONS

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

1. The following are methods of collecting primary data,**EXCEPT**

   A. Experiment
   B. Interview
   C. Financial statements
   D. Observation
   E. Questionnaire

2. A statistical method of collecting information by the use of fractional part of population, as a representative sample, is known as

   A. sample survey
   B. sampling fraction
   C. sampling interval
   D. sampling units
   E. sampling frame

3. SPSS is one of the statistical application programs used for data presentation and analysis. The acronym SPSS stands for

   A. Statistical Package for Social Sciences
   B. Statistical Presentation for Social Sciences
   C. Statistical Preview for Social Sciences
   D. Statistical Processing for Social Sciences
   E. Statistical Program for Social Sciences

4. The number of individuals and their age groups that registered for National Identification Number (NIN), in a particular registration centre, are given in the table below:

Age group	*1 - 10*	*11 – 20*	*21 – 30*	*31 - 40*	*41 – 50*
Number of individuals	*20*	*27*	*21*	*20*	*12*

   The 7^{th} decile of the age group is

A. 30.5
B. 31.5
C. 32.5
D. 33.5
E. 34.5

5. The following data represent the losses and gains (in millions of Naira) of eight quotedcompanies in a stock exchange on a particular trading day: $-5.5, -10, 25, -15.5, 28, 12, 27$ and 15. (Note that: negative numbers indicate losses and positive numbers indicate gains). The range of the data is

A. ₦16,000,000
B. ₦22,500,000
C. ₦23,500,000
D. ₦33,500,000
E. ₦43,500,000

6. The computed mean and variance of a data set are $16$and 25 respectively. The coefficient of variation of the data set is

A. 16%
B. 31.25%
C. 64%
D. 156.25%
E. 625%

7. The regression coefficient of the fitted simple linear regression line of income (x) and expenditure (y) (both in thousands of Naira) are a =15.6 and $b = -0.1$. Using the fitted regression line of y on x,the predicted expenditure, when income is ₦36,000,is

A. ₦3,600
B. ₦12,000
C. ₦15,600
D. ₦17,200
E. ₦36,000

8. The multiplicative model is one of the models of time series analysis. Which of the following is the multiplicative model of time series? (Note that the symbols bear their usual meanings).

A. $I = TSCY$
B. $Y = TSCI$
C. $T = YSCI$
D. $S = TYCI$
E. $C = YSTI$

9. The following pieces of information are extracted from the final computation table of current and previous prices and quantities for five different household items:

$\sum p_0q_0 = 1{,}050$, $\sum p_0q_1 = 1{,}150$, $\sum p_1q_0 = 2{,}600$ and $\sum p_1q_1 = 2{,}900$.

Then, the calculated Marshal Edgeworth's weighted index number is expressed as

A. *40%*
B. *80%*
C. *100%*
D. *125%*
E. *250%*

10. Which of the following is **NOT** true about the conditional probability of two events E_1 and E_2?

A. $P(E_1 / E_2) = \dfrac{P(E_1 \cap E_2)}{P(E_2)}$
B. $P(E_1 \cap E_2) = P(E_1 / E_2)P(E_2)$
C. $P(E_2 / E_1) = \dfrac{P(E_1 \cap E_2)}{P(E_1)}$
D. $P(E_2 / E_1)P(E_2) = P(E_1 \cap E_2)$
E. $P(E_2 / E_1)P(E_1) = P(E_1 \cap E_2)$

11. The table below presents the records of a tutorial school that registers candidates for a particular diet of a professional examination:

Subject	Gender	
	Male	Female
QA	*10*	*40*
IT	*25*	*45*

What is the probability of selecting a female candidate given that she registered for QA?

A. *0.20*
B. *0.40*
C. *0.60*
D. *0.80*
E. *0.90*

12. The weight of the content of a particular brand of beverage has a population mean of *500g* and population standard deviation of *30g.* A random sample of *225* beverages is selected, yielding a sample mean of *505g.* At *5%* level of significance, test completely the hypothesis:

$H_0 : \mu = 500g \qquad vs \qquad H_1 : \mu > 500g$

(Given that $z_{tab} = z_{0.05} = 1.645$)

A. Reject H_0 and conclude that $\mu = 500$
B. Reject H_0 and conclude that $\mu > 500$
C. Do not reject H_0 and conclude that $\mu = 500$
D. Do not reject H_0 and conclude that $\mu > 500$
E. Test is inconclusive

13. A petty trader sold an item for Le *2,800* and made a markup of 12%. What is the cost price of the item?

A. Le 1,500
B. Le 2,050
C. Le 2,500
D. Le 3,136
E. Le 3,163

14. The collection of all insurance policies, offered by two individuals: Mr. *A* and Mr. *B,* are respectively given as: *A = {life, motor, fire, burglary}* and *B = {home, business, motor, fire}.* Find $A \cup B$.

A. *{life, motor}*
B. *{motor, fire}*
C. *{life, burglary, home, business}*
D. *{life, motor, fire, burglary, home, business}*
E. *{life, motor, motor, fire, fire, burglary, home, business}*

15. A businesswoman spends ₦*2.5million* to set up a small company, where *x* is the number of items that are produced. If it costs ₦*750* to produce an item and the sales price of the item is ₦*1,300*, then the woman's profit function $p(x)$ will be

A. $550x - 2{,}500{,}000$
B. $550x + 2{,}500{,}000$
C. $1{,}300x - 2{,}500{,}000$
D. $750x - 2{,}500{,}000$
E. $2{,}050x + 2{,}500{,}000$

16. A businessman can make an investment of ₦*4million* now and receives ₦*6million* in a year's time. What is the rate of internal return on the investment?

A. *0.1*
B. *0.2*
C. *0.4*
D. *0.5*
E. *0.6*

17. The profit function of a firm is given as: $P(q) = q^3 + 3q^2 + 6q + 5$. The rate of change of the profit with respect to q, is

A. $3q^2 + 6q + 6$
B. $3q^3 + 6q + 5$
C. $3q^3 + 6q^2 + 6$
D. $q^3 + 3q^2 + 6q$
E. $q^4 + q^3 + 3q^2 + 5q$

18. The marginal revenue function of a production company is given by $3q^2 + 30$, where q is the number of items produced and sold. The revenue function, if no item is produced and sold at $R = 0$, is

A. $6q + 30$
B. $q^2 - 10$
C. $q^3 + 10q$
D. $q^3 - 30q$
E. $q^3 + 30q$

19. The following are the main stages involved in a typical Operations Research Process, **EXCEPT**

A. Construction of a model
B. Identification of feasible region
C. Identification of problems and objectives
D. Identification of variables
E. Testing the model

20. The term, in linear programming, used to describe the change in the objective function valueper unit increase in the right-hand side of a constraint, is .....

A. binding cost
B. holding cost
C. ordering cost
D. shadow cost
E. decision variable cost

21. The optimal solution of the following formulated Linear Programming (LP) problem:

Maximise: $800x + 400y$
Subject to: $3x + y \leq 90$ (Raw materials constraint)
$x + 3y \leq 110$ (Machine hour constraint)
$x, y \geq 0$ (Non-negativity constraint),

occurs at $x = 20$ and $y = 30$. If the approximate solution of the following two binding constraints: the quantity of raw materials is increased by 1 unit and

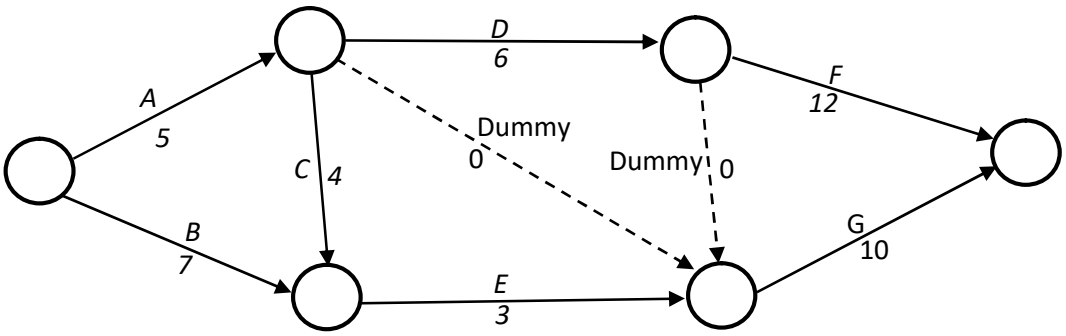
the machine hours remain unchanged, occurs at $x = 20.4$ and $y = 29.7$, then the shadow price per unit of raw materials is

A. ₦100
B. ₦200
C. ₦400
D. ₦600
E. ₦800

22. The ordering quantity of an item of stock, which minimises the cost involved, is known as

A. Re-order quantity
B. Stock-out quantity
C. Economic order quantity
D. Quantity demanded
E. Minimum quantity

23. The Arrow-On-Node network diagram below shows the network diagram to complete a mini-project with the duration of each activity (in weeks):



What is the critical path of the project?

A. *A → D → F*

B. *BE → G*

C. *A → C → E → F*

D. *A → D → Dummy → G*

E. *A → Dummy → G*

24. The name given to the float in a project network, that does not depend on the early start or late finish of preceding or succeeding activities is known as .....

A. free float
B. independent float
C. total float
D. optimistic time
E. pessimistic time

25. The table below shows the information about the Year of service (*Y*), Running cost (*R*), Cumulative Running cost (*CR*), Depreciation cost price (*D*), Total cost (*TC*) and the Average Total cost (*ATC*) of a deteriorating mini-industrial machine equipment for six years:

Y	*R*(₦)	*CR*(₦)	*D*(₦)	*TC*(₦)	*ATC*(₦)
1	*1,200*	*1,200*	*10,000*	*11,200*	*11,200*
2	*1,500*	*2,700*	*10,000*	*12,700*	*6,350*
3	*1,800*	*4,500*	*10,000*	*14,500*	*a*
4	*2,000*	*6,500*	*10,000*	*16,500*	*b*
5	*2,500*	*9,000*	*10,000*	*19,000*	*C*
6	*5,000*	*14,000*	*10,000*	*24,000*	*4,000*

By calculating the values of *a, b* and *c*, when should the equipment be replaced?

A. 2nd year
B. 3rd year
C. 4th year
D. 5th year
E. 6th year

26. The unit transportation costs (₦'000), the quantities demanded, and quantities supplied of adrum of oil product from three different sources to three different destinations, are given in the table below:

	Destination			
Source	*A*	*B*	*C*	Supply
X	*6*	*4*	*3*	*1,200*
Y	*7*	*4*	*3*	*800*
Z	*8*	*3*	*4*	*500*
Demand	*900*	*1,100*	*1,000*	

The above transportation problem is an unbalanced one. Which of the following steps is to be taken to make it a balanced transportation problem?

A. Introduce a vertical dummy of 500 units with zero transportation cost
B. Introduce a horizontal dummy of 500 units with zero transportation cost
C. Introduce a vertical dummy of 0 unit with transportation cost of 500
D. Introduce a horizontal dummy of 0 unit with transportation cost of 500
E. Introduce both vertical and horizontal dummies with zero transportation costs

27. The unit transportation costs (₦'000), quantities supplied, and quantities demanded of a commodity, from the Depots to the Distributors, are given in the table below:

Depot	Distributor			Quantity supplied
	1	*2*	*3*	
I	*4*	*3*	*2*	*2,750*
II	*6*	*5*	*3*	*2,250*
Quantity demanded	*1,600*	*1,500*	*1,900*	

The initial basic feasible transportation cost, using the Least Cost Method (LCM), is

A. ₦18,200
B. ₦19,200
C. ₦50,000
D. ₦1,820,000
E. ₦1,920,000

28. The table below presents the cost table (in hundreds of Naira) of assigning three different jobsto three different technicians:

Jobs	Technicians		
	X	*Y*	*Z*
A	*40*	*46*	*50*
B	*30*	*31*	*30*
C	*37*	*34*	*32*

Use the Hungarian method to assign the jobs to the technicians so as to minimise the cost of the assignment.

A. Assign technician *X* to job *A*, technician *Z* to job *B* and technician *Y* to job *C*
B. Assign technician *Y* to job *A*, technician *Z* to job *B* and technician *X* to job *C*
C. Assign technician *Z* to job *A*, technician *Y* to job *B* and technician *X* to job *C*
D. Assign technician *X* to job *A*, technician *Y* to job *B* and technician *Z* to job *C*
E. Assign technician *Y* to job *A*, technician *X* to job *B* and technician *Z* to job *C*

29. A useful and dependable technique that can be applied in situations where one cannot find an appropriate mathematical analysis or model to solve the problem, is known as

A. Hungarian method
B. Replacement analysis
C. Sensitive analysis
D. Simulation method
E. Vogel's Approximation method

30. The probability distribution of the demand for three different types of dinning sets, manufactured by a furniture company, is given as follows:

Types of furniture	Probability of Demand
Standard (*S*)	*0.47*
Brass (*B*)	*0.40*
Luxury (*L*)	*0.13*

Using the Monte Carlo method to run a simple simulation, what will the next five demands ofthe company be if the random numbers *38, 51, 46, 89* and *29* are selected?

A. *S, S, S, B, L*
B. *S, S, B, L, S*
C. *S, B, S, L, S*
D. *S, L, S, B, S*
E. *S, L, B, S, S*

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 graphical representation of a grouped data that consists of bars of different heights, where each bar represents a range of values, is .....

2. Estimating the percentiles from the cumulative frequency curve, the cumulative frequency value that will be traced to the ogive to give 70^{th} percentile of the distribution with the total frequency of 50 is .....

3. The total daily withdrawals (in millions of Naira) from ten available Automated Teller Machines (ATMs) of a particular bank for five working days,

are given as 1, 2, 5, 7 and 10. The mean deviation of the total daily withdrawals is .....

4. The type of correlation in which all points on a scatter plot lie on a straight line, showing that an increase (or decrease) in one variable results in a corresponding increase (or decrease) in another variableis .....

5. The four basic components of time series are Seasonal, Irregular, ... and .....

6. The prices of three household items in two different months are given in the table below:

Household items	*X*	*Y*	*Z*
Price in September(₦)	*4,000*	*5,000*	*2,000*
Price in October(₦)	*5,000*	*6,000*	*2,500*

The unweighted Simple Aggregate Price Index, using the month of September as the basemonth, is .....

7. Given an event A, the ratio of the number of elements in A to the number of elements in the Sample Space is the .....

8. In the test of hypothesis, the area in the standard normal curve that is equal to the level of significance, which is used to decide whether to reject a null hypothesis or not, is .....

9. A wristwatch peddler bought 10 children's wristwatches for ₦25,000 and sold each for ₦2,800. The peddler's profit/loss percent is .....

10. In an establishment consisting of 50 employees, who are shareholders in two different companies *A*and*B*,*35* of the employees have shares with *A* or *B*,*15*have shares with both companies. If 26 employees have shares with A, then, the number of employees that have shares with B is .....

11. A mathematical expression describing the relationship between two or more variables, is .....

12. The marginal revenue function of a manufacturing firm is given by $6q^2 + 4q + 50$,where q is the number of cartons of the product produced and sold. If $q = 100,$ then, the total revenue of the firm is .....

13. The construction of a model as one of the main stages of Operations Research process can bedone either ..... or .....

14. A profit maximisation Linear Programming (LP) problem is given as:

Maximise: $20x + 30y$
Subject to: $2x + y \leq 10$
$x + 2y \leq 8$
$x, y \geq 0$

If the LP is solved graphically, the corner point that gives the optimal solution, which is the point of intersection of the two binding constraints, is .....

15. The demand for an item is *3,000* units per annum. The cost of order is ₦*15* and the holding cost per item is ₦*4* per annum. Then the total cost of the inventory per annum is .....

16. The table below shows the *EST, LST, EFT, LFT and duration* of activities for a certain project(where all abbreviations bear their usual meanings).

Activity	*EST*	*LST*	*EFT*	*LFT*	*Duration*
A	*4*	*4*	*8*	*10*	*2*
B	*9*	*9*	*14*	*15*	*5*
C	*9*	*9*	*16*	*16*	*6*
D	*15*	*16*	*18*	*18*	*2*
E	*15*	*16*	*24*	*24*	*5*
F	*18*	*18*	*24*	*24*	*6*

The calculated free floats of activities *B* and *C* are ..... and ..... respectively.

17. An electrical component that is used in a firm has a transistor with life span of *4 months.* The percentage failures of these transistors are given in the table below:

Months	*1*	*2*	*3*	*4*
Percentage failure	*15*	*35*	*30*	*20*

Given that *600* transistors are fixed for use at a time. If each transistor costs *₦15* for group replacement and *₦50* for individual replacement. In order to determine the best interval period among group replacements, the number of items replaced at the end of 2nd month is .....

18. The main goal of a transportation model is to ..... the total cost of transporting products from sources to destination

19. The method of calculating the initial basic feasible transportation cost, where allocations start from the top left-hand cell (that is, the cell that occupies the first row and first column) is .....

20. FAFAFA furniture company produces 3 brands of home settee, namely: Normal, Deluxe and Exotic. If Monte Carlo method of running simple simulation gives the following random number range for the 3 products, as shown in the table below:

Products	Random number Range
Normal	00 – 34
Deluxe	35 – 79
Exotic	80 – 99

Then, the probability of producing Deluxe settee is .....

SECTION B: ATTEMPT ANY FOUR QUESTIONS (50 MARKS)

QUESTION 1

a. The profit, after tax (in billions of Naira), of two limited liability companies: *X* and *Y* for eight consecutive years, are presented in the table below:

Year	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
Company X	*8*	*10*	*8*	*13*	*15*	*14*	*11*	*9*
Company Y	*5*	*7*	*9*	*8*	*11*	*9*	*7*	*8*

Required:

i. Calculate the Pearson's product moment correlation coefficient.(6 Marks)

ii. Comment on the result in a(i).

(1 Mark)

b. Seven different marketers ranked the acceptability and uniqueness of two newly introduced products *A* and *B* into the market on a scale of *1* to *100* and their scores are presented in the table below:

Marketer	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Product A	*80*	*70*	*75*	*69*	*85*	*72*	*68*
Product B	*75*	*88*	*70*	*75*	*69*	*80*	*76*

Required:

i.Calculate the Spearman's rank correlation coefficient . (4 Marks)

ii. Interpret the result in b(i) with respect to the rankings of the marketers as per the two products. (1½ Marks)

(Total 12½ Marks)

QUESTION 2

a. A lottery company is organising a weekly lottery, where there are 1,200 prizes of ₦5,000; 400 prizes of ₦10,000; 200 prizes of ₦15,000 and 100 prizes of ₦20,000. Determine the expected fair price to be paid for the lottery ticket if the company is ready to issue and sell 5,000 tickets to their subscribers.
(6½Marks)

b. The frequency distribution of the number of cars sold per day by an automobile firm for 20 working days in a particular month are presented in the table below:

Number of car(s)	*0*	*1*	*2*	*3*	*4*
Number of working days	*10*	*5*	*2*	*2*	*1*

Required:
By calculating the probability of number of cars sold per day: P(0), P(1), P(2), P(3) and P(4),

i. Formulate the probability distribution for the number of cars sold.
(2½ Marks)

ii. Calculate the expected number of cars sold per day by the firm.
(3½Marks)
(Total 12½ Marks)

QUESTION 3

a. A security marketing agency is interested in knowing the average number of security gadgets sold per week per marketer. The agency supervisor thinks that the average number of gadgets sold per week per marketer is 10. The agency head of sales claims that any marketer should be able to sell more than 10 gadgets per week. Out of curiosity, the supervisor selected six marketers at random from the agency sales record for a particular week and got the number of gadgets sold as: 13, 8, 11, 9, 7 and 6.

Required:

i. Set up a suitable hypothesis. (1 Mark)

ii. Test the hypothesis at 5% level of significance. (6½ Marks)

b. The volume of petrol (in ten thousands of litres) sold by 50 selected filling stations during a fuel scarcity, in a particular local government area, is tabulated as follows:

Volume (in 10,000 of litres)	Number of filling stations
0.6 – 1.5	20
1.6 – 2.5	16
2.6 – 3.5	24
3.6 – 4.5	14
4.6 – 5.5	12
5.6 – 6.5	8
6.6 – 7.5	6

Required: Calculate the:

i. Modal quantity of fuel. (2½ Marks)
ii. Median quantity of fuel. (2½ Marks)

(Total 12½ Marks)

QUESTION 4

a. Calculate the amount of annuity of N150,000 per year at 10% interest rate per annum for 4years. (4 Marks)

b. Find the annual amount to be paid over 3 years for a sinking fund of ₦3million at 5% compound interest rate. (4½ Marks)

c. Calculate the present value of an annuity of ₦75,000 for 7years at 7.5% compounded annually.

(4 Marks)

(Total 12½ Marks)

QUESTION 5

WAFAFAFA manufacturing company has three plants A, B and C whose production capacities are limited and can service four depots P, Q, R and S. The production capacities of the three plants are 15,000, 20,000 and 10,000 cartons of the product respectively and the storage requirements of the four depots are 14,500, 10,500, 11,500 and 13,500 cartons of the products respectively. The cost of transportation per carton (in hundreds of Naira) from any of the three plants to any of the four depots are presented in the table below:

	Depot			
Plant	*P*	*Q*	*R*	*S*
A	*12*	*13*	*10*	*11*
B	*11*	*12*	*14*	*10*
C	*14*	*11*	*15*	*12*

Required:

a. Calculate the initial basic feasible transportation cost from the plants to the depots by:

i. North-West corner method (6 Marks)
ii. Least Cost method (6 Marks)

b. Which of the methods, in a(i) and a(ii), gives cheaper transportation cost and what is the difference in the transportation costs of the two methods.

(½ Marks)

(Total 12½ Marks)

QUESTION 6

A manufacturing company keeps stock of the household items it produces. The table below presents the company monthly demand pattern for its product with the associated probabilities from the company's record:

Monthly Demand quantity	*5,000*	*10,000*	*15,000*	*20,000*	*25,000*
Probability	*0.30*	*0.35*	*0.16*	*0.14*	*0.05*

Required:

By Monte Carlo method, simulate the next one year's demands and the total demands for the 12 months, using the sequence of random numbers *39, 28, 28, 54, 92, 70, 18, 35, 85,08, 31 and 62.*

(12½ Marks)

(Total 12½ Marks)

FORMULAE

STATISTICS

$$Mean, \bar{x} = \frac{\sum x}{n}$$

$$Mean\ deviation = \frac{\sum |x - \bar{x}|}{n}$$

Grouped-data mode formula

$$Mode = L_{mo} + \left(\frac{\Delta_1}{\Delta_1 + \Delta_2} \right) c$$

Where:

L_{mo} = Lower class boundary of the modal class;

Δ_1 = Modal class frequency – frequency of the class before the modal class;

Δ_2 = Modal class frequency – frequency of the class after the modal class; and

c = Modal class size

Grouped-data median formula

$$Median = L_{me} + \left(\frac{\frac{N}{2} - \sum f_{me}}{f_{me}} \right) c$$

Where:

L_{me} =Lower class boundary of median class;

N =Total number of items in the data set;

$\sum f_{me}$ =Summation of all frequencies before the median class;

f_{me} =Frequency of the median class; and

c =Median class size or width.

ith Decile, D_i position $= \frac{iN}{10} th$

ith percentile, P_i position $= \frac{iN}{100}$

i[th] Decile, $D_i = L_{D_i} + \left(\frac{\frac{iN}{10} - \sum f_{D_i}}{f_{D_i}} \right) c$

Range = Highest – Lowest

Coefficient of Variation, $CV = \frac{SD}{Mean} \times \frac{100}{1}$

Pearson's product moment correlation coefficient,

$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left[n\sum x^2 - \left(\sum x\right)^2\right]\left[n\sum y^2 - \left(\sum y\right)^2\right]}}$ or $r = \frac{\sum (x-\bar{x})(y-\bar{y})^2}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}}$, where $\bar{x} = \frac{\sum x}{n}$

$\bar{y} = \frac{\sum y}{n}$

Spearman's rank correlation coefficient, $R = 1 - \frac{6\sum d^2}{n(n^2-1)}$

Marshal Edgeworth's weighted index number= $\frac{\sum p_1 q_0 + \sum p_1 q_1}{\sum p_0 q_0 + \sum p_0 q_1} \times \frac{100}{1}$

$P(A) = \frac{n(A)}{n(S)}$

$P(E_1 / E_2) = \frac{P(E_1 \cap E_2)}{P(E_2)}$

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

$z_{cal} = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$

$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$, *where* $\bar{x} = \frac{\sum x}{n}$, $s^2 = \frac{\sum (x-\bar{x})^2}{n-1}$ or $s^2 = \frac{\sum x^2 - \frac{\left(\sum x\right)^2}{n}}{n-1}$

$z_{cal} = \frac{\hat{P} - P}{\sqrt{\frac{P(1-P)}{n}}}$

Simple Aggregate Price Index. $SAPI = \frac{\sum P_0}{\sum P_t} \times \frac{100}{1}$

BUSINESS MATHEMATICS

$$profit\,\% = \frac{profit}{CP} \times \frac{100}{1}$$

$$CP \equiv 100\% \;\&\; SP \equiv (100 + profit\ percent)\,\% \text{ or } SP \equiv (100 - loss\ percent)\%$$

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

Revenue function, $R(x) = price \times quantity$

Profit function, $P(x) = R(x) - C(x)$

$$R(q) = \int MRdq$$

$$TR = \int_q MRdq$$

$$S = \frac{A\left[(1+r)^n - 1\right]}{r}$$

$$P = \frac{A\left[1 - (1+r)^{-n}\right]}{r}$$

OPERATIONS RESEARCH

$$Average\ Total\ \cos t\ (ATC) = \frac{Total\ \cos t(TC)}{year}$$

$$Q = \sqrt{\frac{2cd}{h}}$$

Total cost of the inventory, $T = \frac{cd}{Q} + \frac{Qh}{2}$

$$Free\ \ float = EFT - EST - duration$$

$$N_1 = N_0 P_1$$

$N_2 = N_0 P_2 + N_1 P_1$ (***where*** N_i represent the number of items replaced at the end of i^{th} month)

SECTION A: PART 1

MULTIPLE CHOICE SOLUTIONS

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

Workings

4.

Class interval	*f*	*cf*
1 – 10	*20*	*20*
11 – 20	*27*	*47*
21 – 30	*21*	*68*
31 – 40	*20*	*88*
41 – 50	*12*	*100*

7th Decile, D_7 position $= \frac{7N}{10}th = \frac{7\times100}{10}th = 70th$

$$D_7 = L_{D_7} + \left(\frac{\frac{7N}{10} - \sum f_{D_7}}{f_{D_7}}\right)c$$

$$D_7 = 30.5 + \left(\frac{70-68}{20}\right)10$$

$$D_7 = 30.5 + \left(\frac{2}{20}\right)10$$

$$D_7 = 30.5 + 1 = 31.5$$ **(B)**

5. *Highest/maximum value = 28*

Lowest/minimum value = –15.5

Range = Highest – Lowest = 28 – (–15.5) =28 + 15.5 = 43.5

The range is 43.5 × ₦1,000,000 = ₦43,500,000 **(E)**

6. $\sigma^2 = 25,\ \sigma = \sqrt{25 = 5,}$ *hence coefficient of* $\text{var}\,iation = \frac{\sigma}{\bar{x}} = \frac{5}{16} = 31.25\%$ **(B)**

7. The *fitted simple linear regression line* is given as $y = a + bx$,

where $a = 15.6 \quad and \quad b = -0.1$

$\Rightarrow \qquad y = 15.6 - 0.1x$

For *income* = ₦*36,000* $\Rightarrow \quad x = 36$

$\therefore \qquad y = 15.6 - 0.1(36) = 15.6 - 3.6 = 12$

The *expenditure* = *12* × ₦*1,000* = ₦*12,000* **(B)**

9. *Marshal Edgeworth's weighted index number* $= \dfrac{\sum p_1 q_0 + \sum p_1 q_1}{\sum p_0 q_0 + \sum p_0 q_1} \times \dfrac{100}{1}$

$$= \frac{2{,}600 + 2{,}900}{1{,}050 + 1{,}150} \times \frac{100}{1}$$

$$= \frac{5{,}500}{2{,}200} \times \frac{100}{1} = 250\% \qquad \textbf{(E)}$$

11. Let *F* represent *Female candidates* and *Q* represent *QA candidates*

$$P(F/Q) = \frac{p(F \cap Q)}{P(Q)}$$

$$= \frac{\frac{40}{120}}{\frac{50}{120}} = \frac{4}{5} = 0.80 \qquad \textbf{(D)}$$

12. $n = 225, \qquad \bar{x} = 505g, \qquad \sigma = 30g$

Test Statistic. $z_{cal} = \dfrac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$

$$z_{cal} = \frac{505 - 500}{\frac{30}{\sqrt{225}}} = \frac{5}{\frac{30}{15}} = \frac{5}{2} = 2.5$$

$\therefore \qquad z_{cal} = 2.5$

$and \quad z_{tab} = 1.645 \quad given$

Since, $z_{cal} = 2.5 > z_{tab} = 1.645$

Therefore, reject H_0 and conclude that $\mu > 500g$ **(B)**

13. $CP \equiv 100\%$

$SP \equiv (100+12)\%$

$CP \equiv 100\%$

$2{,}800 \equiv 112\%$

$$\Rightarrow \quad CP = \frac{2{,}800 \times 100}{112} = \text{Le } 2{,}500$$ **(C)**

14. $A = \{life, motor, fire, burglary\}$

$B = \{$*home, business, motor, fire*$\}$

$A \cup B = \{$*life, motor, fire, burglary, home, business*$\}$ **(D)**

15. Let x be the *number of items produced*

Cost function, $C(x) = 750x + 2{,}500{,}000$

Revenue function, $R(x) = 1{,}300x$

Profit function, $P(x) = R(x) - C(x)$

$$P(x) = 1{,}300x - (750x + 2{,}500{,}000)$$

$$P(x) = 550x - 2{,}500{,}000$$ **(A)**

16. The Net Present Value(NPV) of this project is given as

$$-4{,}000{,}000 + \frac{6{,}000{,}000}{1+i},$$

where i is the discount rate.

But the Internal Rate of Return (IRR) is the value of i when $NPV = 0$

$$\Rightarrow \quad -4{,}000{,}000 + \frac{6{,}000{,}000}{1+i} = 0$$

$$\Rightarrow \quad \frac{6{,}000{,}000}{1+i} = 4{,}000{,}000$$

$$\Rightarrow \quad \frac{6}{1+i} = 4$$

$$\Rightarrow \quad 4+4i = 6$$

$$\Rightarrow \quad 4i = 2$$

$$\therefore \quad i = \frac{2}{4} = 0.5$$ **(D)**

17. $P(q) = q^3 + 3q^2 + 6q + 5$

The rate of change of the profit function with respect to q is $\frac{dp}{dq} = 3q^2 + 6q + 6$ **(A)**

18. $R = \int MR\,dq$

$R = \int (3q^2 + 30)dq$

$R = q^3 + 30q + c$

When $q = 0, \quad R = 0$

i.e. $0 = 0^3 + 30(0) + c$

$\therefore \quad c = 0$

$\Rightarrow \quad R = q^3 + 30q$ **(E)**

21. *At the optimal solution,* $x = 20, \quad y = 30$

Objective function value at optimal solution $= 800(20) + 400(30)$

$$= 16{,}000 + 12{,}000 = 28{,}000$$

For a unit increase in raw materials, the approximate solution occurs at $x = 20.4, y = 29.7$, then the *objective function value at a unit increase in raw materials*

$= 800(20.4) + 400(29.7)$

$= 16{,}320 + 11{,}880 = 28{,}200$

Therefore, *the shadow price* $= 28{,}200 - 28{,}000 =$ ***₦200*** **(B)**

23. *Paths* *Duration*

$A \to D \to F$	$5 + 6 + 12 = 23$
$B \to E \to G$	$7 + 3 + 10 = 20$
$A \to C \to E \to G$	$5 + 4 + 3 + 10 = 22$
$A \to D \to Dummy \to G$	$5 + 6 + 0 + 10 = 21$
$A \to Dummy \to G$	$5 + 0 + 10 = 15$

The critical path is $A \to D \to F$ **(A)**

25. $a = \dfrac{14{,}500}{3} = 4{,}833.33$

$b = \dfrac{16{,}500}{4} = 4{,}125$

$c = \dfrac{19{,}000}{5} = 3{,}800$

The equipment should be replaced in the 5th year since this is where the ATC is minimum. **(D)**

26. *Total Supply = 1,200 + 800 + 500 = 2,500*

Total Demand = 900 + 1,100 + 1,000 = 3,000

This implies that *Total Demand > Total Supply*, which implies an unbalanced transportation problem.

To make the problem a balanced one, since the supply is in deficit of 500 units, therefore, one should introduce a horizontal dummy i.e. supply of 500 units with zero transportation cost. **(B)**

27.

Depot	Distributor 1	2	3	Quantity supplied
I	[4] -	[3] 850	[2] 1,900	~~2,750~~ ~~850~~ 0
II	[6] 1,600	[5] 650	[3] -	~~2,250~~ ~~1,600~~ 0
Quantity demanded	~~1,600~~ 0	~~1,500~~ ~~650~~ 0	~~1,900~~ 0	

Since n + m – 1 = 2 + 3 – 1 = 4 cells filled

Therefore, the initial basic feasible transportation cost =
$(850\times3)+(1{,}900\times2)+(1{,}600\times6)+(650\times5)$
= 2,550 + 3,800 + 9,600 + 3,250 = 19,200

Therefore, the initial basic transportation cost = ₦19,200 × 100 = ₦ 1,920,000 (E)

28.

	TECHNICIANS		
JOBS	X	Y	Z
A	40	46	50
B	30	31	30
C	37	34	32

Iteration 1: Row reduction (By subtracting from each row the smallest number)

	TECHNICIANS		
JOBS	X	Y	Z
A	0	6	10
B	0	1	0
C	5	2	0

Iteration 2: Column reduction (By subtracting from each column the smallest number)

	TECHNICIANS		
JOBS	X	Y	Z
A	0	5	10
B	0	0	0
C	5	1	0

Iteration 3: Cover all zeros with lines

	TECHNICIANS		
JOBS	X	Y	Z
A	0	5	10
B	0	0	0
C	5	1	0

Since the number of lines that covered all zeros = number of rows/columns = 3

Therefore, the optimal solution is $A \rightarrow X, \quad B \rightarrow Y, \quad C \rightarrow Z$ i.e. Assign technician *X* to job *A*, technician *Y* to job *B* and technician *Z* to job *C*. (D)

30.

Types of Dinning set	*Probability*	*Cumulative Probability*	*Random number Range*
Standard (S)	*0.47*	*0.47*	*00 – 46*
Brass (B)	*0.40*	*0.87*	*47 – 86*
Luxury (L)	*0.13*	*1.00*	*87 – 99*

The next 5 demands of the furniture company, using the given random numbers 38, 51, 46, 89 and 29 are S, B, S, L, S, respectively. (C)

Examiner's comment

The 30 questions in this part are based on virtually all the parts of the Syllabus.

All the questions are compulsory. About 87% 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. Histogram
2. 35
3. ₦2.8million
4. Perfect positive correlation
5. Secular/ Trend, Cyclical (in any order)
6. *122.73%*
7. Probability of an event A or Pr(A) or P(A)
8. Critical region or rejection region

9. 12% profit
10. 24
11. Function
12. ₦2,025,000
13. mathematically, heuristically/non-mathematically (in any order)
14. $(4,2)$ *i.e.*, $x=4, y=2$
15. ₦*600*
16. 0, 1 (in that order)
17. 224
18. minimise/reduce
19. North-West Corner Method
20. 0.45

Workings

2. 70th percentile, P_{70} position $= \frac{70N}{100} = \frac{70\times 50}{100} = 35$

3. $Mean, \overline{x} = \frac{\sum x}{n} = \frac{1+2+5+7+10}{5} = \frac{25}{5} = 5$

$$Mean\ deviation = \frac{\sum |x-\overline{x}|}{n} = \frac{|1-5|+|2-5|+|5-5|+|7-5|+|10-5|}{5}$$

$$= \frac{|-4|+|-3|+|0|+|2|+|5|}{5} = \frac{4+3+0+2+5}{5} = \frac{14}{5} = 2.8$$

The mean deviation of the total daily withdrawals is ₦2.8million.

6. The unweighted Simple Aggregate Price Index is

$$SAPI = \frac{\sum P_i}{\sum P_o} \times \frac{100}{1} = \frac{5{,}000+6{,}000+2{,}500}{4{,}000+5{,}000+2{,}000}$$

$$= \frac{13{,}500}{11{,}000} \times \frac{100}{1} = 122.73\%$$

9. $CP = ₦25{,}000$

$SP = ₦2{,}800 \times 10 = ₦28{,}000$

Since $SP > CP$, $profit = SP - CP = 28{,}000 - 25{,}000 = ₦3{,}000$

$$\Rightarrow \quad profit\% = \frac{profit}{CP} \times \frac{100}{1}$$

$$= \frac{3{,}000}{25{,}000} \times \frac{100}{1}$$

$$= 12\% \quad profit$$

10. $n(A \cup B) = 35, \quad n(A \cap B) = 15, \quad n(A) = 26, \quad n(B) = ?$

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

$$35 = 26 + n(B) - 15$$

$$n(B) = 35 + 15 - 26 = 24$$

12. $$\int_q MRdq = \int_{q=o}^{100} (6q^2 + 4q + 50)dq$$

$$= \left(\frac{6q^3}{3} + \frac{4q^2}{2} + 50q \right)\Big|_0^{100}$$

$$= \left(2q^3 + 2q^2 + 50q\right)\Big|_0^{100}$$

$$= 2(100)^3 + 2(100)^2 + 50(100)$$

$$= 2{,}000{,}000 + 20{,}000 + 5{,}000$$

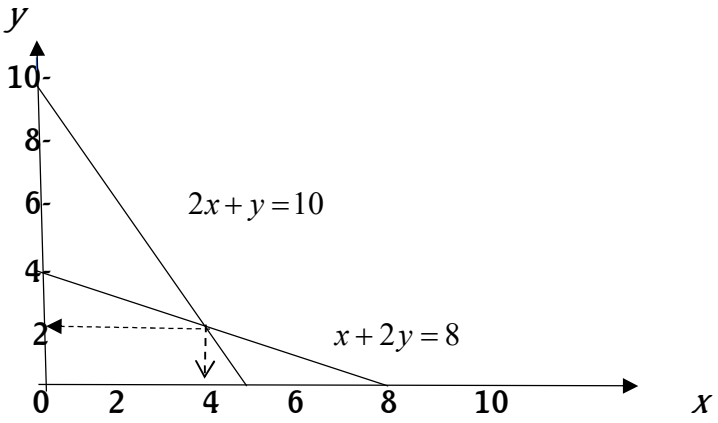
$$= ₦2{,}025{,}000$$

14. $For \quad 2x + y = 10$

$when \quad x = 0, \; y = 10 \Rightarrow (0,10), \qquad when \quad y = 0, \; x = 5 \Rightarrow (5,0)$

$For \quad x + 2y = 8$

$when \quad x = 0, \; y = 4 \Rightarrow (0,4), \qquad when \quad y = 0, \; x = 8 \Rightarrow (8,0)$



This is solving $2x+y=10$ and $x+2y=8$ simultaneously to get $(4,2)$ *i.e.* $x=4, y=2$

15. $T=\frac{cd}{Q}+\frac{Qh}{2}$

$$Q=\sqrt{\frac{2cd}{h}}=\sqrt{\frac{2\times 15\times 3{,}000}{4}}=150$$

$$T=15\times\frac{3{,}000}{150}+150\times\frac{4}{2}=300+300=\text{₦}600$$

16. $Free\ float = EFT - EST - duration$

$Free\ float\ for\ activity\ B = 14-9-5=0$

$Free\ float\ for\ activity\ C = 16-9-6=1$

17. Let N_i represent the number of items replaced at the end of ith month

$N_0 = 600$

$N_1 = N_0P_1 = 600\times 0.15 = 90$

$N_2 = N_0P_2 + N_1P_1 = (600\times 0.35)+(90\times 0.15) = 210+13.5 = 223.5$

∴ Number of items replaced at the end of 2nd month is 224.

20.

Product	Random number Range	Cumulative probability	Probability
Normal	00 – 34	0.35	0.35
Deluxe	35 – 79	0.80	0.85 – 0.35 =0.45
Exotic	80 - 99	1.00	1.00 – 0.80 = 0.20

The probability of producing Deluxe settee is 0.45 or 45%.

Examiner's comment

The 20 Short-Answer Questions are spread throughout the syllabus. All the questions are compulsory.

On the average, the lowest and highest marks are respectively 1 and 16. About 72% of the candidates scored marks in excess of 40%.

SECTION B

SOLUTION 1

a. i.

x	y	x^2	y^2	xy
8	*5*	*64*	*25*	*40*
10	*7*	*100*	*49*	*70*
8	*9*	*64*	*81*	*72*
13	*8*	*169*	*64*	*104*
15	*11*	*225*	*121*	*165*
14	*9*	*196*	*81*	*126*
11	*7*	*121*	*49*	*77*
9	*8*	*81*	*64*	*72*
$\sum x = 88$	$\sum y = 64$	$\sum x^2 = 1{,}020$	$\sum y^2 = 534$	$\sum xy = 726$

$n = 8$

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left[n\sum x^2 - \left(\sum x\right)^2\right]\left[n\sum y^2 - \left(\sum y\right)^2\right]}}$$

$$r = \frac{8(726) - (88)(64)}{\sqrt{\left[8(1{,}020) - (88)^2\right]\left[8(534) - (64)^2\right]}}$$

$$r = \frac{5{,}808 - 5{,}632}{\sqrt{(8{,}160 - 7{,}744)(4{,}272 - 4{,}096)}}$$

$$r = \frac{176}{\sqrt{(416)(176)}}$$

$$r = \frac{176}{\sqrt{73{,}216}}$$

$$r = \frac{176}{270.58}$$

$$r = 0.65$$

ALITER Q1a(i)

x	y	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
8	5	-3	-3	9	9	**9**
10	7	-1	-1	1	1	1
8	9	-3	1	9	1	-3
13	8	2	0	4	0	0
15	11	4	3	16	9	12
14	9	3	1	9	1	3
11	7	0	-1	0	1	0
9	8	-2	0	4	0	0
$\sum x = 88$	$\sum x = 64$			$\sum (x-\bar{x})^2 = 52$	$\sum (y-\bar{y})^2 = 22$	$\sum (x-\bar{x})(y-\bar{y}) = 22$

$$n = 8$$

$$\bar{x} = \frac{\sum x}{n} = \frac{88}{8} = 11$$

$$\bar{y} = \frac{\sum y}{n} = \frac{64}{8} = 8$$

$$r = \frac{\sum (x-\bar{x})(y-\bar{y})^2}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}}$$

$$r = \frac{22}{\sqrt{(52)(22)}}$$

$$r = \frac{22}{\sqrt{1144}}$$

$$r = \frac{22}{33.82}$$

$$r = 0.65$$

ii. This is a fairly strong positive correlation between X and Y i.e., the profits after tax of the two companies grow in the same direction.

b.

A	B	R_A	R_B	$d = R_A - R_B$	d^2
80	75	2	4.5	-2.5	6.25
70	88	5	1	4	16
75	70	3	6	-3	9
69	75	6	4.5	1.5	2.25
85	69	1	7	-6	36
72	80	4	2	2	4
68	76	7	3	4	16
					$\sum d^2 = 89.5$

$$n = 7$$

$$R = 1 - \frac{6\sum d^2}{n(n^2 - 1)}$$

$$R = 1 - \frac{6(89.5)}{7(7^2 - 1)}$$

$$R = 1 - \frac{537}{336}$$

$$R = 1 - 1.5982$$

$$R = -0.5982 \approx -0.60$$

ii. This is a fairly strong negative correlation. This means that the two judges' rankings are in the opposite directions, i.e., their judgements are different from each other.

Examiner's comment

The syllabus area tested is Statistics, focusing on measures of association between two variables using Pearson's and Spearman's correlation methods. Candidates are required to compute correlation coefficients and interpret the results in context. This question examines the understanding of the strength and direction of linear relationships and the ability to apply formulas in real-life business and financial settings.

All the candidates attempted this question with about 87% scoring marks between 8.5 and 12.5. The lowest and highest scores are 4 and 12.5 respectively. The pitfall of the candidates was their inability to substitute correctly into the Pearson's Product Moment Correlation Coefficient formula and their inability to handle tied data in the case of Spearman's Rank correlation coefficient. Candidates are advised to get familiar with these correlation coefficients for future examinations.

SOLUTION 2

a. Let x represent the amount of money to be won.

x (₦)	$frequency\,(f)$	$P(X=x)\ or\ P(x)$
5,000	1,200	$\frac{1,200}{5,000}=0.24$
10,000	400	$\frac{400}{5,000}=0.08$
15,000	200	$\frac{200}{5,000}=0.04$
20,000	100	$\frac{100}{5,000}=0.02$
0	$5,000-1,900=3,100$	$\frac{3,100}{5,000}=0.62$

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

$$E(X)=(5,000\times 0.24)+(10,000\times 0.08)+(15,000\times 0.04)+(20,000\times 0.02)+(0\times 0.62)$$

$$E(X)=1,200+800+600+400+0=3,000$$

The expected fair price for the lottery ticket is ₦*3,000.*

b(i). Let x represent the number of cars sold per day.

x	f
0	9
1	6
2	2
3	2
4	1
	$\sum f = 20$

$$P(0) = P(X = 0) = \frac{10}{20} = 0.5$$

$$P(1) = P(X = 1) = \frac{5}{20} = 0.25$$

$$P(2) = P(X = 2) = \frac{2}{20} = 0.1$$

$$P(3) = P(X = 3) = \frac{2}{20} = 0.1$$

$$P(4) = P(X = 4) = \frac{1}{20} = 0.05$$

b(ii)

x	0	1	2	3	4
$P(X = x)$	0.45	0.3	0.1	0.1	0.05

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

$$E(X) = (0 \times 0.5) + (1 \times 0.25) + (2 \times 0.1) + (3 \times 0.1) + (4 \times 0.05)$$

$$E(X) = 0 + 0.25 + 0.2 + 0.3 + 0.2 = 0.95 \approx 1$$

The expected number of cars sold per day by the automobile firm is *1* car.

Examiner's comment

The syllabus area tested is Probability and Statistics, specifically the application of discrete probability distributions in computing expected values and fair pricing of a lottery. Candidates are required to construct probability distributions from frequency data and calculate the expected value (mean) of a discrete random variable. This tests

candidates' ability to determine fair value and understand the mathematical expectation in practical scenarios.

Just a little bit over 50% of the candidates attempted the question. About 42% of the candidates that attempted the question obtained marks between 2 and 9.

The identified pitfalls are in the inability of the candidates to understand the basic concept of expectation in probability distributions. Some of them failed to demonstrate a clear understanding of the expectations of a random understanding of the expectation of a random variable in the eventual calculations. Candidates are advised to study the relevant portion of the INSIGHT that deals with expected values.

SOLUTION 3

a.i. Let μ be the population mean of the number of security gadgets sold per week per marketer

$$H_0 : \mu = 10 \quad vs \quad H_1 : \mu > 10$$

ii. $\alpha = 5\% = 0.05$

Since $n = 6 < 30$, i.e. small sample, the test statistic is *t,* which is given as

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

Where: $$\bar{x} = \frac{\sum x}{n} = \frac{13+8+11+9+7+6}{6} = \frac{54}{6}$$

$$\bar{x} = 9$$

$$s^2 = \frac{\sum (x - \bar{x})^2}{n-1}$$

$$s^2 = \frac{(13-9)^2 + (8-9)^2 + (11-9)^2 + (9-9)^2 + (7-9)^2 + (6-9)^2}{6-1}$$

$$s^2 = \frac{16+1+4+0+4+9}{5} = \frac{34}{5} = 6.8$$

Or $$s^2 = \frac{\sum x^2 - \frac{\left(\sum x\right)^2}{n}}{n-1}$$

$$s^2 = \frac{(13^2 + 8^2 + 11^2 + 9^2 + 7^2 + 6^2) - \frac{(13+8+11+9+7+6)^2}{6}}{6-1}$$

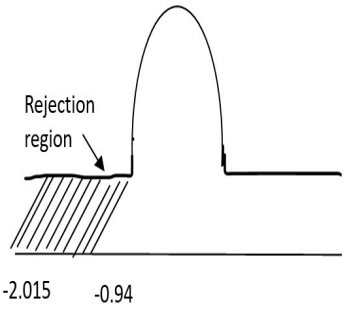
$$s^2 = \frac{(169 + 64 + 121 + 81 + 49 + 36) - \frac{(54)^2}{6}}{5}$$

$$s^2 = \frac{520 - 486}{5} = \frac{34}{5} = 6.8$$

$$s = \sqrt{6.8} = 2.608$$

$$t_{cal} = \frac{9 - 10}{\frac{2.605}{\sqrt{6}}} = \frac{-1}{\frac{2.605}{2.449}}$$

$$t_{cal} = -0.94$$



Degrees of freedom, $df = n - 1 = 6 - 1 = 5$

From the $t-$distribution statistical table,

$t_{tab} = t_{n-i,\alpha} = t_{5,0-05} = 2.015$

Decision rule: Reject H_0 if $t_{cal} > t_{tab}$, otherwise do not reject H_0

Decision: Since $t_{cal} = -0.94 < t_{tab} = 2.015$, we do not reject H_0 and conclude that $\mu = 10$ i.e., the supervisor's claim is right.

b.

Class Interval	f	cf
0.6 – 1.5	20	20
1.6 – 2.5	16	36
2.6 – 3.5	24	60
3.6 – 4.5	14	74
4.6 – 5.5	12	86
5.6 -6.5	8	94
6.6 – 7.5	6	100
	∑f = 50	

i. Model quantity of fuel:
Modal class = 2.6 – 3.5 (Class with the highest frequency of 24)

Recall:

$$\text{Mode} = L_m + \left(\frac{\Delta_1}{\Delta_2 + \Delta_1}\right)$$

$\Delta_1 = 24 - 16 = 8$, $\Delta_2 = 24 - 14 = 10$

Modal quantity = $2.55 + \left(\frac{8}{10+8}\right)1.0$

$= 2.55 + 0.4444$

$= 2.9944$

Thus, the modal quantity of fuel $= 2.9944 \times 10{,}000 = 29{,}944$ *litres*

ii. Median position $= \frac{N}{2} = \frac{100}{2} = 50th$

Median class = $2.6 - 3.5$

Median quantity = $Lm_e + \left(\frac{\frac{N}{2} - \sum f}{fm_e}\right)c$

$= 2.55 + \left(\frac{50 - 36}{24}\right)1.0$

$= 2.55 + 0.5833 = 3.13333$

$= 3.1333$

Thus, the median quantity of fuel $= 3.1333 \times 10{,}000 = 31{,}333$ *litres*

Examiner's comment

The syllabus area tested is Statistics, covering hypothesis testing for a single population mean with a small sample, as well as measures of location for grouped data, including the mode and median. Candidates are expected to set up and test a hypothesis and determine the mode and median from grouped frequency distributions using appropriate estimation methods.

This is a poorly attempted question. Less than 35% of the candidates attempted the question. 40% of this figure were able to make a little impact. The lowest and highest scores were zero(0) and 5 respectively.

Many of these candidates had difficulty in setting up the appropriate hypothesis. Inability to use current formulae for both Mode and Median is another pitfall of the candidates identified.

Candidates should study more on hypothesis testing in relevant text books must especially the ICAN INSIGHT.

SOLUTION 4

a. $A = ₦150{,}000$, $r = 10\% = 0.1$, $n = 4$

$$S = \frac{A\left[(1+r)^n - 1\right]}{r}$$

$$S = \frac{150{,}000\left[(1+0.1)^4 - 1\right]}{0.1}$$

$$S = \frac{150{,}000\left[(1.1)^4 - 1\right]}{0.1} = \frac{150{,}000(1.4641-1)}{0.1}$$

$$S = \frac{150{,}000(0.4641)}{0.1} = 696{,}150$$

∴ The amount of annuity is ₦696,150.00

b. $S = ₦3{,}000{,}000$, $r = 5\% = 0.05$, $n = 3$

$$S = \frac{A\left[(1+r)^n - 1\right]}{r}$$

$$3{,}000{,}000 = \frac{A\left[(1+0.05)^3 - 1\right]}{0.05}$$

$$A = \frac{3{,}000{,}000 \times 0.05}{(1.05)^3 - 1}$$

$$A = \frac{3{,}000{,}000 \times 0.05}{1.157625 - 1}$$

$$A = \frac{3{,}000{,}000 \times 0.05}{0.157625} = 951{,}625.69$$

∴ The annual amount to be paid is ₦951,625.69

c. $A = ₦75{,}000$, $r = 7.5\% = 0.075$, $n = 7$

$$P = \frac{A\left[1 - (1+r)^{-n}\right]}{r}$$

$$P = \frac{75{,}000\left[1 - (1+0.075)^{-7}\right]}{0.075}$$

$$P = \frac{75{,}000\left[1-(1.075)^{-7}\right]}{0.075} = \frac{75{,}000(1-0.6027549)}{0.075}$$

$$P = \frac{75{,}000(0.397245099)}{0.075} = 397{,}245.10$$

$\therefore$ The present value of an annuity is ₦397,245.10

Examiner's comment

The syllabus area tested is Financial Mathematics, focusing on annuities, present and future values, and sinking funds. Candidates are required to apply the time value of money concepts to calculate present and future values, periodic contributions, and assess financial planning scenarios accurately.

This question, on Mathematics of Finance, was less attractive to candidates. About 50% of the candidates attempted the question. About 25% of this number provided correct solution.

Some of these candidates could not distinguish clearly among sinking funds, annuities and future values. Candidates are advised to master the calculation of interest, compounded at different intervals – annually, quarterly, compounded at different intervals – annually, quarterly, and so on.

SOLUTION 5

a.i. This is an unbalanced transportation problem and a horizontal dummy of 5,000 units with zero transportation cost will be introduced. North-West Corner Method

Plant	Depot P	Depot Q	Depot R	Depot S	Production capacity (Quantity Supplied)
A	12 **14,500**	13 **500**	10 —	11 —	~~15,000~~ ~~500~~ 0
B	11 —	12 **10,000**	14 **10,000**	10 —	~~20,000~~ ~~10,000~~ 0
C	14 —	11 —	13 **1,500**	12 **8,500**	~~10,000~~ ~~8,500~~ 0
Dummy	0 —	0 —	0 —	0 **5,000**	~~5,000~~ 0
Storage capacity (Quantity demanded)	~~14,500~~ 0	~~10,500~~ ~~**10,000**~~ 0	~~11,500~~ ~~1,500~~ 0	~~13,500~~ ~~5,000~~ 0	

Since n + m − 1 = 4 + 4 − 1 = 7 cells filled

The initial basic feasible transportation cost

$$=(14{,}500\times12)+(500\times13)+(10{,}000\times12)$$

$$+(10{,}000\times14)+(1{,}500\times15)+(8{,}500\times12)+(5{,}000\times0)$$

The initial basic feasible transportation cost $=174{,}000+6{,}500+120{,}000$

$$+140{,}000+22{,}500+102{,}000+0=565{,}000$$

Therefore, the initial basic transportation cost = **₦565,000** $\times$ 10 = **₦**5,650,000

ii. This is an unbalanced transportation problem and a horizontal dummy of 5,000 units with zero transportation cost will be introduced. By Least Cost Method

Case 1 (Dummy-P route used first)

Plant	Depot				Supply
	P	Q	R	S	
A	^{12} 3,000	^{13} 500	^{10} 10,500	^{11} X	15,000
B	^{11} 6,500	^{12} X	^{14} X	^{10} 13,500	20,000
C	^{14} X	^{11} 10,000	^{15} X	^{12} X	10,000
Dummy	^{0} 5,000	^{0} X	^{0} X	^{0} X	5,000
Demand	14,500	10,500	11,500	13,500	50,000

Total Cost (TC) Calculation:

TC = 3,000(12) + 500(13) + 10,500(10) + 6,500(1) + 13,500(10) + 10,000(11) + 5,000(0)

= 36,000 + 6,500 + 115,000 + 71,500 + 135,000 + 110,000 + 0 = ₦474,000

Therefore, the initial basic transportation cost = ₦474,000 × 10 = ₦4,740,000.

Case 2 (Dummy –Q route used first)

Plant	Depot				Supply
	P	Q	R	S	
A	^{12} 3,500	^{13} X	^{10} 11,500	^{11} X	15,000
B	^{11} 6,500	^{12} X	^{14} X	^{10} 13,500	20,000
C	^{14} 4500	^{11} 5500	^{15} X	^{12} X	10,000
Dummy	^{0}	^{0} 5000	^{0} X	^{0} X	5,000
Demand	14,500	10,500	11,500	13,500	50,000

Total Cost (TC) Calculation:

TC = 3,500(12) + 11,500(10) + 6,500(11) + 13,500(10) + 4,500(14) + 5,500(11) + 5,000(0)

= 42,000 + 115,000 + 71,500 + 135,000 + 63,000 + 60,500 + 0
= ₦487,000

Therefore, the initial basic transportation cost = ₦487,000 × 10 = ₦4,870,000.

Case 3 (Dummy-R route used first)

Plant	Depot				Capacity
	P	Q	R	S	
A	[12] 8000	[13] 500	[10] 6,500	[11] X	15,000
B	[11] 6,500	[12] X	[14] X	[10] 13,500	20,000
C	[14] X	[11] 10,000	[15] X	[12] X	10,000
Dummy	[0] X	[0] X	[0] 5000	[0] X	5,000
Demand	14,500	19,500	11,500	13,500	50,000

Working Notes

TC = 8,000(12) + 500(13) + 6,500(10) + 10,000(11) + 6,500(11) + 13,500(10) + 5,000(0)

= 96,000 + 6,500 + 65,000 + 110,000 + 71,500 + 135,000 + 0
= ₦484,000

Therefore, the initial basic transportation cost = ₦484,000 × 10 = ₦4,840,000.

Case 4 (Dummy-S route used first)

Plant	Depot				
	P	Q	R	S	Capacity
A	[12] 3,000	[13] 500	[10] 11,500	[11] X	15,000
B	[11] 11,500	[12] X	[14] X	[10] 8,500	20,000
C	[14] X	[11] 10,000	[15] X	[12] X	10,000
Dummy	[0]	[0]	[0] X	[0] 5,000	5,000
Demand	14,500	10,500	13,500	13,500	50,000

Total Cost = 3,000(12) + 500(13) + 11,500(10) + 11,500(11) + 8,500(10) + 10,000(11) + 5000(0)

= 36,000 + 6,500 + 115,000 + 126,500 + 85,000 + 110,000 + 0

= ₦479,000

Therefore, the initial basic transportation cost = ₦479,000 × 10 = ₦4,790,000.

b. The Least Cost Method gave a cheaper transportation cost and the difference is ₦5,650,000 – ₦4,870,000 = ₦780,000

Examiner's comment

The syllabus area tested is Operations Research, specifically the Transportation Problem. Candidates are required to recognise unbalanced transportation problems, introduce dummy origins or destinations to balance them, obtain initial basic feasible solutions using North-West Corner and Least Cost methods, compute total transportation costs, and compare alternative solutions. Clear presentation of allocations and accurate computation of costs are essential.

This is a fairly popular question. About 86% of candidates attempted this question. 75% of this number obtained marks between 5 and 12.5

The only pitfall identified was the inability of some candidates to know that the transportation problem is not balanced. Hence, they failed to introduce the appropriate dummy.

SOLUTION 6

Monthly Demand Quantity	*Probability*	*Cumulative Probability*	*Random Number Range*
5,000	0.30	0.30	00 – 29
10,000	0.35	0.65	30 – 64
15,000	0.16	0.81	65 – 80
20,000	0.14	0.95	81 – 94
25,000	0.05	1.00	95 – 99

The next one year i.e. *12* months simulated demand is given as:

Month	*Random Number*	*Simulated Demand*
1	39	10,000
2	28	5,000
3	28	5,000
4	54	10,000
5	92	20,000
6	70	15,000
7	18	5,000
8	35	10,000
9	85	20,000
10	08	5,000
11	31	10,000
12	62	10,000
		$Total = 125{,}000$

Examiner's comment

The syllabus area tested is simulation and its application to demand and forecasting, focusing on the application of Monte Carlo simulation techniques. Candidates are required to generate random outcomes, simulate scenarios, compute expected values, and interpret results in a business or financial context, applying probabilistic reasoning to decision-making. About 80% of candidates attempted this question. Of this number, about 74% obtained marks between 5 and 12.5. Some candidates had difficulty in formulating the required Random Number Range.

THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA

ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
SEPTEMBER 2025 EXAMINATIONS (PART II)

INFORMATION TECHNOLOGY

PLEASE READ THESE INSTRUCTIONS BEFORE COMMENCEMENT OF THE PAPER

EXAMINATION INSTRUCTIONS

1. All solutions should be in 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 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, SEPTEMBER 23, 2025

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 – SEPTEMBER 2025

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** an objective of business organisation?

   A. Generate a reasonable financial return for shareholders
   B. Maintain a low market share
   C. Increase productivity annually
   D. Acknowledge social responsibilities
   E. Develop a reputation as a responsible employer

2. When Systems are decoupled, they

   A. become too complex to understand
   B. become too complex to operate
   C. are difficult to administer
   D. are more flexible
   E. become difficult

3. Which of the following is **NOT** true about data?

   A. Data is raw and unchanged fact
   B. Data by itself is significant
   C. Data serves as input into the computer system
   D. Data is the lowest level of knowledge
   E. Observation and recording are done to produce data

4. Which of the following is **NOT** a benefit of an information system?

   A. Operational efficiency
   B. Functional effectiveness
   C. Better product selection
   D. Competitive advantage
   E. Ease of fraud

5. Which of the following is **NOT** a feature of the fifth-generation computers?

   A. Development of Artificial Intelligence
   B. Development of Natural Language Processing
   C. Advancement in parallel processing
   D. More user-friendly interfaces with multimedia features
   E. Storage media is magnetic storage

6. Which of the following is **NOT** a direct input device?

   A. Touch screens
   B. Light Pens
   C. Voice Recognition system
   D. Barcode
   E. Joystick

7. Keyboard contains the following, **EXCEPT:**

   A. alphabetic keys
   B. numeric Keys
   C. control Keys
   D. function keys
   E. leading Keys

8. Which of the following is **NOT** an example of an image input device?

   A. Graphic Tablet
   B. Image Creator
   C. Cross hair cursor
   D. Image Scanner
   E. Digitising Camera

9. Which of the following is **NOT** an advantage of flat panel display?

   A. They are lightweight
   B. They are compact
   C. They provide better resolution than CRT
   D. They are bulky
   E. They are modern

10. VGA is an acronym for

   A. Visual Graphic Array
   B. Video Graphic Adapter
   C. Versatile Graphic Array
   D. Versatile Graphic Adapter
   E. Visual Graphic Adapter

11. The following operations are carried out by Arithmetic Logic Unit (ALU), **EXCEPT:**

    A. Repetition
    B. Movement of data
    C. Comparison of data
    D. Addition and subtraction
    E. Multiplication and Division

12. Which of the following are **NOT** stored in the primary memory?

    A. Programs that contain instructions that will be used for processing
    B. Raw facts and figures
    C. Data that has been read from an input device or a secondary storage device
    D. Intermediate results
    E. Output information that is ready to be sent to an output device or a secondary storage device.

13. Which of the following is **NOT** a type of system software?

    A. Operating System
    B. Editor
    C. Browser
    D. Loader
    E. Complier

14. Which of the following is **NOT** an advantage of interpreters over compilers?

    A. They are fast and easier to use
    B. It takes longer time for a program to run
    C. They are cheaper
    D. They are suitable for interactive work
    E. They are very useful for small program writing

15. Which of the following is **NOT** an example of an electronic spreadsheet?

    A. MultiMate
    B. Multiplan
    C. Quattro Pro
    D. Supercalc
    E. Excel

16. Which of the following is **NOT** a feature of machine language?

    A. Machine language code is in the form of binary digits represented by zero (0) and one (1)
    B. An instruction code in machine language consists of an operation code and operand address.
    C. Machine language is the first-generation language
    D. It is machine independent
    E. It is only written by highly skilled programmers

17. Which of the following is **NOT** an advantage of Object-Oriented Programming?

    A, It uses graphical interface
    B. It's not easy to use
    C. Faster program development
    D. Enhanced programmer productivity
    E. Programs produced are more reliable

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. Which of the following is **NOT** a characteristic of files?

    A. Hit Rate
    B. Volatility
    C. Robustness
    D. Size
    E. Access time

20. Which of the following is **NOT** a method of storing data on disk?

    A. Serial
    B. Sequential
    C. Indexed Sequential
    D. Random
    E. Indirect

21. Which of the following is **NOT** a feature of Multiprocessing techniques?

A. If one processor (CPU) fails, the processing system can shift work to the remaining CPU
B. The system provides fast throughput for jobs
C. It pays particular attention to individual tasks/jobs to give them rapid service
D. Inability to share memory among the CPU
E. If a task/job requires more resources than the one available on any of the systems, all the resources can be pooled together to serve only one processor

22. A processing technique in which data is processed from terminals connected to the central processor is:

A. On-line processing
B. Real-time processing
C. Batch processing
D. Centralised processing
E. Distributed processing

23. Which of the following is **NOT** a major staff of an IT department?

A. Software engineer
B. Software expert
C. System Analyst
D. Network engineer
E. Technical support

24. Which of the following is **NOT** possible for users on the computer networks?

A. Share peripheral devices
B. Share programs
C. Ability to control the network
D. Engage in better communication
E. Share data

25. Which of the following is **NOT** a network equipment?

A. Router
B. Switch
C. Bridge
D. Gateway
E. Panel

26. The set of rules and procedures for exchanging information between computers on the network is called:

A. Ethernet
B. Internet
C. Protocol
D. Network
E. Intranet

27. SMTP is an acronym for:

A. Simple Mail Transfer Protocol
B. Simple Message Transfer Protocol
C. Simple Mail Transfer Packet
D. Simple Message Transfer Packet
E. Simple Message Total Packet

28. The 5th layer of the OSI model is:

A. Physical
B. Network
C. Session
D. Transport
E. Application

29. Which of the following is **NOT** a social media platform?

A. Facebook
B. Twitter
C. WhatsApp
D. Instagram
E. Email

30. A Computer crime that uses psychological manipulations to trick users into making security mistakes or divulging confidential information is:

A. Social engineering
B. Salami Technique
C. Hacking
D. Denial of service attack
E. Masquerading

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 technical term for meaningful data is .....
2. Data in ASCII code is a group of .....
3. An organised collection of structured data is.....
4. In data processing, a range check on data is an act of what?.....
5. What characteristic of information ensures that it is free from errors?
6. What technology innovation defines third-generation computer systems?
7. The system design that uses multiple processors for task execution is .....
8. The processing technique which involves grouping data for scheduled execution is.....
9. The computing device which is primarily used for individual productivity tasks is .....
10. A peripheral device that captures physical images and converts them into digital format is .....
11. The storage solution which provides remote data access via the internet is .....
12. The semi-formal notation that outlines algorithmic logic using plain language is .....
13. The software bundle that integrates multiple related application programs is .....
14. A programming paradigm that is based on encapsulation and object manipulation is.....
15. A graphical presentation of programming logic is achieved through a .....

16. An operating system developed by Microsoft that is commonly deployed on microcomputers is*.....*

17. Distributed computing approach which employs interconnected systems for resource sharing is *.....*

18. The process of retrieving files from a remote server to a local device is *.....*

19. A network topology that connects devices in a closed-loop configuration is *.....*

20. A mode of data transmission which permits bidirectional communication, but only one direction at a time is*.....*

SECTION B: ATTEMPT ANY FOUR QUESTIONS (50 MARKS)

QUESTION 1

(a) What are the digits contained in each of the following number systems?

i. Binary

ii. Octal

iii. Denary

iv. Hexadecimal (4 Marks)

(b) Convert the following decimal numbers to binary number equivalents.

i. 1875

ii. 151.0625 (4 Marks)

(c) i. What is a general-purpose digital computer? (1½ Marks)

ii. State **TWO** distinctions between data acquisition and data cleansing. (3 Marks)

(Total 12½ Marks)

QUESTION 2

(a) State **FOUR** distinctions between Read Only Memory (ROM) and Random Access Memory (RAM). (4 Marks)

(b) Magnetic and optical technologies are used for external storage media.

Required:

i. List **FOUR** examples of Magnetic storage media. (2 Marks)

ii. Enumerate **FOUR** examples of optical storage media. (2 Marks)

(c) i. State **TWO** functions of cloud storage. (1½ Marks)

ii. State **THREE** types of data and programs that can be stored in the primary memory of a computer system. (3 Marks)

(Total 12½ Marks)

QUESTION 3

(a) State **ONE** distinction between Multitasking and Multiprogramming techniques. (3 Marks)

(b) Enumerate **THREE** benefits and **TWO** lapses of object-oriented programming languages. (5 Marks)

(c) State **ONE** major function of each of the following packages.

i. E views

ii. SPSS

iii. Strata (4½ Marks)

(Total 12½ Marks)

QUESTION 4

(a) i. What is a computer Service Bureaux? (1½ Marks)

ii. Enumerate **SIX** services that can be provided by computer service bureau. (3 Marks)

(b) Enumerate **THREE** benefits and **TWO** lapses of using e-commerce. (5 Marks)

(c) State **TWO** distinctions between centralised and decentralised processing methods. (3 Marks)

(Total 12½ Marks)

QUESTION 5

(a) i. What is a network protocol? (1½ Marks)

ii. Enumerate **THREE** reasons why protocols are very necessary in computer network. (3 Marks)

(b) State **ONE** distinction between simplex and duplex modes of data transmission over a channel and provide **ONE** example in each case. (3 Marks)

(c) Enumerate **THREE** benefits and **TWO** lapses of using internet. (5 Marks)

(Total 12½ Marks)

QUESTION 6

(a) One of the criteria of feasibility study in information system investigation is economic feasibility.

Required:

i. State **TWO** functions of economic feasibility. (1½ Marks)

ii. Enumerate **FIVE** one-off (tangible) costs and **THREE** running (intangible) costs that can be incurred during information system development. (4 Mark)

(b) State **ONE** distinction between direct and parallel changeover methods in information system development. (2 Marks)

(c) Enumerate **THREE** benefits and **TWO** lapses of parallel changeover methods. (5 Marks)

(Total 12½ Marks)

SECTION A: PART 1

MULTIPLE CHOICE SOLUTIONS

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

Examiner's comment

This section consists of thirty multiple-choice questions (MCQs), and the candidates were expected to answer all the questions.

The questions cover all the segments of the syllabus, and the performance is very good.

SECTION A: PART II

SHORT ANSWER SOLUTIONS

1. Information
2. 7 Bits
3. Database
4. Data validation
5. Accuracy
6. Integrated Circuits (IC)| Silicon Chips
7. Multiprocessing System
8. Batch Processing Technique
9. Microcomputer|personal Computer|Laptop|Desktop
10. Scanner
11. Cloud storage
12. Pseudocode
13. Integrated Package| Integrated Software
14. Object-Oriented Programming (OOP)
15. Flowchart/Flowcharting
16. Windows| Microsoft Windows| Ms Windows
17. Grid Computing
18. Downloading
19. Ring
20. Half-duplex Mode

Examiner's comment

This section consists of twenty short-answer questions (SAQ), and the candidates were expected to attempt all the questions.

The questions cover the majority of the syllabus' content. Surprisingly, the performance is better than the previous ones. There has been a significant improvement in the solutions submitted by the candidates. The performance is highly commendable.

SOLUTION 1

a. The digits contained in each of the following number systems are:

S/N	Number System	Digits	No of Digits
i.	Binary	0, 1	2
ii.	Octal	0, 1, 2, 3, 4, 5, 6, 7	8
iii.	Denary	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	10
iv.	Hexadecimal	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F	16

b. i. Conversion of 1875_{ten} to binary equivalent

2	1	8	7	5
2	1	5	1	
2		7	5	R 1
2		3	7	R 1
2		1	8	R 1
2			9	R 0
2			4	R 1
2			2	R 0
2			1	R 0
2		9	3	7 R 1
2		4	6	8 R 1
2		2	3	4 R 0
2		1	1	7 R 0
2			5	8 R 1
2			2	9 R 0
2			1	4 R 1
2				7 R 0
2				3 R 1
2				1 R 1
2				0 R 1

∴ 1875ten $=11101010011_{two}$

ii. 151.0625_{ten} to binary

This can be done by converting the whole number's part separately and then the fractional part. Then merge them to form the number.

To convert .0625 to binary is as below:
.0625 x 2 = 0.1250
0.1250 x 2 = 0.2500
0.2500 x 2 = 0.5000
0.5000 x 2 = 1.0000

Thus
$0.0625_{ten} = .0001_{two}$
and
$151_{ten} = 10010111_{two}$
Therefore $151.0625_{ten} = 10010111.0001_{two}$

An alternative method to convert the decimal fractions is as follows:

Disintegrate it into the sum of the weights:
2^{-1}, 2^{-2}, 2^{-3}, 2^{-4}, 2^{-5}, 2^{-6}etc, that is
0.5, 0.25, 0.125, 0.0625, 0.03125 etc.

Then, $.0625_{ten} = 0+0+0+0.0625$
$= 0+0+0+2^{-4}$
$= .0001_{two}$

$\therefore 151.0625_{ten} = 10010111.0001_{two}$

Note: This alternative method is NOT recommended because the values of the weights may be in-correct

Ci. A general-purpose digital computer is a category of computers that is completely programmable and can be used to perform a variety of numerical calculations and solve business problems. They can be used for such wide tasks as payroll, sales analysis, billing, manufacturing scheduling, inventory control, etc.

C ii. **Distinction between data acquisition and data cleansing**

S/N	DATA ACQUISITION	DATA CLEANSING
1	It is the process of collecting or gathering raw data from various sources such as sensors, surveys, databases, or the internet.	It is the process of detecting and correcting or removing inaccurate, incomplete, or irrelevant parts of the data.
2	It obtains data that will be used for processing, analysis, or decision-making.	It improves the quality of data so that analysis or reporting is accurate and reliable
3	It focuses on bringing in data	It eliminates errors and inconsistencies
4	It provides data for cleansing	It makes data clean and usable

Examiner's comment

This question tests the capability of the candidates in handling basic ideas in Number Bases. It demanded for the process of converting integral and floating-point numbers from base 10 to base 2. It also demanded some distinctions between data acquisition and data cleansing.

This is a popular question among the candidates, and over 90% of the candidates attempted the question. The performance is highly encouraging.

Unfortunately, 50% of those who attempted the question could not handle the decimal part of the number.

In this study pack, we give two methods of solution, but we do not recommend an alternative method using weights.
For future examinations, master the technique of continuously multiplying the decimal part by the required base.

Note the difference between the digits involved and the number of digits involved in each Number Base System.

SOLUTION 2

2. a.

	Read-Only Memory (ROM)	Random Access Memory (RAM)
1	Data stored in ROM is retained when the computer is switched off (non-volatile)	Data stored in RAM is lost when the computer is switched off (volatile)
2	ROM stores essential instructions for the computer permanently (permanent storage)	Hold data that the CPU is actively using, like currently running programs and open files (temporary storage)
3	The content of the ROM can only be read, but not written	The content of RAM can both be read and written
4	ROM has a much smaller storage capacity than RAM (measured in Megabytes –MB)	It has a much larger storage capacity than ROM (measured in Gigabytes-GB)
5	ROM has slower access speeds compared to RAM	RAM provides faster access speeds than ROM
6	The BIOS chip on the motherboard is a type of ROM	When opening a document in a word processor, the data is loaded into RAM for quick access by the CPU

b. i. **Examples of magnetic storage media include:**

1. Hard Disk Drive (HDD)
2. Floppy Disks
3. Magnetic Tape
4. Zip Disks
5. Jaz Disks
6. Magneto-optical discs
7. Magnetic strip cords
8. Solid-state drive

9. Bubble memory
10. Super Disk (LS-120)

ii. **Examples of Optical storage media include:**

1. Compact Disks (CDs)
2. Digital Versatile Disks (DVDs)
3. Blu-ray Disks
4. Laser Disks
5. Write-Once, Read-Many (WORM)
6. Optical cartridges

C i Cloud Storage is a method of storing digital data on remote servers, accessible over the internet rather than on a personal computer or local hard drive.

Functions of Cloud Computing

1. **Data Storage:** It provides scalable storage space for files, databases, and applications without the need for local hardware.
2. It enables global connectivity, content delivery, and secure communication through virtual networks.
3. **Backup and Recovery:** It provides automatic data backup, disaster recovery, and business continuity solutions.
4. **Enhances collaboration and remote access:** It facilitates teamwork by allowing multiple users to access and work on the same data/applications from anywhere.
5. It enhances application development and deployment by supporting developers with platforms (PaaS) to build, test, and deploy apps quickly.
6. It enhances the security of data by offering encryption, authentication, and monitoring tools to protect data and systems.
7. It reduces the need for expensive hardware/software purchases by using pay-as-you-go services
8. It allows users to access applications (like Google Docs, Microsoft 365) directly over the internet without installation.
9. It offers virtual servers and processors for running applications, simulations, and complex calculations.

ii. **Types of data and programs stored in the primary Memory of the computer system include:**

1. Programs that contain instructions that will be used for processing (running programs)

2. Data that has been read from an input device or secondary storage devices
3. Intermediate result, that is, data that is currently being processed or is used for processing other data
4. Output information that is ready to be sent to an output device or secondary storage device
5. An operating system that manages the computer resources and provides a user interface
6. Data that the computer is currently working on, such as documents, images, or spreadsheet data.
7. Data was created and used by programs during operations but not intended to be stored long-term.

Examiner's comment

This tests the candidate's understanding of the computer's storage devices. These are the primary and secondary storage devices. The primary is the RAM, ROM and possibly the cache, while the secondary involves magnetic, optical, and possibly cloud. The various technologies and properties should be noted. The majority of the candidates attempted the question, and the performance is excellent.

SOLUTION 3

3. a. Multitasking is the capability of computers to perform multiple tasks simultaneously, allowing users to seamlessly switch between different applications, thereby boosting efficiency.

   OR

   It is the ability of the computer's operating system to execute multiple tasks or processes concurrently, giving the illusion that they are running simultaneously.

   Multiprogramming refers to the techniques of running multiple computer programs concurrently on a single processor. OR it's a technique that allows multiple programs to reside in the main memory of a computer and run concurrently on a single CPU.

   b. Benefits of object-oriented programming Language includes:
   1. It promotes efficient development practice leading to higher programmer productivity
   2. It allows for representing real-world entities and their interactions within the code.

3. There is improved maintenance and error corrections.
4. It uses a graphical interface.
5. Produces more reliable and error-free programs.
6. Enable breaking down complex problems into smaller, manageable objects, each responsible for a specific task. (modularity).
7. There is code re-usability through inheritance and polymorphism.
8. Increased flexibility and scalability.

Lapses of Object-Oriented Programming include:

1. Object-oriented programming design can be complex when not correctly implemented
2. Initial development costs can be high
3. More extensive start-up time
4. Programs produced may be larger, slower, and use more memory and other computer resources
5. OOP can sometimes make programs difficult to adapt to changing environments(rigidity)

c. i. **E Views:** This stands for Econometric Views and is used for time series analysis and econometrics

Functions:

1. It is used for forecasting and modeling economic/financial data.
2. It is used for running regression analysis.
3. It is used to analyse time-series data such as stock prices and GDP (Gross Domestic Product) trends
4. It is used for the graphical representation of econometric results.

ii. **SPSS:** Statistical Package for the Social Sciences

This package is widely used in social sciences, education, business, and health research.

Functions:

1. It is used for data entry, management, and cleaning.
2. It is used for statistical analysis
3. It is used for surveys and questionnaire data analysis.
4. It is used for producing charts, tables, and reports.

5. It is used for handling large datasets in an easy, user-friendly interface.

iii. **Strata:** This is a powerful tool for data analysis, statistics, and graphics.

Functions:

1. It is used for data management and manipulation (merging, reshaping, and cleaning).
2. It is used for advanced statistical analysis (regression, survival analysis, logistic models).
3. It is used for econometrics (time-series, panel data, causal inference).
4. It is used for graphical data presentation.
5. It is used for automating analysis with scripting and programming.

Examiner's comment

This tests the candidates' knowledge of certain processing techniques and properties of Object-Oriented Programming (OOP). It also demanded the principal features of three similar application packages. This topic is highly unpopular with All the candidates, as less than 10% of them attempted it.

The performance is extremely poor.

The major pitfalls are:

i) Lack of understanding of the properties of these processing techniques.
ii) Lack of understanding of the properties of OOP.
iii) The three application packages only differ in terms of trade names, as they perform the same tasks but are possibly used by different professionals.

For future examinations, the candidates should consult the ICAN Study Pack.

SOLUTION 4

4. ai. A computer service bureau is a company that operates computer services to process data for other companies for a fee, particularly those that cannot justify acquiring a computer system.

OR

It is a company providing computer services such as computer system development, maintenance, and support for other companies for a fee.

ii. **Services provided by a computer service bureau include:**

1. Data preparation
2. Program preparation and testing
3. Hiring of computer time
4. Hiring computer systems
5. Do–it–yourself service
6. Time-sharing facility
7. Sales of computer resources
8. Repair and maintenance
9. System installation
10. Training of staff
11. Feasibility study consultants
12. Help desk
13. Cloud computing
14. Technical consulting services
15. Software-as-a-service, etc

b. **Benefits of e-commerce include:**

1. E-commerce eliminates the need for a physical store, reducing expenses related to rent, utilities, and staffing.
2. Businesses can reach customers globally, expanding their market beyond geographical limitations.
3. Online stores are accessible all day, allowing customers to shop at their convenience.
4. E-commerce platforms provide valuable customer data for targeted marketing.
5. Businesses can use e-commerce to stay competitive by offering unique products, competitive pricing, and excellent customer service.
6. It allows businesses to connect directly with customers by fostering brand loyalty and building relationships.
7. It allows customers to shop from anywhere, anytime, eliminating the need to travel and saving time.
8. It allows customers to easily compare prices from different retailers for the best deals.
9. It allows customers to have access to a rash array of products from various sellers with more choices.
10. Customers can communicate directly with sellers through online platforms, enabling quick responses to queries.

Lapses of e-commerce include:

1. E-commerce platforms are vulnerable to cyber-attacks, leading to data breaches and loss of customer trust.
2. E-commerce is highly competitive, making it challenging for businesses to stand out and attract customers.
3. High shipping costs can deter customers from completing purchases, especially for smaller or less expensive items.
4. There is a lack of personal touch, for it is difficult for customers to check the quality of the products.
5. Delayed deliveries, damaged goods, and other logistical issues can negatively affect the process.
6. Lack of physical interaction between the customers and the sellers.
7. Managing returns and refunds can be complex and costly for the business.
8. Inadequate customer service can lead to frustration, negative reviews, and loss of customers.
9. E-commerce businesses must comply with various regulations which can be complex and time-consuming.
10. The problem of scaling their operations to meet growing demands is a problem.

c. Distinction between centralized and decentralized processing methods

S/N	CENTRALISED PROCESSING	DECENTRALISED PROCESSING
1	Data processing is done at a single computer centre	Data processing is done at different computer centres
2	It is less expensive	It is expensive
3	It can lead to a delay in information Generation	It cannot lead to a delay in information generation
4	It will not lead to the abuse of the computer system resources	There may be abuse of the computer system resources
5	It does not give room for data processing Autonomy	It gives room for data processing autonomy

Examiner's comment

This question tests the candidates' understanding of the Computer Bureau, E-commerce, and processing techniques.

The question is very popular among the candidates as over 90% of the candidates attempted it and the performance is very impressive.

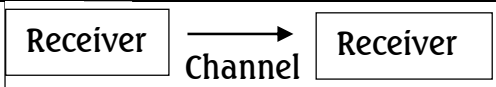
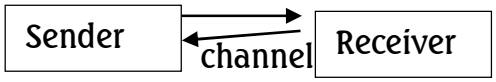
SOLUTION 5

5. ai. Network Protocol is a set of rules and guidelines that govern how devices and computers communicate and exchange data and information across a network.

ii. **Reasons why protocols are necessary in a computer network include:**

1. Protocols allow devices/computers with different operating systems, hardware, and software to communicate seamlessly.
2. Protocols act like a common language, ensuring that all devices understand how to send and receive data.
3. Facilitate the exchange of information between devices, enabling file sharing, e-mail, and web browsing.
4. Protocols include error-checking mechanisms to detect and correct errors during transmission.
5. Protocols can verify the identity of devices and users, preventing unauthorized access to the network.
6. Managing network operations in terms of network traffic, congestion routing, monitoring, and managing devices.
7. Optimizing the use of network resources such as bandwidth and storage.
8. Providing a framework for developing new network devices and applications, ensuring compatibility.

b. **Differences between simplex and duplex data transmission**

S/N	SIMPLEX TRANSMISSION	DUPLEX TRANSMISSION
1	It is a one-way data transmission	It is a two-way simultaneous data Transmission
2	The receiver cannot reply	Both sender and receiver can Communicate
3	It is not efficient because only the sender can send data or communicate	It is efficient because both sender and The receiver can communicate
4	It is very cheap to implement	It is expensive to implement
		
	EXAMPLE:	**EXAMPLE:**
1	The use of a keyboard to type data into the computer	Teleconferencing and Video Conferencing and audio conferencing
2	Radio and Television broadcast	A radio and Television program that allow viewers or listeners to make a call and contribute to the program
3		Telephone conversation

c. **Benefits of the internet include:**

1. It facilitates instant communications with people worldwide through email, social media platforms, etc.
2. It enables video conferencing, making remote collaboration and communication easier.
3. It serves as a world library to obtain useful information in various fields.
4. It serves as a cheap medium for entertainment.
5. It provides access to educational resources, online courses, and learning materials, making knowledge readily available.
6. It allows users to shop for products and services from the comfort of their homes.
7. It provides access to online banking services, enabling users to manage their finances, make payments, and transfer money securely.
8. The Internet keeps users updated on current events, news, and trends through online news sources and social media platforms.
9. It allows social media platform users to connect with friends, share updates, and engage in online communities.

Lapses of Internet include:

1. Spread of misinformation and fake news
2. It can cause data breaches, hacking, and the collection of personal information by online platforms.
3. It is a breeding ground for cybercrime, including hacking, phishing, and online scams, posing threats to individuals and organisations.
4. Excessive internet use leads to internet addiction, internet isolation, and negative impacts on mental health.
5. There is a high cost of installation.
6. There is a loss of information confidentiality.
7. Display of some moral hazards, like the display of blue films that promote sexual vices, can be downloaded.
8. Problems of connectivity by the internet service provider.
9. It depends on electricity energy, which is unavailable in Nigeria.

Examiner's comment

This tests the candidate's knowledge of certain aspects of computer data transmission.

These topics are very popular among the candidates, as over 90% of them attempted the question and the performance is very good.

The only pitfall is that candidates should know that duplex mode of transmission could be either Half-Duplex or Full-Duplex because the examples differ.

SOLUTION 6

6. a i. **Functions of Economic Feasibility**

1. It is used to determine the economic viability of the proposed system.
2. It is used to identify financial risks and uncertainties.
3. It helps to determine the cost benefits of the proposed system.
4. It helps to justify investment decisions.
5. It helps in budget planning by estimating the financial requirements and expected returns.
6. It helps in building stakeholders' trust.
7. It helps to decide on sources of funds to execute the project.

ii. **Examples of one-off/tangible costs include:**

1. Cost of hardware, software, and other equipment.
2. Cost of producing the document
3. Training cost
4. Development cost
5. Consultant cost
6. Changeover cost
7. Rent cost
8. Software licenses
9. Cost of installation
10. Cost of site preparation

Examples of running/operating costs

1. Salaries and pensions
2. Overheads
3. Maintenance
4. Utilities and consumables cost
5. Stationery and accessories
6. Standby arrangement against power failure
7. Cost of contingencies
8. Costs of the power supplier

b. The direct changeover method involves replacing the old or existing system with the new system in one move or at a go. It is achieved by completely shutting down the old system and activating the new system on a predetermined date. It is not expensive, and the changeover is fast. Additional staff resources may not be required; it can lead to data loss if the new system fails.

Parallel changeover describes a method of conversion where the organization continues operation with both the old and the new system for some predetermined period. it is a method where both old and new systems are operated simultaneously for a period. It is expensive, and the conversion period is long. Additional staff resources will be required. It cannot lead to data loss if the new system fails because the old system has not been dismantled.

c. **Benefits of the parallel changeover method include:**

1. The output of the implemented systems is available for comparison and evaluation.
2. The old system is kept alive until the new system proves sufficient.
3. The new system will be fully checked, corrected, and perfected under actual operating conditions and will be put in place.
4. Users will have the time to become completely familiar with the new system.
5. The old system acts as a backup if the new system encounters issues, minimizing disruption and data loss.
6. The overall risk of a complete system is available for fallback

Lapses of the parallel changeover method include:

1. It is more expensive due to the need to maintain both systems concurrently.
2. It can take a longer time as the same tasks need to be performed on both systems.
3. It requires more hardware, software, and personnel to manage both systems.
4. Maintaining data consistency between the two systems can be challenging and may lead to errors.
5. The volume of work may be too large to be handled for the two systems.
6. More staff may be needed.

Examiner's comment

This tests the candidate's knowledge on certain aspects of computer system development. It particularly demanded for functions of Economic feasibility of the development, the costs incurred, and the properties of certain changeover techniques.

This topic is NOT popular among the candidates, as less than 10% of them attempted the question and the performance is very poor.

The major pitfalls are:

i) Many of the candidates are not familiar with computer systems development.
ii) The question demanded TANGIBLE one-off costs and INTANGIBLE running costs.
iii) The major differences between Direct and Parallel change over techniques are NOT very clear to them.

Candidates are advised to consult reliable Textbooks such as the ICAN study pack for future examinations.