



**THE INSTITUTE OF CHARTERED
ACCOUNTANTS OF NIGERIA**

INSIGHT

**SEPTEMBER 2023 ATSWA EXAMINATIONS
PART II**

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

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THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA**ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
SEPTEMBER 2023 EXAMINATIONS (PART II)****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, 26, SEPTEMBER, 2023

**ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
PART II EXAMINATIONS – SEPTEMBER 2023**

FINANCIAL ACCOUNTING

Time Allowed: 3 hours

SECTION A: PART I MULTIPLE-CHOICE QUESTIONS (30 Marks)

ATTEMPT ALL QUESTIONS IN THIS SECTION

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

1. With regard to a not-for-profit organisation, a debit balance on the subscription account is reported in
 - A. Income and expenditure account
 - B. Accumulated fund account
 - C. Statement of financial position
 - D. Total subscription account
 - E. Receipts and payments account

2. In the final Accounts of a club, the amount owing on bar purchases are recorded in
 - A. Accumulated fund account
 - B. Income and expenditure account
 - C. Receipts and payment account
 - D. Statement of financial position
 - E. Bar trading account

Use the following information to answer questions 3 and 4

Subscription account of Agege Social Club are as follows:

- Subscription Owing as at January 1, 2021 - Le50,000
- Subscription received during the year Jan-Dec 2021 -Le650,000
- Subscription received in 2021 included Le35,000 meant for 2022 financial year.

3. What is the subscription to be recorded for the year ended 2021?
 - A. Le565,000
 - B. Le600,000
 - C. Le635,000
 - D. Le650,000
 - E. Le665,000

4. What amount should be recorded in the statement of financial position as at the year ended 2021?
 - A. Le15,000
 - B. Le35,000
 - C. Le50,000
 - D. Le85,000
 - E. Le650,000

5. Which of the following statements is **NOT** true about the accounts of clubs and societies?
 - A. A deficit in income and expenditure account reduces accumulated fund
 - B. The closing balances of receipt and payments account is transferred to income and expenditure account
 - C. Income and expenditure account does not contain capital receipts and expenditure
 - D. The excess of total assets over liabilities represents accumulated fund.
 - E. The loss incurred in the bar trading account is recorded in the income and expenditure account.

6. Which of the following is **NOT** a primary user of financial statement?
 - A. Investors
 - B. Lenders
 - C. Government
 - D. Political parties
 - E. Suppliers

7. Which of the following is **NOT** a characteristic of property, plant and equipment?
 - A. They are non-current assets
 - B. Their useful life is beyond one year
 - C. They are assets deployed for sale
 - D. Benefits from its use flow to the organisation
 - E. The entity has control over the use of the asset

8. An office equipment which originally cost ~~£~~80m with accumulated depreciation of ~~£~~68m was sold for ~~£~~10m and the cost of disposal was ~~£~~5m.
 What is the gain or loss on disposal of the office equipment?
 - A. ~~£~~7m loss
 - B. ~~£~~5m loss
 - C. ~~£~~2m gain
 - D. ~~£~~3m gain
 - E. ~~£~~5m gain

9. Which of the following is **NOT** part of the complete set of financial statement of an SMEs?
- A. Statement of financial position
 - B. Statement of comprehensive income
 - C. Statement of value added
 - D. Statement of cashflows
 - E. Notes and summary of accounting policies
10. A non-current asset cost ~~₦~~100m, it is depreciated using reducing balance method at the rate of 20% per annum. What is the carrying amount at the end of the 3rd year?
- A. ~~₦~~40m
 - B. ~~₦~~40.96m
 - C. ~~₦~~51.2m
 - D. ~~₦~~60m
 - E. ~~₦~~64.5m

Use the following information to answer question 11 & 12

A company has the following capital structure;

- Ordinary Share Capital at 50kobo each	-	₦ 200,000
- Share premium Account	-	₦ 150,000

11. The company made a rights issue of 1 for 4 at ~~₦~~1.50 which were fully subscribed. Determine the value of the rights issue
- A. ~~₦~~140,000
 - B. ~~₦~~150,000
 - C. ~~₦~~160,000
 - D. ~~₦~~190,000
 - E. ~~₦~~200,000
12. What is the balance on the share premium account after the rights issue?
- A. ~~₦~~50,000
 - B. ~~₦~~100,000
 - C. ~~₦~~150,000
 - D. ~~₦~~200,000
 - E. ~~₦~~250,000

13. Which of the following will **NOT** be reported in the statement of profit or loss?
- A. Income Tax expense
 - B. Administrative cost
 - C. Distribution cost
 - D. Dividend paid
 - E. Interest on loan
14. The financial statement of a limited liability company prepared in accordance with IAS 1 include
- A. Revaluation account
 - B. Notes to the financial statement
 - C. Capital account
 - D. Current account
 - E. Control account
15. Which of the following should **NOT** be disclosed in the statement of changes in equity?
- A. Transfer to retained earnings
 - B. Current year profit or loss
 - C. Increase in share capital
 - D. Distribution cost
 - E. Share premium account
16. Which of the following is **NOT** an advantage of accounting standard?
- A. Improve reliability of financial statements
 - B. Give room for uniform interpretation of financial statements by users
 - C. Allow for inter-firm and intra-firm comparisons
 - D. Ensure profitability of financial statements
 - E. Ensure uniformity in the preparation of financial statements.
17. The accrual basis of accounting requires the recognition of revenue only when they are
- A. Received
 - B. Paid
 - C. Earned
 - D. Budgeted
 - E. Ordered

18. The accounting concept that requires business transactions to be recognised in the financial statement in accordance with their economic realities other than their legal substance is
- A. Fair Presentation
 - B. Materiality
 - C. Consistency
 - D. Substance over form
 - E. Going concern
19. The process to reduce or eliminate variations in accounting practice and to introduce a degree of uniformity into financial reporting is through
- A. Accounting standard
 - B. Auditing standards
 - C. Accounting concepts
 - D. Accounting manuals
 - E. Management policies
20. Which of the following **CANNOT** be used to measure non-current asset of an entity's financial statements?
- A. Historical Cost
 - B. Fair value
 - C. Current cost
 - D. Sunk cost
 - E. Present value
21. The following are the enhancing qualitative characteristics of conceptual framework, **EXCEPT**
- A. Comparability
 - B. Understandability
 - C. Timeliness
 - D. Fullness
 - E. Verifiability
22. Which of the following is **NOT** an advantage of computerised accounting system?
- A. Reliability and no routine work
 - B. Easy backup and restoration of records
 - C. Dependence on machines
 - D. Higher accuracy
 - E. Quick or mobile reporting

23. Which of the following is **NOT** a limitation to computerised accounting system?
- A. Computer viruses and power failures
 - B. It is Garbage in Garbage Out
 - C. If improperly setup can cause more harm than good
 - D. Internal control system for increased productivity
 - E. The system is open to persistent computer fraud
24. Which of the following is **NOT** a typical activity of a transaction processing system?
- A. Data mining
 - B. Data collection
 - C. Data editing
 - D. Data storage
 - E. Data processing
25. Which of the following elements of financial statements is directly related to the measurement of an entity's statement of financial position?
- A. Assets, Liabilities and Performance
 - B. Assets, Liabilities and Equity
 - C. Performance, Income and Expenses
 - D. Income, Expenses and Equity
 - E. Performance, Income and Equity
26. The objective of sales ledger control account is to determine the
- A. Trade payables
 - B. Trade receivables
 - C. Total purchases
 - D. Net profit
 - E. Gross profit
27. The agreement of a trial balance will **NOT** disclose which of the following fundamental errors in the accounting books
- A. Double entry errors
 - B. Errors of principle
 - C. Error in computation of balances
 - D. Transposition errors
 - E. Errors of wrong posting in the debit and credit column

28. Rent in arrears amounting to ₦120,000 was omitted in the financial statement prepared for the year ended December 31, 2022.

Which of the following will be correct?

- A. Capital of the company would be understated by ₦120,000
B. Liabilities of the company would be overstated by ₦120,000
C. Net profit of the company would be understated by ₦120,000
D. Assets of the company would be overstated by ₦120,000
E. Liabilities of the company would be understated by ₦120,000
29. The accounting entries required for increase in provision for doubtful debts are
- | DR. | CR. |
|--|-------------------------------------|
| A. Trading Account | Bad debt account |
| B. Statement of profit or loss account | Provision for doubtful debt account |
| C. Provision for doubtful debt account | Trading Account |
| D. Trade payable account | Provision for Doubtful debt account |
| E. Provision for Doubtful debt account | Trade Receivables |
30. Which of the following is correct?
- A. $\text{Capital} = \text{Non-Current Assets} + \text{Non-Current liabilities}$
B. $\text{Capital} = \text{Total Assets} + \text{Total Liabilities}$
C. $\text{Capital} = \text{Total Liabilities} - \text{Total Assets}$
D. $\text{Capital} = \text{Non-Current Assets} - \text{Total Liabilities}$
E. $\text{Capital} = \text{Total Assets} - \text{Total Liabilities}$

SECTION A: PART II

SHORT-ANSWER QUESTION

(20 MARKS)

ATTEMPT ALL QUESTIONS

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

1. The account used for recording cash transactions of a non-for-profit entity is called
2. The net asset of a not-for-profit organisation is known as
3. Statement of Profit or loss account is to a sole trader asis to a not-for-profit Association
4. Two models specified for the subsequent measurement of an item of property, plant and equipment are and

5. The cost of an asset at the beginning of the year plus additions during the year less depreciation is known as
6. Assets held for sale in the ordinary course of business are
7. The profit as a percentage of cost is known as, while profit as a percentage of sales is called
8. **TWO** methods of accounting for transactions in accordance with provisions of IAS 1 are and.....
9. The body responsible for issuing new accounting standard globally is
10. The financial tools used for evaluating past, current and future performance of an entity is known as
11. Two enhancing qualitative characteristics of financial information are and
12. In accordance with IAS 8, how should all material prior year errors be corrected in the first set of financial statements following the discovery of the errors?
13. **TWO** main ways of processing computerised business transactions are and
14. The proper trail generated in a computerised financial transaction is called
15. The shares issued to ordinary shareholders at a price which is usually lower than the market price of the share is called
16. The difference in a trial balance as a result of an omission is temporarily transferred to a.....account
17. The equity of an entity is accounted for in
18. The increase in the inflow of economic benefit during an accounting year is referred to as
19. The difference between the par value of a company's shares and the total amount a company receives for shares recently issued is.....
20. The other name for script issue is

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

- a. In accordance with the provisions of IAS 1, explain the term current assets and state the conditions which must be satisfied for an asset to be termed as current. (5 Marks)
- b. A fire which occurred on March 31, 2022 destroyed some of the inventory of Ajakuta Limited and its inventory records were lost. The following information is available

	L\$`000
Inventory at March 1, 2022	1,270
Purchases for the month of March	2,530
Sales for the month of March	3,510
Inventory in good conditions as at March 31, 2022	760

Ajakuta Limited makes standard gross profit of 30% on its sales

Required:

Calculate the cost of inventory lost to fire (6 Marks)

- c. State **THREE** examples of current assets, except inventory. (1½ Marks)
- (Total 12½ Marks)**

QUESTION 2

The following is the trial balance extracted from the books of Alice Ventures Limited for the year ended December 31, 2022.

	DR Le'000	CR Le'000
Property, plant & equipment cost	36,000	
Inventories as at January 1, 2022	3,900	
Interest Expenses	100	
PPE– accumulated depreciation 1/1/22		12,500
Revenue		33,000
Purchases	16,100	
Trade receivables	4,500	

Cash at bank	1,600	
Dividend paid	600	
Retained earnings		13,850
Administrative expenses	3,500	
Distribution expenses	4,450	
Income tax		200
8% bank loan repayable in 2022		2,500
Ordinary share capital Le1 each		5,000
Share premium		2,500
Trade payables	<u> </u>	<u>1,200</u>
	<u>70,750</u>	<u>70,750</u>

The following information are also provided:

- (i) Closing Inventories was valued at Le4,200,000. Included in this figure are inventories that cost Le250,000 but was sold for only Le125,000 in the new year.
- (ii) Interest on bank loan for the past 6 months has not been paid as at December 31, 2022. This was not included in the trial balance.
- (iii) Included in the revenue figure is a sale made on credit to a customer on November 30, 2022 amounting to Le1,550,000.
- (iv) Depreciation of property, plant and equipment for the year was charged at 10% per annum using straight line method.
- (v) Accrued Distribution expenses amounted to Le75,000 at December 31, 2022
- (vi) Income tax represents over estimate in respect of current tax in the previous year. Income tax estimate for the current year is Le900,000.

You are required to prepare:

- a. Statement of profit or loss and other comprehensive income for the year December 31, 2022. (6 Marks)
 - b. Statement of changes in equity for the year ended December 31, 2022. (2½ Marks)
 - c. Statement of financial position as at 31 December, 2022. Show all necessary notes to the accounts (4 Marks)
- (Total 12½ Marks)**

QUESTION 3

a. **Write short notes on the following accounting concepts**

- | | | |
|------|---------------------|------------|
| i. | Realisation concept | (1½ Marks) |
| ii. | Dual aspect concept | (1½ Marks) |
| iii. | Prudent concept | (1½ Marks) |
| iv. | Matching concept | (1½ Marks) |
| v. | Entity Concept | (1½ Marks) |

b. Distinguish between Cash basis and Accrual basis when preparing general purpose financial statements (5 Marks)

(Total 12½ Marks)

QUESTION 4

John Adulam entered into the following financial transactions for October 2022 in respect of his new business (Adulam Electronics) for the repairs of electronic equipment

- | | | |
|---------|----|--|
| October | 1 | John Adulam invests ₦ 800,000 in the new business |
| | 2 | Purchased the following assets for cash
Inventory of materials ₦ 120,000
Loose tools ₦ 240,000 |
| | 3 | Acquired a fairly used Motor Van for ₦ 1,000,000 from Evan Motors, paying ₦ 200,000 immediately and the balance to be paid later in five equal monthly installments. |
| | 4 | Paid rent of ₦ 120,000 |
| | 5 | Received ₦ 100,000 as payment for repair services |
| | 6 | Repairs of ₦ 220,000 and the customers will pay later |
| | 7 | The first of the five installment payments of ₦ 160,000 is made in respect of the Motor Van acquired in October 3 |
| | 8 | Additional loose tools of ₦ 20,000 were acquired from Ahmed Enterprises on credit |
| | 9 | Paid electricity bill of ₦ 10,000 |
| | 10 | Received cash of ₦ 180,000 in respect of October 6 transaction |
| | 11 | Withdraw ₦ 40,000 for personal use |
| | 12 | Paid Transport fare of ₦ 2,500 |

You are required to:

Prepare the cash book and ledger accounts to reflect the above transactions in the books of the business and extract the trial balance for the month of October 2022.

(Total 12½ Marks)

QUESTION 5

- a. Define “Cash Operating Cycle” (1 Mark)
- b. Financial information of Zarwa Company Limited, is as follows:

	GH¢'000
Opening inventory	320
Gross profit	2,800
Receipts from trade receivables	5,160
Payment to suppliers	2,560
Opening trade payables	220
Closing trade payables	200
Opening trade receivables	120
Closing trade receivables	160
Closing inventory	460

All sales and purchases were on credit

Required:

Determine the cash Operating Circle of Zarwa Company Limited (11½ Marks)

Show all workings. (Total 12½ Marks)

QUESTION 6

- a. List the main types of business entities (1½ Marks)
- b. State **THREE** features for each of the types of business entity (9 Marks)
- c. A Not-for-profit entity is different from other form of business entities. State **TWO** of its important features. (2 Marks)
- (Total 12½ Marks)**

SECTION A: PART 1

MULTIPLE-CHOICE SOLUTIONS

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

Workings

$$\begin{aligned} 3. \quad & \text{Le } 650,000,000 - (\text{Le } 35,000,000 + \text{Le } 50,000,000) \\ & = \text{Le } 565,000,000 \end{aligned}$$

$$\begin{aligned} 8. \quad & \text{₦ } 10,000,000 (80,000,000 - 68,000,000 + 5,000,000) \\ & = \text{₦ } 7,000 \text{ Loss} \end{aligned}$$

10. $\text{₦}100,000,000 - 20\text{m}(\text{yr } 1) - \text{₦ } 16\text{m}(\text{yr}2) - \text{₦ } 12.8\text{m}(\text{yr}3) = 51.2\text{m}$
11. Number of outstanding shares $(200,000 \div 0.5)400,000$
 Right issue $(400,000 \div 4)$ 100,000
 Value of right issue $100,000 \times \text{₦ } 1.50 = \text{₦ } 150,000$
12. Share premium balance b/f 150,000
 Addition during the year $(150,000 - (100,000 \times 0.5))$ 100,000
250,000

Examiner's comment

All the candidates attempted the questions and performance was good.

SECTION A: PART II

SHORT-ANSWER SOLUTIONS

1. Receipts and Payment
2. Accumulated Fund
3. Income and Expenditure Account
4. Cost model and Revaluation model
5. Carrying Amount
6. Inventories
7. Mark up/profit margin
8. Historical cost model and fair value
9. IASB – International Accounting Standard Board
10. Financial ratios, Accounting ratios or Ratio Analysis
11. Comparability, verifiability, timeliness, understandability
12. Errors should be retrospectively accounted for
13. Batches and Real Time
14. Audit trail
15. Rights issue
16. Suspense Account
17. Statement of changes in equity or statement of financial position
18. Assets
19. Share Premium or Share discount
20. Bonus or Capitalization issue

Examiner's comment

All the candidates attempted the questions and most of them performed well.

SECTION B

SOLUTION 1

- a. **Current assets:** are assets that are expected to provide economic benefit in the short term. They are usually part of working capital of a company.
IAS 1 states that an asset should be classified as a current asset if it satisfies any of the following criteria:

- The entity expects to realise the assets, or sell or consume it, in its normal operating cycle.
- The asset is held for trading purposes.
- The entity expects to realise the asset within 12 months after the reporting period.
- It is cash or cash equivalent unless the asset is restricted from being used for at least 12 months after the reporting date.

- b. **Ajakuta Limited**
Cost of inventory lost to fire in March 2022

	N`000
Inventory March 1, 2022	1270
Purchases for month of March	<u>2530</u>
	3800
Closing inventory	<u>(760)</u>
Cost of sales + cost of lost inventory	3040
Cost of sales (3510 x 70%)	<u>(2457)</u>
Inventory lost in the fire	<u>583</u>

- c. **Examples of current assets except inventory**

- Receivables
- Prepayment
- Cash and cash equivalent.
- Short term marketable securities (Investment)

Examiner's comment

The question tested candidates understanding of the provisions of IAS and understanding and interpretation of current assets and calculation of cost of inventory loss to fire. About 70% of the candidates attempted the question and the performance was good as they scored above 80% of the allocated marks.

SOLUTION 2**ALICE VENTURE LIMITED****STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME FOR THE
YEAR ENDED DECEMBER 31, 2022**

	NOTES	Le'000	Le'000
Revenue			33,000.00
<u>Cost of Sales</u>			
Opening inventory		3,900.00	
Purchases		<u>16,100.00</u>	
Cost of goods available for sales		20,000.00	
Closing inventory		<u>(4,075.00)</u>	
Cost of sales			<u>(15,925.00)</u>
Gross Profit			17,075.00
<u>Expenses</u>			
Depreciation of PPE	1	3,600.00	
Distribution expenses	2	4,525.00	
Administrative expenses		<u>3,500.00</u>	
Total operating expenses			<u>(11,625.00)</u>
Operating Profit			5,450.00
Finance cost	3		<u>(200.00)</u>
Profit before tax			5,250.00
Income Tax	4		<u>(700.00)</u>
Profit for the year			<u>4,550.00</u>

ALICE VENTURE LIMITED**STATEMENT OF CHANGES IN EQUITY FOR THE YEAR ENDED DECEMBER 31, 2022**

	Ordinary Shares Le'000	Share Premium Le'000	Retained Earnings Le'000	TOTAL Le'000
Balance b/f	5,000.00	2,500.00	13,850.00	21,350.00
Profit for the year	-	-	4,550.00	4,550.00
Dividend				<u>(600.00)</u>
				<u>(600.00)</u>
Balance c/f	5,000.00	2,500.00	17,800.00	25,300.00

ALICE VENTURE LIMITED

STATEMENT OF FINANCIAL POSITION AS AT DECEMBER 31, 2022

<u>Non-Current Assets</u>	NOTE	Le'000
Property, plant and equipment		
-Cost		36,000.00
-Accumulated depreciation		<u>(16,100.00)</u>
<i>Carrying Value</i>		<i>19,900.00</i>
<u>Current Assets</u>		
Inventory	5	4,075.00
Trade receivables		4,500.00
Cash at bank		<u>1,600.00</u>
<i>Total Current Assets</i>		<i>10,175.00</i>
<i>Total Assets</i>		<i>30,075.00</i>
<u>EQUITY</u>		
Ordinary shares (LE1 each)		5,000.00
Share premium		2,500.00
Retained earnings		<u>17,800.00</u>
<i>Total Equity</i>		<i>25,300.00</i>
<i>Non-Current Liabilities</i>		
8% Bank loan		2,500.00
<u>Current Asset</u>		
Trade payables		1,200.00
Accrued interest expenses		100.00
Accrued distribution expenses		75.00
Current tax payables		<u>900.00</u>
<i>Total Current Liabilities</i>		<i>2,275.00</i>
<i>Total Liabilities</i>		<i>4,775.00</i>
<i>Total Equity and Liabilities</i>		<i>30,075.00</i>

Workings

1. DEPRECIATION OF PPE	Le'000
10%*36000	<u>3,600.00</u>
2. DISTRIBUTION EXPENSES	Le'000
Balance in TB	4,450.00
Accrual	<u>75.00</u>
Recognised in profit or loss	<u>4,525.00</u>

3. FINANCE COST	Le'000
Balance in TB	100.00
Accrual	<u>100.00</u>
Recognised in profit or loss	<u>200.00</u>
4. INCOME TAX	Le'000
Current Tax	900.00
Prior year over provision	<u>(200.00)</u>
Recognised in profit or loss	<u>700.00</u>
5. CLOSING INVENTORY	Le'000
Total Amount	4,200.00
Write-off (250-120)	<u>(125.00)</u>
	<u>4,075.00</u>

Examiner's comment

The question was on statement of profit or loss and other comprehensive income and statement of financial position. About 65% of the candidates attempted this question. Most of the candidates scored above 75% of the marks allocated. Some of the candidates that attempted the question displayed shallow knowledge of posting the right items in the statement of comprehensive income and changes in equity.

SOLUTION 3

(i) Realisation concept

Realization concept is concerned with ascertaining when revenue or income is earned. The concept advocates that revenue and income should not be recognized until they have been realized or earned. It also holds that revenue should be recognized at the time goods are sold and services rendered that is at the point the customer accepts liabilities for the goods. Rent income is realized with passage of time and not when the rent is received.

(ii) Dual Aspect Concept

The dual aspect concept states that there are two aspects to every business financial transaction. One is the giving of value the other is the receiving of the same value. The receiving of value gives rise to assets while the giving gives rise to capital and liabilities. Under this concept the two aspects are always equal to each other. This give rise to the accounting equation Capital+ liabilities= Assets

The dual aspect concept is the basis of the double entry book keeping in modern accounting.

(iii) **Prudent concept**

This is a concept that allows accounts to envisage recognition of loss while profit that are not easily realisable are delayed from recognition. The new financial reporting framework has now emphasised the use of this concept unlike the old framework.

(iv) **Matching concept**

The matching concept holds that in determining profits or loss for an accounting period. The income earned in the period should be matched with the expenses or cost incurred in the same period to earn the income. Where income is deferred from one period to another, all elements of cost or expenses relating to the deferred income will be carried forward. The concept is important because any error in the matching of the income and expenses will result in the financial statement being misleading and unreliable.

(v) **Entity concept**

The entity concept is also known as legal entity or business entity concept. Under this concept, the business is treated for the purpose of financial reporting as an institution separate and distinct from the legal owners. For this reason, transactions are reported from the point of view of the business and the presence or existence of its owners is reflected only in the capital account. The essence is to distinguish the income and expenses of the business from the private income and expenses of the owner or his drawings from the business.

The application of this concept is important in sole traders and partnership businesses where the owner or partner actively participate in the business affairs. However, for a limited liability company, the legal entity is established by law.

b i) **Cash Basis**

Cash basis accounting recognizes transactions in the periods in which cash receipts and payments occur. Revenue from credit sales and other incomes are reported in the period when the cash involved are received and not in the period when the sales were made or the income earned. Also, expenses are recognized when the payments are made rather than when expenses were incurred.

ii) **Accrual Basis**

The accrual basis of accounting recognizes transactions, other events and conditions in the accounting period they occurred and not necessarily when the associated cash is received or paid. Hence revenue from sales (cash or credit) and other incomes are reported in the period when they arise and not in the period when the cash is received. Similarly, expenses should be charged in the period to which it relates and not when the payment is effected or made.

Examiner's comment

The question tested accounting concepts and the difference between cash and accrual basis of accounting. Because it was a direct question, about 90% of the candidates attempted the question and the performance was good as average score in it was about 70%.

SOLUTION 4

JOHN ADULUM
CASHBOOK FOR THE MONTH OF OCTOBER 2022

<i>DATE</i>	<i>PARTICULAR</i>	<i>CASH</i>	<i>DATE</i>	<i>PARTICULAR</i>	<i>CASH</i>
Oct.		₦			₦
1	Capital	800,000.00	2	Inventory	120,000.00
5	Service Revenue	100,000.00	2	Loose Tools	240,000.00
10	Trade receivables	180,000.00	3	Motor Van	200,000.00
			4	Rent	120,000.00
			7	Evans Motor	160,000.00
			9	Electricity Bill	10,000.00
			11	Drawings	40,000.00
			12	Transport fare	2,500.00
			31	Balance c/f	187,500.00
		<u>1,080,000.00</u>			<u>1,080,000.00</u>
1-Nov	Balance b/d	187,500.00			

CAPITAL A/C

<i>Oct</i>		<i>₦</i>	<i>Oct</i>		<i>₦</i>
31	Balance c/f	<u>800,000.00</u>	1	Cash	<u>800,000.00</u>
		<u>800,000.00</u>			<u>800,000.00</u>
			1-Nov	Bal b/d	800,000.00

INVENTORY A/C

<i>Oct</i>		<i>₦</i>	<i>Oct</i>		<i>₦</i>
2	Cash	<u>120,000.00</u>	31	Balance c/f	<u>120,000.00</u>
		<u>120,000.00</u>			<u>120,000.00</u>
1-Nov	Balance b/d	120,000.00			

LOOSE TOOLS A/C

Oct		₦	Oct		₦
2	Cash	240,000.00			
8	Ahmed Enterprise	<u>20,000.00</u>	31	Balance c/f	<u>260,000.00</u>
		<u>260,000.00</u>			<u>260,000.00</u>
1-Nov	Balance b/d	260,000.00			

MOTOR VAN A/C

Oct		₦	Oct		₦
3	Evans Motors	<u>1,000,000.00</u>	31	Balance c/d	<u>1,000,000.00</u>
1-Nov	Balance b/d	1,000,000.00			

EVANS MOTORS (CREDITORS) A/C

Oct		₦	Oct		₦
3	Cash	200,000.00	3	Motor Van	1,000,000
7	Cash	160,000.00			
31	Balance c/f	<u>640,000.00</u>			<u>1,000,000.00</u>
		<u>1,000,000.00</u>	1-Nov	Balance b/d	640,000.00

RENT A/C

Oct		₦	Oct		₦
4	Cash	<u>120,000.00</u>	31	Balance c/f	<u>120,000.00</u>
		<u>120,000.00</u>			<u>120,000.00</u>
1-Nov	Balance b/d	120,000.00			

SERVICE REVENUE A/C

Oct		₦	Oct		₦
			5	Cash	100,000.00
31	Balance c/f	<u>320,000.00</u>	6	Trade receivables	<u>220,000.00</u>
		<u>320,000.00</u>			<u>320,000.00</u>
			1-Nov	Balance b/d	320,000.00

TRADE RECEIVABLES A/C

Oct		₦	Oct		₦
6	Service Revenue	220,000.00	10	Cash	180,000.00
		<u>220,000.00</u>	31	Balance c/f	<u>40,000.00</u>
					<u>220,000.00</u>
1-Nov	Balance b/d	40,000.00			

AHMED ENTERPRISES A/C

Oct		₦	Oct		₦
31	Balance c/f	<u>20,000.00</u>	8	Loose tools	<u>20,000.00</u>
		<u>20,000.00</u>			<u>20,000.00</u>
			1-Nov	Balance b/d	20,000.00

ELECTRICITY BILL A/C

Oct		₦	Oct		₦
9	Cash	<u>10,000.00</u>	31	Balance c/f	<u>10,000.00</u>
		<u>10,000.00</u>			<u>10,000.00</u>
1-Nov	Balance b/d	10,000.00			

DRAWINGS A/C

Oct		₦	Oct		₦
11	Cash	<u>40,000.00</u>	31	Balance c/f	<u>40,000.00</u>
		<u>40,000.00</u>			<u>40,000.00</u>
1-Nov	Balance b/d	40,000.00			

TRANSPORT A/C

Oct		₦	Oct		₦
12		<u>2,500.00</u>	31	Balance c/f	<u>2,500.00</u>
		<u>2,500.00</u>			<u>2,500.00</u>
1-Nov	Balance b/f	2,500.00			

JOHN ADULAM**TRIAL BALANCE FOR THE MONTH ENDED 31 OCTOBER 2022**

	DR	CR
	₦	₦
Cash	187,500.00	
Capital		800,000.00
Motor Van	1,000,000.00	
Inventory	120,000.00	
Sales		320,000.00
Loose Tools	260,000.00	
Rent	120,000.00	
Trade Receivables	40,000.00	
Evans Motors		640,000.00
Ahmed Enterprises		20,000.00
Drawings	40,000.00	
Electricity	10,000.00	
Transport	<u>2,500.00</u>	
	<u>1,780,000.00</u>	<u>1,780,000.00</u>

Examiner's comments

The question tested posting to cash book and ledgers. 90% of the candidates attempted the question but their performance was just above average. Almost 50% of the candidates that attempted the question did not know the side of the ledger they are to post to.

SOLUTION 5

- a) **Cash operating cycle** is the length of times it takes a business entity to convert its inventory into sales (Inventory turnover period) converts receivables into cash (receivables collection period) and mobilizes cash to pay its trade payable (payable payment period)

b)

<u>Zarwa Company Ltd</u> <u>Cash Operating Cycle</u>	
Inventory Turnover period	59 days
Trade receivable collection period	<u>10</u> days
	69 days
Less: Trade payable payment period	<u>30</u> days
Cash operating cycle	39 days

Workings

(i)

Income Statement			
	₦'000		₦'000
Turnover			5,200
Opening Inventory	320		
Purchases	<u>2,540</u>		
	2,860		
Less: Closing Inventory	<u>460</u>		
Cost of sales			<u>2,400</u>
Gross profit			<u>2,800</u>

(ii)

Trade receivables			
	₦'000		₦'000
Balance b/d	120	Bank	5,160
Sales	<u>5,200</u>	Balance c/d	<u>160</u>
	<u>5,320</u>		<u>5,320</u>

(iii)

Trade payables			
	₦'000		₦'000
Bank	2,560	Balance b/d	220
Balance c/d	<u>200</u>	Purchases	<u>2,540</u>
	<u>2,760</u>		<u>2,760</u>

(iv) Inventory turnover period = $\frac{\text{Average Inventory} \times 365\text{days}}{\text{Cost of goods sold}}$
 $= \frac{(\text{N}320,000 + 460,000 \div 2) \times 365\text{days}}{\text{N}2,400,000}$
 $= 59\text{days}$

(v) Trade Receivable Collection period = $\frac{\text{Average Trade Receivables} \times 365\text{days}}{\text{Credit Sales}}$
 $= \frac{(\text{N}120,000 + \text{N}160,000 \div 2) \times 365\text{days}}{\text{N}5,200,000}$
 $= 10\text{days}$

(vi) Trade Payables Payment period = $\frac{\text{Average Trade payables} \times 365\text{days}}{\text{Credit purchases}}$
 $= \frac{(\text{N}220,000 + \text{N}200,000 \div 2) \times 365 \text{ days}}{\text{N}2,540,000}$
 $= 30\text{days}$

Examiner's comments

The question was on cash operating cycle. Few candidates attempted this question and the performance was also poor. The average score was about 40%.

SOLUTION 6

- a) The main types of business entities are:
- A sole trader or sole proprietorship.
 - A partnership business
 - A company or **limited liability company**

- b) The features of the types of business entities are:

1. **A sole trader or sole proprietorship**

- There is no legal distinction between the proprietor and the business. Thus he is personally liable for an unpaid debt and other obligations of the business and also when a sole trader dies the business cease to exist.

- ii. The profits of the business belong to the sole proprietor.
- iii. The assets of the business belong to the sole proprietor.
- iv. The sole trader can extract cash and other asset from the business for personal use and this called drawings when preparing financial reports.
- v. The business may be financed by the owners' capital as well as by personal and business loans introduced.
- vi. A sole proprietorship business can be sold as a going concern by its owner.

2. A partnership business

- i. It must be an association of two or more persons to carry on a business.
- ii. The partners are the owners of the business are personally liable as individuals for the unpaid debts and other obligations of the business.
- iii. When a partner dies the partnership comes to an end and is dissolved. That is there is no perpetual succession.
- iv. The profits of the business belong to the partners in an agreed ratio.
- v. The assets of the business belong to the partners in agreed ratio.
- vi. The partners, if allowed by the partnership deed, can extract cash and other assets from the business as drawings.
- vii. The business may be financed by both the partners' capital and loans
- viii. A partnership can be sold as going concern by its owners.

3. A company or Limited Liability Company

- i. Ownership of the company is represented by ownership of shares. A company might issue any number of shares, depending largely on its size. Large companies usually have large number of shares in issue and consequently large number of shareholders. The number of shares acquired by a shareholder determines his stake or ownership interest in the company.
- ii. Unlike a sole trader or partnership, a company has the status of a "legal system" in the eyes of the Law.
- iii. A company can be the legal owner of business assets and can sue and be sued in its own right in the law.
- iv. A company is taxed separately from its owners for net profits made by the company. This is not so with sole traders and partnerships as the business profit is taxed in the hands of the partners or the sole proprietor.
- v. A company is liable for its own debts and not the shareholders. When the shareholders are not the managers of their company, it becomes

essential that information about the position and performance of the company should be reported regularly by the management to the shareholders.

c) Features of Not-for-Profit entities are:

- i. Members pay a subscription to maintain their membership
- ii. They sometimes carry out activities which yield profit like running a bar, organising fee-paying competitions
- iii. The entities do not prepare statements of profit or loss, rather income and expenditure account is prepared.
- iv. Surplus funds are reinvested and not distributed to members
- v. Relies on donations, grants and volunteer support
- vi. Aims to benefit the public or specific Communities.

Examiner's comment

This question tested candidates' understanding of the types of business entities and their comparison. About 95% of the candidates attempted the question and the performance was good. Virtually all the candidates that attempted this question performed very well and was like a bonus question to them.

THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA



**ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
SEPTEMBER 2023 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, 27 SEPTEMBER, 2023

**ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
PART II EXAMINATIONS – SEPTEMBER 2023**

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 composition of the Board of Survey consist of the President and **NOT** less than which of the following
 - A. Six members
 - B. Four members
 - C. Two members
 - D. Three members
 - E. Seven members

2. Which of the following is **NOT** saddled with the responsibility of preparing the financial statements of the Federal Government?
 - A. Permanent Secretary
 - B. Director of Finance
 - C. Accountant General of the Federation
 - D. Minister of Finance
 - E. Auditor General for the Federation

3. The officer that has the responsibility for collecting a specified type of revenue for Government is
 - A. Director of Finance
 - B. Revenue Collector
 - C. Bursar
 - D. Cashier
 - E. Chief Accountant

4. Which of the following is **NOT** a receipt of inventories to the Store?
 - A. Acquisition through local purchase orders
 - B. Converted or manufactured goods
 - C. Return inventories
 - D. Excess taken on charge
 - E. Condemned inventories

5. Which of the following is **NOT** among the structure of National Chart of Accounts?
 - A. Historic segment
 - B. Functional segment
 - C. Economic segment
 - D. Geographical segment
 - E. Programme segment

6. Which of the following books of accounts must **NOT** be prepared under IPSAS-Accrual basis
 - A. Investment Register
 - B. Revenue Receivable Register
 - C. Performing and non – performing Loan Register
 - D. Property, plant and equipment schedule
 - E. Salaries and wages register

7. On which of the following should Pension assets **NOT** be invested?
 - A. Purchase of durable Asset
 - B. Purchase of investment
 - C. Purchase of property
 - D. Purchase of bonds
 - E. Purchase of intangible asset

8. In line with the Financial Regulations, the officer who is responsible to convene a Board of Enquiry will forward a copy of the order to
 - I. The Accounting Officer
 - II. The Auditor-General for the Federation
 - III. The Accountant-General of the Federation
 - IV. The Chairman, Federal Civil Service Commission
 - A. I
 - B. II
 - C. III
 - D. I, II and III
 - E. I, III and IV

Use the following information to answer questions 9 to 12

Gabriel Matiluko (Assistant Director) in the Family Health Department of the Federal ministry of Health, received a credit alert from Premays Pension Limited (PFA) for the sum of ₦7,584,650.00 from his Retirement Savings Account for the first quarter in the year 2022. His monthly payroll contains the following details.

	₦
Consolidated basic emolument	210,850.00
Pay As You Earn	14,759.50
National Housing Fund	5,271.25

9. Compute the employee monthly deduction to the PFA account:
 - A. ₦16,810.00
 - B. ₦16,857.00
 - C. ₦16,868.00
 - D. ₦16,878.00
 - E. ₦16,885.00
10. Compute the employer monthly deduction from his emolument.
 - A. ₦21,085.00
 - B. ₦21,500.80
 - C. ₦21,508.00
 - D. ₦21,805.00
 - E. ₦21,805.50
11. How much has Gabriel Matiluko contributed into his RSA for the first quarter in the year 2022?
 - A. ₦50,600.40
 - B. ₦50,604.00
 - C. ₦50,640.40
 - D. ₦50,650.40
 - E. ₦50,660.40
12. How much has the employer contributed into his RSA for the first quarter in the year 2022?
 - A. ₦63,252.00
 - B. ₦63,255.00
 - C. ₦63,525.00
 - D. ₦63,552.00
 - E. ₦63,355.00

13. Which of the following factors may **NOT** be considered in the calculation of employee pension and gratuity under non-contributory pension?
- I. The length of service
 - II. Terms and conditions of employment
 - III. Basic emolument
 - IV. Rank or Grade level
 - V. Overtime allowances
- A. V
 - B. V and IV
 - C. I, II, and III
 - D. I, II, III, and IV
 - E. III
14. The primary focus of business accounting is profitability while the primary focus of fund accounting is to
- A. Follow the rules of a democracy
 - B. Record spending
 - C. Record Profitability
 - D. Check and balances
 - E. Distribution of dividend
15. Government officers and agencies serve as.....of taxpayers' money.
- A. Stewards
 - B. Administrators
 - C. Keepers
 - D. Butlers
 - E. Checks and balances
16. Under IPSAS 24, which of the following ways can comparison of budgeted and actual amounts be presented separately for each level of legislative oversight?
- A. Actual amount on a comparable basis
 - B. Gross amount on comparable basis
 - C. Actual amount on individual basis
 - D. Net figures as summarised
 - E. Gross amount on individual basis
17. Which of the following is **NOT** a source of government revenue?
- A. Statutory Allocation
 - B. Consolidated Revenue Fund (CRF) charges – Pensions and Gratuities
 - C. Aid & Grants
 - D. Capital Receipts
 - E. Value Added Tax

18. In ministries and extra-ministerial departments, budget preparation and approval undergo some levels as listed below
- I. The ministerial or Pre-treasury board phase
 - II. Judiciary phase
 - III. Executive council phase
- A. I
 - B. I and II
 - C. I and III
 - D. II
 - E. I, II and III
19. Which of the following is **NOT** the main purpose of a government budget?
- A. It highlights government's policies, which are designed to promote economic growth, full employment and enhance the quality of life of the citizenry
 - B. It is a useful guide for the allocation of available resources
 - C. Through the legislature, the executive arm uses the budget as a means of accountability for the fund earlier entrusted and the newly approved appropriations
 - D. It is a request by the executive arm of government to the legislature to collect and disburse funds
 - E. It serves as payables and liabilities to pay for goods or services that have been received or supplied
20. Which of the following is **NOT** included in the law enforcement and regulatory agencies on financial and other related matters?
- A. Economic and Financial Crimes Commission (EFCC)
 - B. Independent Corrupt Practice and Other Related Offences Commission
 - C. Corporate Affairs Commission (CAC)
 - D. Code of Conduct Bureau/Code of Conduct Tribunal Act
 - E. Nigeria Extractive Industries Transparency Initiative, (NEITI) Act
21. Under the Money Laundering and Prohibition Act 2011(as amended)
- I. A financial institution shall verify its customer's identity and address before opening an account.
 - II. A body Corporate is required to provide proof of its identity by presenting certificate of incorporation.
 - III. The manager, employee delegated by a body corporate to open or operate an account shall provide a proof of the power of Attorney.

- IV. Where a financial institution suspects that the amount involved in a transaction relates to laundering of drug money, it shall require identification of a customer.
- A. III & IV
 - B. I, II, III & IV
 - C. II, III & IV
 - D. I and IV
 - E. I only
22. Which of the following sanction is **NOT** correct for the offences under the Public Procurement Act 2007?
- A. Summary dismissal from Government office
 - B. Awarding another contract of lower sum
 - C. Imprisonment of not less than 5 calendar years without option of fine
 - D. Debarment from all public procurement for a period not less than 5 calendar years
 - E. A fine equivalent to 25% of the value of the procurement in issue
23. The Public Complaint Commission is also known as Nigeria's
- A. Eagle eye
 - B. Watchdog
 - C. Ombudsman
 - D. Legal system
 - E. Political class
24. Which of the following is **NOT** true about Treasury Single Accounting (TSA)?
- A. Used for capital costs
 - B. Used for Federal Government funds
 - C. Used for all private cost
 - D. Used for personnel cost
 - E. Used for overhead cost
25. By the provision of International Standard on Auditing (ISA), which of the following is **NOT** a process in financial audit?
- A. Examination and evaluation of financial records
 - B. Preparation of financial records of the auditee
 - C. Expression of opinion of financial records
 - D. Attestation of financial accountability and administration of Government
 - E. Audit of Internal controls and internal check

26. ISA 260 extensively dwell on communication of audit observations to those charged with governance, **EXCEPT** to
- A. Communicate clearly with those charged with governance the responsibilities of auditors in relation to the financial statement audit
 - B. Provide those charged with governance with timely observations arising from the audit that are significant and relevant to the financial reporting process
 - C. Provide relevant information to those charged with governance
 - D. Promote effective two way communication between the auditor and those charged with governance
 - E. Prepare financial statement that will enable Public Sector Government to spend more money
27. Public sector organisations are created by which of the following?
- I. The Legislature
 - II. Acts of Parliament
 - III. Bye-Laws
 - IV. Nation's Constitution
- A. II & III
 - B. II & IV
 - C. IV
 - D. II, III & IV
 - E. I
28. The Nigerian public sector is made up of
- I. Federal government
 - II. State government
 - III. The three-tiers of government
 - IV. Government companies
 - V. Parastatals and other public agencies
- A. I, II & V
 - B. III, IV & V
 - C. I, II, IV & V
 - D. I, II & III
 - E. I & II

29. Which of the following is **NOT** an advantage of accrual basis of accounting?
- A. Practised in the private sector alone
 - B. Used by all parastatals such as Central Bank of Nigeria, Federal Inland Revenue Service, etc
 - C. Aligns with the 'matching concept'
 - D. Reveals an accurate picture of the state of financial affairs at the end of the period
 - E. Could be used for both economic and investment decision-making as all parameters for performance appraisal are available
30. Which of the following committee is set up when the various Ministries, Extra-ministerial Departments and Agencies receive the call circular?
- A. Public Account Committee
 - B. Public Affairs Commission
 - C. Committee of Permanent Secretary
 - D. Committee on Advance Proposals
 - E. Committee of Director

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. According to Financial Regulation 605 of January 2009, a payment Voucher Register shall be maintained by
2. The form used to sum up the amount stated in each separate payroll is.....
3. Under Cash flow accrual basis of accounting, two methods of preparing cash flow statement are.....and.....
4. The proposal for the supply of goods or services made and presented as a result of invitation is known as
5. The Voucher which is similar to journals in the private sector and used for amending errors is called.....
6. Functional report, programme report and geo-location reports are integral part of
7. The Pension Reform Act 2014 (as amended) has classified Pension into and

- c. You are the officer controlling expenditures in the Odogbolu Local Government. The expenditure incurred in the month of July, 2022 that was extracted from the Vote Book are as follows:

	₦
(i) Balance available	45,000,000
(ii) Expenditure balance	54,000,000
(iii) Total expenditure	18,000,000
(iv) Total outstanding	9,000,000

Additional information:

On 29th July 2022, the outstanding liability of ₦3,000,000 was settled for ₦3,900,000.

You are required to:

- Estimate the monthly allocation
- Determine the commitment balance (5 Marks)

NOTE: Ignore the 15 columns Vote Book specimen or format

(TOTAL 12½ Marks)

QUESTION 2

- As a financial officer of the Local Government, the Treasurer has a number of roles to play. State **EIGHT** functions of the Treasurer in a Local Government. (4 Marks)
- In line with the Nigeria Constitution 1999 (as amended), enumerate the functions of Local Government (5 Marks)
- Enumerate **SEVEN** items in the exclusive legislative list. (3½ Marks)

(Total 12½ Marks)

QUESTION 3

- State the **TWO** responsibilities of the Federal Government in consultation with the States on the preparation of Medium-Term Expenditure Framework (MTEF) as enshrined in Section 11 of the Fiscal Responsibility Act, 2007. (2½ Marks)
- State **FIVE** objectives of MTEF in the preparation of government budget. (5 Marks)
- In line with the Part II, Section 11-17 of the Fiscal Responsibility Act (FRA), 2007, list **FIVE** contents of the MTEF for the next three financial years. (5 Marks)

(Total 12½ Marks)

QUESTION 4

- Briefly explain "Consolidated Revenue Fund" (CRF) (2½ Marks)
- List **FOUR** major sources of revenue to Consolidated Revenue Fund. (4 Marks)
- From the following information which was extracted from the Office of the Accountant General of the Federation, prepare a statement of Consolidated Revenue Fund (CRF) for the year ended 31st December, 2021.

	₦'000	
Balance B/F	15,000,000	
Treasury Bills issued during the year	18,000,000	
Treasury Bills Paid	10,000,000	
Transfer from Contingencies Fund	15,000,000	
Transfer to Contingencies Fund	8,000,000	
Revenue received for the year	180,000,000	
Transfer to Development Fund	30,000,000	
Expenditure for the year	140,000,000	(6 Marks)
		(Total 12½ Marks)

QUESTION 5

- When is a Board of Enquiry **NOT** necessary? (2½ Marks)
 - What circumstance(s) warrants setting up a Board of Enquiry? (5 Marks)
 - State **FIVE** contents of Board of Enquiry's report. (5 Marks)
- (Total 12 ½ Marks)**

QUESTION 6

The Auditor should carry out such examination of the financial statements of the audited body as it is sufficient in conjunction with the conclusions drawn from other audit evidence which will give him reasonable basis for his opinion in the financial statement.

Required:

State and explain the **FIVE** steps to be taken in auditing the financial statements of government.

(Total 12½ Marks)

SECTION A: PART 1

MULTIPLE-CHOICE SOLUTIONS

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

Workings

Q9. $8\% \text{ of } \text{N}210,850 = \text{N}16,868$

Q10. $10\% \text{ of } \text{N}210,850 = \text{N}21,085$

Q11. $\text{N}16,868 \times 3 \text{ months} = \text{N}50,604$

Q12. $\text{N}21,085 \times 3 \text{ months} = \text{N}63,255$

Examiner's comment

This consists of 30 Multiple-Choice Questions which cut across the entire syllabus. This is a compulsory question and all the candidates attempted the questions. Performance was fair as about 80% of the candidates scored above 50% of marks obtainable.

The commonest pitfall was the inability of some candidates in covering the entire syllabus.

Candidates are advised to prepare very well in future examinations. They are also required to make use of the ATSWA Study Text as well as past questions of previous diets' examinations.

SECTION A: PART II

SHORT-ANSWER QUESTIONS

1. Officer Controlling Vote
2. Payroll Summary Voucher
3. Direct and Indirect
4. Tender
5. Adjustment Voucher/Journal
6. National Chart of Account
7. Contributory Plan Scheme or
Non-Contributory Plan Scheme or
Defined Benefits Scheme
8. No. Pension Fund Asset cannot be used
9. Consolidated Revenue Fund
10. Internal Audit
11. False
12. Extra Budgeting
13. Budgeted Revenue
14. Budgetary Control
15. Medium-term expenditure framework (MTEF)
16. Vote Book
17. Executive Arm
18. The Independent & Other related offences Act, 2000
19. Public Accounts Committee
20. Medium-term expenditure framework

Examiner's comment

This consists of 20 compulsory Short Answer Questions which requires the candidates to write the correct answer that best completes each of the questions/statements. The questions covers all the areas of the syllabus.

All the candidates attempted the questions and about 60% of them scored above 50% of the marks obtainable.

The commonest pitfalls were the inability of some candidates to cover the syllabus. Candidates are advised to endeavor to prepare well for future examinations. They are also enjoined to make adequate use of the Study Text as well as other Reference materials.

They are equally required to familiarise themselves with past examination questions of previous diets.

SECTION B

SOLUTION 1

- a. The various arms of government budgetary control over public expenditures are the following:
 - i. The Executive or Presidential Control
 - ii. The Legislature or National Assembly Control
 - iii. The Ministry of Finance control
 - iv. The Treasury or Accountant-General Control
 - v. The Ministerial Control
 - vi. The Public Account Committee Control
 - vii. The Departmental Control
- b. The main roles of the National Assembly in planning and monitoring of public Expenditure:
 - i. Consideration and ultimate approval of the nation's budget
 - ii. Ratification of monetary and fiscal policies adopted by the executives
 - iii. Ratification of the appointment of the Auditor-General
 - iv. Ensuring that money was expended for the purpose for which they were meant for.
 - v. Appointment of Public Account Committee to consider the reports submitted by the Auditor-General, especially in the areas of fraud practices or embezzlement of public funds.
 - vi. Monitoring of the implementation of the budget.
 - vii. Monitoring of the actualization of budget.
 - viii. Guide against extra budgeting spending.
 - ix. Failure to approve the appropriation act, constitute a vote of no confidence on the incumbent administrator.

c. **ODOGBOLU LOCAL GOVERNMENT COUNCIL**
EXPENDITURE INCURRED IN THE MONTH OF JULY 2022

TOTAL EXPENDITURE	EXPENDITURE BALANCE	TOTAL OUTSTANDING	BALANCE AVAILABLE
₦	₦	₦	₦
18,000,000.00	54,000,000.00	9,000,000.00	45,000,000.00
3,900,000.00	(3,900,000.00)	(3,000,000.00)	(3,900,000.00)
21,900,000.00	50,100,000.00	6,000,000.00	41,100,000.00
i. Monthly allocation	—	—	63,000,000.00
ii. Commitment	—	—	50,100,000.00
Balance	—	—	

Examiner's comment

The question tests the candidates' knowledge and understanding of government budgetary control over public expenditure, main roles of the National Assembly in planning and monitoring of expenditure and vote book.

About 40% attempted the question and about 20% of them scored above 50% of marks obtainable.

The commonest pitfalls were the inability of some candidates to correctly interpret the question as some of them wrote on budgetary control procedures.

Candidates are advised to always study the examiner's requirements before attempting the questions. Candidates are advised to make adequate use of the study text as well as to familiarise themselves with past questions of previous diets examinations.

SOLUTION 2

(a). **Functions of the Treasurer in a Local Government**

The Treasurer has the following roles to play:

- He is responsible for all the receipts and disbursements of funds.
- He is responsible for keeping accurate and timely accounting records of funds received or disbursed.
- He should ensure that all records kept by his subordinate officers are checked routinely for accuracy.
- He is to intimate the Local Government of any economic policy that will increase the internally generated revenue (IGR) of the Council.

- v. He should exploit all the opportunities available for the collection of all forms of revenue as specified in the budget estimate.
- vi. He is to see that all the laid out procedures as regards disbursements of funds are followed.
- vii. He should assist in the preparation of annual and supplementary budgets
- viii. He is to be actively involved in the appraisal of all capital projects before they are executed.
- ix. He is to make recommendations to the Council in his capacity as the financial adviser.
- x. He is responsible for ensuring that the liquidity position of the Council is favourable at all times.
- ix. He should ensure that payment vouchers are validly prepared and presented for payment.
- ix. He should maintain all records of accounts in a form suitable for decision-making by the Council.

(b). Functions of Local Government

The functions of Local Government are:

- i. Collection of rates, radio and television licenses
- ii. Establishment and maintenance of cemeteries, burial grounds and homes for the destitute or infirm.
- iii. Licensing of bicycles, trucks other than mechanically propelled trucks canoes, wheel barrows and carts.
- iv. Establishment, maintenance and regulation of slaughter houses, slaughter slabs, markets, motor parks and public conveniences.
- v. Construction and maintenance of roads, street lighting, drains and other public highways, parks, gardens, open spaces from time to time such public facilities as may be prescribed
- vi. Naming of road and streets and numbering of houses
- vii. Provision and maintenance of public conveniences, sewage and refuse disposal
- viii. Registration of births, deaths and marriages
- ix. Control and regulation of out-door advertising and hoarding
- x. Control and regulation of movement and keeping of pets of all description
- xi. Control and regulation of restaurants, bakeries and other places for sale of food to the public
- xii. Licensing, regulation and control of the sale of liquor

(c). The items of exclusive legislative list are:

- i. Defence — Arms, Ammunition and Explosive
- ii. Aviation — Airport, Safety of aircraft
- iii. Central Bank — Currency, Coinage and legal tender
Borrowing of money (Local or/and Foreign)
Exchange Control
- iv. Immigration — Passport and Visa
- v. Prison or Correctional Services
- vi. Population — Census, Citizenship, Naturalization
- vii. Creation of States
- viii. Customs and Exercise Duties
- ix. Foreign Affairs — Diplomatic, Consular and Trade representation
Deportation of persons who are not citizens of Nigeria
- x. Mines and Mineral Resources — Oil and Gas
- xi. Public Holidays

Examiner's comment

The question tests the candidates' knowledge and understanding of roles of a Treasurer in a Local Government as well as functions of Local Government.

About 60% of the candidates attempted the questions. And about 55% scored above 50% of marks obtainable.

The commonest pitfall was the inability of some candidates to enumerate the functions of Local Government.

Candidates are advised to prepare very well in future examinations and ensure that they cover all the areas of the syllabus.

They are enjoined to make adequate use of the Institute's study text as well as past question of Previous diets examinations.

SOLUTION 3

- a)
- i. Prepare and submit to the National Assembly a medium-term expenditure framework for the next three financial years on which the National Assembly will deliberate. This would have to be done not later than six months from the commencement of the Act.
 - ii. Subsequently, not later than four months before the next financial year, - commences a Medium-Term Expenditure Framework for the next three financial years will be prepared for the National Assembly's consideration
- b) The objectives of MTEF are:
- i. To improve macroeconomic balance, including fiscal discipline through good estimates of the available resource envelope, which are then used to make budgets that fit squarely within the envelope;
 - ii. To improve inter- and intra-sectoral resource allocation by effectively prioritizing all expenditure (on the basis of the government's socio-economic program) and dedicating resources only to the most important ones;
 - iii. To increase greater budget predictability as a result of commitment to more credible sectoral budget ceilings;
 - iv. To increase greater political accountability for expenditure outcomes through legitimate decision making;
 - v. To make public expenditure more efficient and effective, essentially by allowing line ministries greater flexibility in managing their budgets in the context of hard budget constraints and agreed upon policies and programmes.
- c) The MTEF shall contain the following:
- i. A macro-economic framework setting out the three financial years, the underlying assumptions and an evaluation and analysis of the macro-economic projection for the preceding three financial years;
 - ii. Fiscal strategy document setting out:
 - Federal Government's medium-term financial objectives;
 - The policies of the Federal Government for the Medium Term relating to taxation, recurrent expenditure borrowings, lending and investment and other liabilities;
 - The strategies, economic, social and developmental priorities of government for the next three financial years;
 - An explanation of the financial objectives, strategic, economic, social and developmental priorities and fiscal measures;

- iii. An expenditure and revenue frameworks which set out:
 - Estimates of aggregate revenue for the Federation for each financial year, based on the pre-determined commodity Reference Price adopted and tax revenue projections;
 - Aggregate expenditure for each of the next three financial years;
 - Minimum capital expenditure projection for the Federation for each of the next three financial years;
 - Aggregate tax expenditure projection for the Federation for each of the next three financial years.
- iv. A consolidated Debt Statement indicating and describing the fiscal significance of the debt liability and measures to reduce the liability;
- v. A statement on the nature and fiscal significance of contingent liabilities and quasi-fiscal activities and measures to offset the crystallization of such liabilities.

Examiner's comment

The question tests the candidates' knowledge and understanding of Medium-Term Expenditure Framework (MTEF) as to the preparation, observation and contents.

Many candidates avoided this question. About 60% attempted the question and only 40% scored above 50% of marks obtainable.

The commonest pitfalls were the inability of some candidates to fully cover every area of the syllabus.

Candidates are enjoined to make adequate use of the Institute's study text as well as other Reference materials recommended. They are also advised to use the previous diets examination for future examinations.

SOLUTION 4

a) Definition of Consolidated Revenue Fund (CRF)

Consolidated Revenue Fund (CRF) is the Federal Government Account. This is maintained by the Federal Government of Nigeria. The revenue accruing to the Federal Government only is credited into this account. It is known and Called CRF and it is being controlled by the Accountant General of Federation.

b) Sources of Revenue into Consolidated Revenue Fund (CRF)

1. Statutory allocation from Federation Account
2. Direct tax
3. Rent of government property
4. License and internal revenue

5. Armed forces
6. Reimbursement
7. Interest and repayment general
8. Miscellaneous
9. Interest and repayment Stat

c) **Federal Republic of Nigeria**

Statement Of Consolidated Revenue Fund For The Year Ended 31st December, 2021.

	N'000	N'000
Balance as at 1 st January, 2021		15,000,000
Transfer from Contingences fund	15,000,000	
Transfer to Contingences fund	<u>(8,000,000)</u>	7,000,000
Treasury Bills issued (1 st Jan. to 31 st Dec.)	18,000,000	
Treasury Bills Paid (1 st Jan. to 31 st Dec.)	<u>(10,000,000)</u>	8,000,000
<u>Appropriation</u>		
Revenue for the year	180,000,000	
Expenditure for the year	(140,000,000)	
Transfer to Development Fund	<u>(30,000,000)</u>	<u>10,000,000</u>
Balance as at 31 st December, 2021		<u>40,000,000</u>

Examiner's comment

The question tests the candidates' knowledge and understanding of Consolidated Revenue Fund (CRF). It required candidates to explain the term "CRF", state the major sources of revenue and to prepare a statement of Consolidated Revenue Fund (CRF). About 90% of the candidates attempted the question and about 70 scored above 50% of total marks obtainable.

The commonest pitfall was the inability of some candidates to prepare the statement of Consolidated Revenue Fund (CRF).

Candidates are enjoined to always read all instructions of the paper carefully before answering the questions.

Candidates are required to make adequate use of the Institute's study text and also the previous diets examination questions.

SOLUTION 5

a) When Board of Enquiry not Necessary

1. If the Loss is small
2. If it is an isolated case
3. If the identity of the officer responsible is indisputable.

b) Circumstances warranting setting up Board of Enquiry

- i. If fraud is probable.
- ii. If the loss is substantial.
- iii. If several officers are involved.
- iv. If the responsibility of the officers are not clearly defined.
- v. If the loss took place over a period of time.
- vi. if collusion is suspected.

c) Contents of Board of Enquiry's Report

- i. A statement on the exact amount of loss incurred.
- ii. An opinion as to whether operation of the accounting system was at fault in the office concerned.
- iii. An opinion as to whether the accounting system was faulty with suggestions as to any remedy which may appear to be practicable in view of local condition.
- iv. Recommendation for improving the physical security measure if those have been inadequate.
- v. Recommendation as to the surcharge officer(s) responsible for the loss.
- vi. Recommendation for the assessment of the degree of negligence of the officer(s) concerned /responsible for the Loss.
- vii. Recommendation as to the fixing of responsibility for the loss in whole or in part.
- viii. Details of any mitigating circumstances which should be taken into consideration in the assessment of the degree of negligence.

Examiner's comment

The question tests the Candidates' knowledge and understanding of a Board of Enquiry. It specifically required candidates to state when and circumstances of setting up a Board of Enquiry, as well as the contents of the report.

About 70% of the candidates attempted the question and about 40% of them scored above 50% of total marks obtainable.

The commonest pitfall was the inability of some candidates to state the contents of Board of Enquiry's report.

Candidates are advised to cover every areas of the syllabus. They are enjoined to make adequate use of the Institute's study text as well as other reference materials. Candidates are also required to practice the past diets' examination questions.

SOLUTION 6

a. SCHEDULING AND PLANNING THE AUDIT

At the planning stage, the objective of the entire audit guides the planning. The timing of the audit is first discussed and agreed with Management. Other aspect of the planning such as:

- i. The nature of the audit
- ii. The independence of the members of the Team
- iii. The audit programme
- iv. The scope of the audit is articulated before embarking on the audit exercise.

b. ENGAGEMENT LETTER

The engagement letter serves to notify management of a pending audit. It occurs via letters to the Client (auditee) and usually includes a request for preliminary documentation needed for review such as any written policies, procedures, the books of account as well as documentation and records. Engagement letter should also contain terms of reference (TOR) and scope of the audit. With respect to Government audits, the term of reference is prescribed in relevant statutes which must be complied with. Hence the auditor is expected to:

- i. Establish whether the pre – conditions of an audit are present and
- ii. Confirm that there is a common understanding between the auditor and management and those charged with governance of the terms of engagement of the audit.

c. ENTRANCE CONFERENCE

An entrance conference may be scheduled with the department to discuss the purpose and scope of the audit. This may be accomplished through a scheduled meeting between audit office and the Client (auditee). The client should be encouraged to discuss any concerns or questions they have about the audit issues management would like to be included in the review, will also be discussed.

d. REGULARITY (FINANCIAL AUDIT)

By the provisions of International Standards on Auditing (ISA), Regularity (Financial) audit involves:

- i. Examination and evaluation of financial records and expression of opinion
- ii. Attestation of financial accountability of Government administration

- iii. Audit of financial systems and transaction involving the compliance with applicable statute and regulations.
- iv. Audit of Internal controls and Internal audit function
- v. Reporting of any other matter arising from or relating to the audit, that the Auditor considers relevant that it should be disclosed.

e. **FIELD WORK**

Field work is a statutory audit in the Public Sector, it is being done at the site of the auditee for easy access to necessary records and information. During the field work, interviews are conducted and questionnaires administered for better understanding of operations and procedures. While official time is valuable, documents and information obtained during the review are safeguarded and handled professionally in a responsible and confidential manner.

f. **DRAFT AUDIT REPORT**

After completion of audit work, a draft report is prepared and presented to the departmental management for review and commentary. This is to ensure that issues noted in the draft report are accurate, fairly presented and complete. Response is also requested from management for each of the recommendations contained in the draft report. Management responses must include corrective action plan for those responsible for implementing the corrective actions and the estimated time for completion.

g. **EXIT CONFERENCE**

A formal exit conference may be held at the option of the auditee. Sometimes it would be completed informally via email, telephone or other forms of communication.

h. **REPORT DISTRIBUTION**

This is the final stage of the audit exercise. Auditors prepare an audit report setting out their opinion for the organisation's stakeholders or members. Final audit report is addressed to the legislative body and the Accountant General and published for users' consumption.

Examiner's comment

The question seeks to test candidates' knowledge and understanding of steps to be taken in auditing the financial statements of government.

Many candidates abstained from this question as about 60% attempted the question. Only about 20% of them scored above 50% of total marks obtainable.

The commonest pitfalls was ill preparation of many candidates and poor coverage of the syllabus. Candidates are enjoined to prepare very well for future examinations. They are also required to make adequate use of the Institute's study text as well as other recommended Reference materials.

They are also enjoined to make use of the previous diets' examination questions.

THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA**ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
SEPTEMBER 2023 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, 27 SEPTEMBER, 2023

**ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
PART II EXAMINATIONS – SEPTEMBER 2023**

QUANTITATIVE ANALYSIS

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. A committee has 5 members whose weights (in kg) are 48, 50, 63, 70, 69. The variance and standard deviation of their weights are respectively
 - A. 7.74 and 60
 - B. 9.32 and 86.8
 - C. 20.83 and 434
 - D. 86.8 and 9.32
 - E. 434 and 20.83

2. Which of the following is **NOT** an example of a continuous data?
 - A. The length of time every customer spends on hold waiting to place their order via the telephone
 - B. The number of cars finished in a factory each day
 - C. Wages of workers in a firm
 - D. Prices of goods and services
 - E. Weights of employees in a company

3. Which of the following, normally used for making decision, lies in understanding the relationships between two or more variables such as advertising expenditure and sales?
 - A. Ranking
 - B. Index Number
 - C. Statistic
 - D. Inference
 - E. Correlation

4. The trend line of a Time Series data is given as $T = 32.75 + 0.45x$. If the seasonal adjustment obtained for $x = 15$, when the multiplication model used is 1.02, then the adjusted forecast will be
- A. 38.48
B. 39.5
C. 40.29
D. 40.52
E. 47.4
5. An election observer claims that 45% of the total number of voters in an election are male. A random sample of 500 voters from a particular local government area shows that 50% of them are male. The value of the test statistic that would be used to test the validity or otherwise of the observer's claim is
- A. -20.62
B. -2.42
C. -2.24
D. 2.24
E. 2.42
6. The classification table below, which is extracted from the records of National Centre for Disease Control of a country, shows the status of those that contracted corona virus infection and their age categories for a particular village:

Status	Age category		
	Young	Adult	Aged
Those that survived	14	16	4
Those that died	2	4	10

The probability that an individual selected at random from this village will survive the infection given that he/she is an adult is

- A. 0.27
B. 0.33
C. 0.57
D. 0.80
E. 0.85

7. The relationship between the number of bottles of beer consumed (x) and blood alcohol content (y) was studied in 16 male college students by using least squares regression. The following regression equation was obtained from this study:

$$y = -0.0127 + 0.0180x$$
- The above equation implies that
- Each bottle of beer consumed increases blood alcohol by 1.27%
 - On the average, it takes 1.8 bottles of beers to increase blood alcohol content by 1%
 - Each bottle of beer consumed increases blood alcohol by an average amount of 1.8%
 - Each bottle of beer consumed increases blood alcohol by exactly 0.018
 - Bottles of beer are consumed and blood alcohol are inversely related
8. Which of the following is usually employed in ranking variables?
- Pearson
 - Spearman
 - Fisher
 - Paasche
 - Laspeyres
9. In Paasche's price index number, the weight is considered as
- Quantity in the base year
 - Quantity during the current year
 - Prices in the base year
 - Prices in the current year
 - Both quantity and prices in the base year
10. The relationship among three mutually exclusive and exhaustive events: X , Y and Z is $P(X) = 2P(Y) = 6P(Z)$. The value of $P(Y)$ is
- 0.1
 - 0.2
 - 0.3
 - 0.5
 - 0.6

11. In the semi-averages method, the data is usually divided into
- A. Four parts
 - B. Two parts
 - C. Three equal parts
 - D. Two equal parts
 - E. Five parts
12. Complete the following: 5th Decile = 2nd Quartile = 50th Percentile =
- A. Mean
 - B. Median
 - C. Mode
 - D. Coefficient variation
 - E. Mean deviation
13. Which of the following is the central aspect of an Operations Research Project?
- A. Identification of controllable and uncontrollable variables
 - B. Identification of objectives
 - C. Construction of a model
 - D. Identification of the problem for which decisions are being sought
 - E. Location of the various constraints/restrictions present in the problem
14. A maximisation problem with objective function: $Z = 6x + 11y$, has the following corner points of the boundary of the feasible region: P (0,0), Q (0,38), R (44,11), S (52, 0) and T (52, 5). The point that gives the maximum solution is
- A. P
 - B. Q
 - C. R
 - D. S
 - E. T
15. In inventory planning and production control, the term 'inventory' could mean any of the following, **EXCEPT**
- A. List of items in a shop
 - B. Stock of items in circulation
 - C. Stock of items available in an organisation
 - D. List of items in a company
 - E. Stock of raw materials, partly finished products or finished products.

16. The table below shows the Earliest Finish Times (EFTs), Latest Finish Times (LFTs), Earliest Start Times (ESTs), Latest Start Times (LSTs) and Durations of a project:

Activity	EFT	LFT	EST	LST	Duration
A	5	5	0	0	5
B	10	10	5	5	5
C	10	10	5	5	3
b D	16	17	10	10	6
E	18	18	10	10	8
F	18	18	14	15	1
G	22	22	14	15	8
H	22	22	16	16	4

The critical path of the project is

- A. A, B, C, D, E, H
 - B. A, B, E, G
 - C. A, B, E, H
 - D. A, B, C, E, F, G, H
 - E. D, B, C, D, E, H
17. The cost per year of operating a machine X is as follows:

Year	1 st	2 nd
Operating Cost (₦)	250	550

If the cost price is ₦12,300 and the scrap value is ₦250, the machine should be replaced at the end of the year.

- A. 1st
- B. 2nd
- C. 3rd
- D. 4th
- E. 5th

18. In the following transportation problem, the column and row penalty factors of a, b, c and d for the first iteration of Vogel's Approximation method are

Destination	A		B		C		D		supplies	
W	6		5		4		3		5000	e
X	4		3	2500	5		7		3500	f
Y	3		6		7		2		4500	g
Z	5		7		4		4		4000	h
Demands	3000		2500		4500		4000			
	A		B		C		d			

- A. column factors: a =1, b = 2, c = 1, d = 1; row factors: e=1, f=1, g=1,h=1
 B. column factors a =1, b = 1, c = 1, d = 1; row factors: e=1, f=1, g=2,h=2
 C. column factors a =2, b = 1, c = 1, d = 1; row factors: e=2, f=1, g=1,h=1
 D. column factors a =1, b = 1, c = 2, d = 1; row factors: e=1, f=2, g=2,h=1
 E. column factors a =1, b = 1, c = 1, d = 2; row factors: e=1, f=2, g=1,h=1
19. The allocation to the box represented by S_2D_2 in the following transportation problem using the Least Cost Method is

Destination	D ₁		D ₂		D ₃		Available supplies
S ₁	4		8		8		76
S ₂	16		24		16		82
S ₃	8		16		24		77
Demands	72		102		41		

- A. 4
 B. 20
 C. 21
 D. 41
 E. 72

20. Which of the following is **NOT** a method of obtaining an initial basic feasible solution to a transportation problem?
- A. NWCR
 - B. Least Cost Method
 - C. Vogel's approximation Method
 - D. Hungarian Method
 - E. Replacement Method
21. The following pieces of information are obtained from a particular activity of a project: Earliest Finish Time (EFT) = 30, Earliest Start Time (EST) = 18, Latest Finish Time (LFT) = 30 and Latest Start Time (LST) = 15, if the Duration of the activity is 7, then its total float is
- A. 3
 - B. 4
 - C. 5
 - D. 7
 - E. 8
22. In a Linear Programming problem, when the materials are increased by 1 kilogram, the values of the decision variables become $x = 30$ and $y = 49$, where x and y respectively denote the labour hours and materials (in kilograms). If the objective function is $850x + 490y$ and the original contribution was ₦70,000.00, determine the shadow cost.
- A. ₦20,490
 - B. ₦24,010
 - C. ₦25,500
 - D. ₦49,510
 - E. ₦119,510
23. Which of the following is **NOT** an advantage of Re-order level?
- A. Lower stocks are required
 - B. It is more responsive to changes in consumption
 - C. It takes care of differing types of inventory
 - D. Items ordered are economic quantities via the EOQ calculations
 - E. Items reach re-order level in no particular sequence

24. The failure rates of tubelights in a company are summarised in the table below:

End of Week	1	2	3	4
Probability of failure to date	0.18	0.25	0.48	1.00

The cost of replacing an individual failed tubelight is ₦1000. If all the tubelights are replaced simultaneously, it would cost ₦400 per tubelight. Assume that there are 100 tubelights in use. If group replacement policy is followed to replace the tubelights, then the total cost for preventive maintenance at the end of the first week is

- A. ~~₦~~5,360
B. ~~₦~~10,720
C. ~~₦~~58,000
D. ~~₦~~107,200
E. ~~₦~~158,000
25. A motor spare parts dealer buys an article for ₦115,000 and sells it at a loss of 3.5%. What is the selling price of the article?
- A. ₦110,000
B. ₦110,350
C. ₦110,750
D. ₦110,970
E. ₦110,975
26. If the cost function of a production company is $C(q) = 3q^2 + 4q + 150$ while its sales function is $S(q) = 5q + 20$, obtain the profit when $q = 25$.
- A. 1,250
B. 1,500
C. 1,750
D. 1,800
E. 1,850

27. The estimated average cost function of producing x units of a certain item by a Computer Software Company, is given by $AC(x) = 200 - 7x + \frac{x^2}{3}$. Determine the marginal cost function of the company.
- A. $MC(x) = 200 + 14x + x^2$
 - B. $MC(x) = x^2 - 7x^2 + 200$
 - C. $MC(x) = x^2 - 14x + 200$
 - D. $MC(x) = \frac{x^3}{3} - 7x^2 + 200x$
 - E. $MC(x) = \frac{x^4}{12} - \frac{7}{3}x^3 + 100x^2$
28. How much will be received after investing ₦25,000 at 12% simple interest per annum at the end of $10\frac{1}{2}$ months?
- A. ~~₦~~21,108
 - B. ~~₦~~27,625
 - C. ~~₦~~29,000
 - D. ~~₦~~32,000
 - E. ~~₦~~36,000
29. If universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $X = \{1, 2, 3, 4\}$ and $Y = \{2, 6, 8\}$, then $\{X \cup Y\}'$ is
- A. $\{5, 7, 9\}$
 - B. $\{2, 5, 7\}$
 - C. $\{3, 7, 8\}$
 - D. $\{4, 5, 9\}$
 - E. $\{5, 6, 9\}$
30. If the marginal revenue function is $x^2 - 5x$, then the demand and the revenue, when $x = 10$, are respectively
- A. 8.00, 83.33 (in that order)
 - B. 8.33, 83.00 (in that order)
 - C. 8.33, 83.33 (in that order)
 - D. 8.00, 83.00 (in that order)
 - E. 9.33, 93.33 (in that order)

ATTEMPT ALL QUESTIONS

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

1. Sampling is an important statistical method that entails the use of part of a population to study and make about the characteristics of the given population.
2. The savings (₦ '000) of a group of market women on a particular market day are 14, 19, 16, 14, 15, 14, 22, 14 and 16. The addition of the mean, mode and median of the data set is
3. If the standard deviation, mean, mode and median of a data are respectively 1.2, 4.69, 4.0 and 3.59, the two possible values of the Coefficient of Skewness are and
4. The performances of **FIVE** mobile network operators were ranked by **TWO** different ranking bodies: P and Q and their decisions are as tabulated below:

Mobile Network Operators	A	B	C	D	E
Rank of P	1	5	4	2	3
Rank of Q	5	1	2	4	3

The Spearman's rank correlation coefficient for the data is

5. The prices of food, rent and cloth purchased by a household in 2021 and 2022 are given in the table below.

Items	Price in \$, P₀ (2021)	Price in \$, P₁ (2022)
Food	150	174
Rent	50	60
Cloth	100	125

The Simple Average of Price Relative Index is

6. Three out of every sixty electronic gadgets, manufactured by an electronic manufacturing company, are faulty. The information as to which of the gadgets are faulty is not known by the company until they receive a complaint from the customers. A profit of \$50 is made on the sale of a working gadget but suffers a loss of \$400 for every faulty gadget. The expected profit made by the company, in the long term, is

7. A statement about a population developed for the purpose of testing is referred to as
8. A set of data that are successively collected at regular intervals of time is called
9. A washing machine is sold for ₦349,999. Calculate its marked price if a discount of 4.5% is allowed on the washing machine.
10. If the demand and cost functions of a firm are respectively $D(q) = 20,500 - 4q^2$ and $C(q) = 18,000 + 10,400q$, where q is the number of items produced, then the profit function is
11. A man deposited ₦3,000 at the end of each year into his account for 20 years. If the deposit is compounded yearly at the rate of 3%, the accumulated total amount in his account is.....
12. A demand curve is elastic if the price elasticity of demand is greater than one then, a/an in price will cause a/an in revenue.
13. In production planning, Operations Research may be used to allocate various to production schedules in an way.
14. The table below shows the final table of Monte Carlo method to simulate daily demand of a certain commodity:

Daily demand	Probability	Cumulative Probability	Random Number Interval
15	0.18	0.18	00 – 17
20	0.21	0.39	18 – 38
25	0.52	0.91	39 – 90
30	0.09	1.00	91 – 99

If 54, 94, 25, 86 and 50 is a sequence of random numbers to be used to simulate the demand for the next 5 days, then the average daily demand for the product, on the basis of the simulated data, is

15. In a transportation problem, when the total supply is larger than the total demand, then an additional must be created to accommodate the to achieve the balanced problem.
16. The cost of equipment over a given time period, say 10 years, has three elements. These are purchase price, and

17. The critical path of a network is the path with the..... duration.
18. The objective function, for a minimisation LP problem, is given by $400x + 600y$: and the coordinates of the corner points of the feasible region are (0, 30), (20, 40), and (50, 0). The coordinates of the corner point that give the minimum solution and the minimum objection function value are respectively and (in that order)
19. The amount of time by which the duration of an activity can be extended without affecting the time available for succeeding activities or preceding activities is the
20. The use of a dummy activity in the Network Analysis will ensure that do not have the same starting and finishing nodes.

SECTION B: ATTEMPT ANY FOUR QUESTIONS IN THIS SECTION (50 MARKS)

QUESTION 1

The table below shows the distribution of monthly income (N'000) of 100 employees at First Class Construction Company:

Monthly Income (N'000)	Number of Employees
20 – 24	3
25 – 29	5
30 – 34	12
35 – 39	18
40 – 44	14
45 – 49	6
50 – 54	2

You are required to:

- a. Construct a cumulative frequency table for the distribution and draw an ogive curve. (6½ Marks)
- b. Use the curve to estimate the
 - i. Median. (1 Mark)
 - ii. Quartile deviation. (4 Marks)
 - iii. 95th percentile. (1 Mark)

(Total 12½ Marks)

QUESTION 2

A survey, conducted to study the relationship between the total cost of production (in millions of Naira) and the revenue (in millions of Naira) of a production company for seven months, gives the following results:

Total Cost of Production (x)	26	35	42	48	56	60	74
Revenue (y)	80	88	98	120	182	135	130

You are required to:

- Find the equation of the least squares regression line of y on x , in the form $y = a + bx$. Express the values of a and b to 2 decimal places; (7½ Marks)
- Use your answer to part (a) to find the Revenue predicted by the regression line for the total cost of production of 40 million Naira; (1 Mark)
- Find the equation of the least squares regression line of x on y , in the form $x = \alpha + \beta y$. Express the values of α and β to two decimal places. (4 Marks)

(Total 12½ Marks)

QUESTION 3

Mr. AKUP, a popular cake baker, took the records of his cakes. He found out, based on his past experience, that the daily demand for the cakes and the associated probability follows the pattern given in the table below:

Daily Demand	0	10	25	35	45	50
Probability	0.01	0.14	0.20	0.38	0.25	0.02

By considering the following sequence of random numbers: 46, 72, 08, 50, 54, 62, 17, 24, 65 and 12.

You are required to:

- Establish the required random number interval. (3 Marks)
- Simulate the demand for the next 10 days and determine the average daily demand for the cakes. (8 Marks)
- Determine the total number of cakes remaining in stock if Mr. AKUP decides to bake 36 cakes on daily basis. (1½ Marks)

(Total 12½ Marks)

QUESTION 4

A minimisation linear programming problem is formulated as follows:

$$\begin{array}{ll}\text{Minimise} & Z = x_1 + 9x_2 - 20x_3 \\ \text{Subject to:} & x_1 + 2x_2 + 3x_3 \leq 9 \\ & 3x_1 + 2x_2 + 2x_3 \leq 15 \\ & x_1, x_2, x_3 \geq 0\end{array}$$

You are required to:

- Obtain the initial simplex tableau for the problem. (5½ Marks)
- Identify the entering and leaving variables. (1 Mark)
- Obtain the first iteration Table for the problem. (5 Marks)
- Determine the minimum value of Z. (1 Mark)

(Total 12½ Marks)

QUESTION 5

- Mr. Wade sells his goods to customer at the price marked by his boss. Mr. Tunde gives a discount of 5% from the marked price which implies that he sells for ₦2,208.00 the same goods which Mr. Wade sells for ₦2,240.00.
 - Determine Mr. Tunde's marked price for the goods that Mr. Wade sells for ₦1,120.00. (2½ Marks)
 - What is Mr. Tunde's marked price to his customers of these goods in (i) above? (2 Marks)
 - Find Mr. Wades' selling price for goods which Mr. Tunde sells for ₦1,472.00. (3 Marks)
- The cost of producing an article is ₦30,000. It is then sold to make a profit of 25%. Later, the cost of production was increased by 18%. If the selling price of the article is increased in order to maintain the same percentage profit as before, by how much is the selling price increased? (5 Marks)

(Total 12½ Marks)

QUESTION 6

- a. Determine the output that maximises profit for a product whose demand function is $p = 302 - 2q$ and whose cost function is $C = 500 + 8q + 5q^2$, where q is the quantity produced and sold in thousands units. (5 Marks)
- b. The price per unit of a product is given by $p = 100 - 1.5q$ while the cost of manufacturing the q units is given as $C = 10 + q$.
- Determine the profit function for the product. (1½ Marks)
 - Compute the profit/loss from the sale of 15 units of the product. (1½ Marks)
 - At what sales level does the producer make his maximum profit? (3 Marks)
 - Determine the maximum profit. (1½ Marks)

(Total 12½ Marks)

FORMULAE

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

Economic Order Quantity

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

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

Slope of a regression equation

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

Elasticity of demand, $e = \left(-\frac{p}{q} \right) \left(\frac{dq}{dp} \right)$

The 95% confidence interval for μ

$$= \bar{x} \pm t_{\alpha, n-1} \frac{s}{\sqrt{n}}$$

The trend equation, $y = a + bt$, where $t = x_i - x_m$

$$b = \frac{\sum ty}{\sum t^2}, \quad a = \bar{y} - bx_m, \quad x_m = \text{median of } x \text{ values}$$

$$\text{SARPI} = \frac{\sum \left(\frac{P_n}{P_o} \times 100 \right)}{N}$$

$$\text{SAPI} = \frac{\sum P_{ni}}{\sum P_{oi}} \times 100$$

$$t = \frac{p}{\sqrt{\frac{pq}{n}}}$$

EOQ with stock-out

$$Q = \sqrt{\frac{2cd}{h}} \times \sqrt{\frac{h + c_s}{c_s}}$$

$$\text{LPI} = \frac{\sum p_1 q_o}{\sum p_o q_o} \times 100$$

$$Z = \frac{p - \hat{p}}{\sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}}$$

$$Q_i = L_{Q_i} + \left(\frac{\frac{iN}{4} - \sum f_{Q_i}}{f_{Q_i}} \right) c$$

$$D_i = L_{D_i} + \left(\frac{\frac{iN}{10} - \sum f_{D_i}}{f_{D_i}} \right) c$$

$$P_i = L_{P_i} + \left(\frac{\frac{iN}{100} - \sum f_{P_i}}{f_{P_i}} \right) c$$

Spearman's rank correlation coefficient

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

EOQ with gradual replenishment

$$Q = \sqrt{\frac{2cd}{h \left(1 - \frac{d}{r} \right)}}$$

$$\text{Length of Inventory cycle} = \frac{Q}{d}$$

$$\text{Number of production runs} = \frac{d}{Q}$$

$$\text{Production cost} = \text{Ordering cost} + \text{Holding cost}$$

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

SECTION A: PART I

MULTIPLE-CHOICE SOLUTIONS

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

Workings (MCQ)

1. Formula:

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{N}}$$

There are five observations, so $N = 5$.

$$\text{Mean, } \bar{x} = \frac{\sum x}{N} = \frac{48 + 50 + 63 + 70 + 69}{5} = 60$$

X	Deviation from Mean $x - \mu$	Square of deviation $(x - \mu)^2$
48	-12	144
50	-10	100
63	3	9
70	10	100
69	9	81
$\sum x = 300$		$\sum (x - \bar{x})^2 = 434$

Thus,

$$SD = \sqrt{\frac{434}{5}} = \sqrt{86.8} = 9.32$$

The variance of the given data set of weights is 86.8 while the standard deviation is 9.32. (D)

4. At $x=15$, $T = 32.75 + 0.45(15) = 39.5$
Then the adjusted forecast = 39.5×1.02
= 40.29 (C)

5. The formula for the test statistic (TS) of a population proportion is:

$$Z_{cal} = \frac{\hat{p} - p_0}{\sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}}$$

$\hat{p}$ is the sample proportion (also known as the estimated proportion), p_0 is the claimed population proportion and n denotes the sample size.

The claimed population proportion is

$$p_0 = 45\% = 0.45.$$

The sample (estimated) proportion is

$$\hat{p} = 50\% = 0.50;$$

and the sample size is $n = 500$.

$$\begin{aligned}
 \therefore Z_{cal} &= \frac{0.50 - 0.45}{\sqrt{\frac{0.50(1-0.50)}{500}}} \\
 &= \frac{0.05}{\sqrt{0.0005}} \\
 &= 2.24 \quad (\text{D})
 \end{aligned}$$

6. Let S be the event that an individual who contracted the virus survived;
Let A represent the event that an adult contracted the virus.

Status	Age category			Total
	Young	Adult	Aged	
Those that survived	14	16	4	34
Those that died	2	4	10	16
TOTAL	16	20	14	100

The probability that an individual selected from this village will survive the infection given that he/she is an adult is a conditional probability, that is

$$\begin{aligned}
 P(S / A) &= \frac{P(S \cap A)}{P(A)} \\
 &= \frac{16/50}{20/50} \\
 &= \frac{16}{20} \\
 &= 0.80 \quad (\text{D})
 \end{aligned}$$

10. $P(X) + P(Y) + P(Z) = 1$

But $P(X) = 2P(Y)$

$$2P(Y) = 6P(Z)$$

$$P(Z) = 1/3 (P(Y))$$

Therefore,

$$2P(Y) + P(Y) + 1/3 (P(Y)) = 1$$

$$6P(Y) + 3P(Y) + P(Y) = 3$$

$$10 P(Y) = 3$$

$$P(Y) = 3/10 = 0.3 \quad (\text{C})$$

14.

Coordinates of the corner point	Value of the objective function $Z = 6x + 11y$
P(0, 0)	$Z = 6(0) + 11(0) = 0$
Q(0, 38)	$Z = 6(0) + 11(38) = 418$
R(44, 11)	$Z = 6(44) + 11(11) = 385$
S(52, 0)	$Z = 6(52) + 11(0) = 312$
T(52, 5)	$Z = 6(52) + 11(5) = 367$

Since $Z = 418$ is the highest, then the point Q(0,38) gives the optimal solution. (B)

16.

Total Float = Latest Finish Time – Earliest Start Time – Activity Duration

That is,

Total float = LFT – EST – D

Activity	EFT	LFT	EST	LST	Duration	Total Float
A	5	5	0	0	5	0
B	10	10	5	5	5	0
C	10	10	5	5	3	2
D	16	17	10	10	6	1
E	18	18	10	10	8	0
F	18	18	14	15	1	3
G	22	22	14	15	8	0
H	22	22	16	16	4	2

The critical activities are activities with total float of zero, which are A, B, E, G. (B)

17.

$C = \text{₦}12,300$ and $S = \text{₦}250$

Year of Service n	Running Cost (₦)	Cumulative Running Cost (₦) $\sum f(n)$	Depreciation Cost Price $= C - S$	Total Cost TC (₦)	Average Cost ATC(n) (₦)
Col 1	Col 2	Col 3	Col 4	Col 3 + Col 4 = Col 5	Col 6 = Col 5/n
1	250	250	12050	12300	12300
2	550	800	12050	12850	6425

(B)

18.

Destination Depot	A		B		C		D		Dummy		Available Supplies	Penalties
W	6		5		4	4500	3		0	500	5000	1
X	4	1000	3	2500	5		7		0		3500 1000	1
Y	3	500	6		7		2	4000	0		4500	1
Z	5	1500	7		4		4		0	2500	4000	1
Demands	3000		2500		4500		4000		3000			
Penalties	1		2		1		1					

(A)

1st possibility

19.

	D ₁		D ₂		D ₃		Dummy		Supplies
S ₁	(56)	4		8		8	(20)	0	76 56 0
S ₂		16	(41)	24	(41)	16		0	82 41 0
S ₃	(16)	8	(61)	16		24		0	77 61 0
Demands	72		102		41		20		
	16		41		0		0		
	0		0						

OR
2nd Possibility

	D ₁		D ₂		D ₃		Dummy		Supplies
S ₁	(72)	4	(4)	8		8		0	76 4 0
S ₂		16	(21)	24	(41)	16	(20)	0	82 62 21 0
S ₃		8	(77)	16		24		0	77 0
Demands	72		102		41		20		
	0		98		0		0		
			21						
			0						

OR
3rd Possibility

	D ₁		D ₂		D ₃		Dummy		Supplies
S ₁	(72)	4		8	(4)	8		0	76 4 0
S ₂		16	(25)	24	(37)	16	(20)	0	82 62 25 0
S ₃		8	(77)	16		24		0	77 0
Demands	72		102		41		20		
	0		25		37		0		
			0		0				

OR
4th Possibility

	D ₁		D ₂		D ₃		Dummy		Supplies
S ₁	<u>72</u>	4	<u>4</u>	8		8		0	76 4 0
S ₂		16	<u>41</u>	24	<u>41</u>	16		0	82 41 0
S ₃		8	<u>57</u>	16		24	<u>20</u>	0	77 57 0
	72		102		41		20		
	0		98		0		0		
			41						
			0						

S₂D₂ = 21 (C)

Explanation for tutorial only: Basic transportation cost for 1st possibility = 2,080; 2nd possibility 2, 713; 3rd possibility = 2,744; and 4th possibility = 2,872.

From the above, the least basic transportation cost is 2,080 which is the 1st possibility. It means the correct answer for S₂ D₂ should be 41.

21. Total Float = Latest Finish Time – Earliest Start Time – Activity Duration

That is,

$$\text{Total float} = \text{LFT} - \text{EST} - D$$

$$= 30 - 18 - 7$$

$$= 5 \quad (\text{C})$$

22. New contribution is $850(30) + 490(49) = 25,500 + 24,010 = \text{₹}49,510$

$$\therefore \text{shadow cost is } \text{₹}70,000 - \text{₹}49,510 = \text{₹}20,490 \quad (\text{A})$$

24. Let p_i be the probability that a tubelight which was new when placed in position for use, fails during the i th week of its life. Hence,

$$p_1 = 0.18,$$

$$p_2 = 0.25 - 0.18 = 0.07,$$

$$p_3 = 0.48 - 0.25 = 0.23,$$

$$p_4 = 1.00 - 0.48 = 0.52$$

Since the sum of p_i is equal to 1 at the end of the 4th week, the tubelights are sure to fail during the fourth week.

Let N_i be the number of tubelights replaced at the end of the i th week.

Let N_0 be the number of tubelights replaced at the end of the week 0 (or at the beginning of the first week).

Thus, $N_0 = 100$.

N_1 = number of tubelights replaced at the end of the 1st week

$$= N_0 p_1 = 100 \times 0.18 = 18$$

At the end of the first week:

Cost of replacing 100 tubelights at a time = ~~₦~~(400 × 100) = ~~₦~~40,000

Cost of replacing failed tubelights individually at the end of the first week

$$= \text{₦}(18 \times 1000) = \text{₦}18,000$$

Therefore, the total cost for preventive maintenance at the end of the first week is

$$\text{₦}40,000 + \text{₦}18,000 = \text{₦}58,000 \quad (C)$$

25. CP ----- 100%

SP ----- (100 - k)% where k is the loss %

$$CP \times (100 - k) = SP \times 100$$

$$CP = \text{₦}115,000$$

Loss % = 3.5%

$SP = ?$

CP ----- 100%

SP ----- (100 - 3.5)% = 96.5%

$$CP \times 96.5 = SP \times 100$$

$$SP = \frac{CP \times 96.5}{100}$$

Thus, we have

$$SP = \frac{115,000 \times 96.5}{100} = \text{₦}110,975 \quad (E)$$

ALITER:

$$\frac{CP - SP}{CP} = \frac{LOSS}{100} \Rightarrow \frac{115,000 - SP}{115,000} = \frac{3.5}{100}$$

$$\Rightarrow 115,000 - 100SP = 402.500 \Rightarrow 115,000 - SP = 4,205$$

$$\Rightarrow SP = 115,000 - 4,205 = 110,975$$

$$26. \quad C(q) = 3q^2 + 4q + 150$$

$$S(q) = 5q + 20$$

$$\begin{aligned} R(q) &= q S(q) \\ &= 5q^2 + 20q \end{aligned}$$

Thus, the profit function is obtained using the functional relationship:

$$\begin{aligned} P(q) &= R(q) - C(q) \\ \therefore P(q) &= 5q^2 + 20q - (3q^2 + 4q + 150) \\ &= 5q^2 + 20q - 3q^2 - 4q - 150 \\ &= 2q^2 + 16q - 150 \end{aligned}$$

When $q = 25$, then the profit is

$$\begin{aligned} P(25) &= 2(25^2) + 16(25) - 150 \\ &= 1250 + 400 - 150 \\ &= 1500 \end{aligned} \quad (B)$$

27. Average cost is given by

$$AC(x) = \frac{C(x)}{x} = 200 - 7x + \frac{x^2}{3}.$$

Therefore, the cost function of the company is obtained as:

$$\begin{aligned} C(x) &= x \times AC(x) \\ &= x \left(200 - 7x + \frac{x^2}{3} \right) \\ &= 200x - 7x^2 + \frac{x^3}{3} \end{aligned}$$

Now, the marginal cost function is obtained by differentiating the cost function with respect to x .

That is,

$$\begin{aligned} MC(x) &= \frac{dC(x)}{dx} \\ &= \frac{d}{dx} \left(200x - 7x^2 + \frac{x^3}{3} \right) \\ &= 200 - 14x + x^2 \end{aligned} \quad (C)$$

28.

$$I = \frac{PRT}{100}$$

$$= \frac{25,000 \times 12 \times 10.5}{100 \times 12} = 2625$$

$$A = I + P$$

$$A = 25,000 + 2625 = \text{N}27,625 \quad (\text{B})$$

29.

$$XUY = \{1, 2, 3, 4, 6, 8\}$$

$$(XUY)' = \{5, 7, 9\} \quad (\text{A})$$

30.

$$\frac{dR(x)}{dx} = x^2 - 5x$$

$$R(x) = \int_0^{10} (x^2 - 5x) dx$$

$$R(x) = \left(\frac{x^3}{3} - \frac{5x^2}{2} \right) \Big|_0^{10}$$

$$\therefore R(10) = \frac{10^3}{3} - \frac{5(10)^2}{2} = 83.33$$

$$\begin{aligned} \therefore \text{Demand} &= \frac{83.333}{10} \\ &= \underline{\underline{8.33}} \end{aligned}$$

(C)

SECTION A: PART II

SHORT-ANSWER SOLUTIONS

1. Fractional, Decisions (in that order)
2. ~~₦~~45,000
3. 0.575, 2.75 (in any order)
4. -1
5. 120.33%
6. \$27.5
7. Hypothesis
8. Times series data
9. ~~₦~~366,491.10
10. $-4q^2 + 10,100q - 18,000$
11. ~~₦~~80,611.12
12. An increase, a decrease (in that order)
13. Resources, optimal (in that order)
14. 25
15. Column, dummy (in that order)
16. Resale Value, Maintenance cost (in any order)
17. Longest
18. (0, 30), 18,000 (in that order)
19. Independent float
20. Two different/ separate activities

Workings (SAQ)

2. The mean of the data set is

$$\begin{aligned}\bar{x} &= \frac{\sum x}{n} \\ &= \frac{14 + 19 + 16 + 14 + 15 + 14 + 22 + 14 + 16}{9} \\ &= \frac{144}{9} \\ &= 16\end{aligned}$$

Thus, the mean savings is ~~₦~~16,000.

The mode is the value, which occurs most frequently in a set of data. In the data set, the savings that occurs most frequently is ~~₦~~14,000. This is the mode.

To obtain the median:

Recall that the median of a data set is the value of the middle item of the data when all the items in the data set are arranged in an ordered array form (either ascending or descending order).

For an ungrouped data (like the one under consideration), the Median is the item occupying the $\frac{N+1}{2}$ position.

Put the data in an array, we have: 14, 14, 14, 14, 15, 16, 16, 19, 22

$$\text{Median position} = \frac{N+1}{2} \text{th};$$

$$\text{Median position} = \frac{9+1}{2} \text{th} = \frac{10}{2} \text{th} = 5^{\text{th}} \text{ position}$$

The observation that occupies the 5th position is 15. So, the median = 15, which corresponds to ₦15,000.

Summing up the mean, mode and median, we have

$$\text{₦16,000} + \text{₦14,000} + \text{₦15,000} = \text{₦45,000}$$

3. Given: Standard deviation, SD = 1.2; Mean $\bar{x}$ = 4.69; Mode = 4.0; Median = 3.59.

Using mode:

$$\begin{aligned} \text{Coefficient of Skewness} &= \frac{\text{Mean} - \text{Mode}}{\text{Standard Deviation}} \\ &= \frac{4.69 - 4.0}{1.2} \\ &= \frac{0.69}{1.2} \\ &= 0.575 \end{aligned}$$

Using median:

$$\begin{aligned} \text{Coefficient of Skewness} &= \frac{3(\text{Mean} - \text{Median})}{\text{Standard Deviation}} \\ &= \frac{3(4.69 - 3.59)}{1.2} \\ &= \frac{3(1.1)}{1.2} \\ &= \frac{3.3}{1.2} \\ &= 2.75 \end{aligned}$$

4.

Rank of P R_p	Rank of Q R_q	$d = R_p - R_q$	d^2
1	5	-4	16
5	1	4	16
4	2	2	4
2	4	-2	4
3	3	0	0
			$\sum d^2 = 40$

The Spearman's correlation coefficient is given by the formula:

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

Therefore,

$$\begin{aligned}
 R &= 1 - \frac{6(40)}{5(5^2 - 1)} \\
 &= 1 - \frac{240}{5(24)} \\
 &= 1 - \frac{240}{120} \\
 &= 1 - 2 \\
 &= -1
 \end{aligned}$$

5.

Items	Price in \$, P_0 (2019)	Price in \$, P_1 (2020)	$\frac{P_1}{P_0} \times 100$
Food	150	174	$\frac{174}{150} \times 100 = 116\%$
Rent	50	60	$\frac{60}{50} \times 100 = 120\%$
Cloth	100	125	$\frac{125}{100} \times 100 = 125\%$

$$P_{01} = \frac{\sum \left(\frac{P_1}{P_0} \times 100 \right)}{N}$$

$$P_{01} = \frac{116 + 120 + 125}{3} = \frac{361}{3} = 120.3\%$$

6. The expected value of profit made by the company is

$$E(X) = 50 \times \frac{57}{60} - 400 \times \frac{3}{60}$$

$$E(X) = \frac{2850}{60} - \frac{1200}{60} = 47.5 - 20 = 27.5$$

9. Selling price = ~~N~~349,999, Discount% = 4.5%
Marked price (MP) = Selling price (SP) + Discount = 349,999 + 4.5% of MP
 $\Rightarrow MP = 349,999 + 0.045MP$
 $\Rightarrow MP - 0.045MP = 349,999$
 $\Rightarrow 0.955MP = 349,999$
 $\therefore MP = \frac{349,999}{0.955} = \text{N}366,491.10$

10. $P(q) = 20,500 - 4q^2$
 $\therefore R(q) = P \times q = 20,500q - 4q^3$
 $C(q) = 18,000 + 10,400q$
Profit = Revenue - Cost.
Thus,
Profit = $R(q) - C(q)$
 $= 20,500q - 4q^3 - (18,000 + 10,400q)$
 $= 10,100q - 4q^3 - 18,000$
OR

$$D(q) = 20,500 - 4q$$

$$C(q) = 18,000 + 10,400q$$

But Profit = Revenue - Cost.
Thus,
 $R = R - C$
 $= (20,500q - 4q^2)q$
 $= 20,500q - 4q^2$
 $\therefore \text{Profit} = 20,500q - 4q^2 - (18,000 + 10,400q)$
 $= 20,500q - 4q^2 - 18,000 - 10,400q$
Profit = $10,100q - 4q^2 - 18,000$
Profit = $10,000q - 4q^2 - 18,000$

$$11. \quad S = \frac{A((1+r)^n - 1)}{r} = \frac{3000((1+0.03)^{20} - 1)}{0.03}$$

$$S = \frac{3000 \times 0.806111}{0.03} = \text{N}80,611.12$$

14. The simulated demands for the next 5 days using the given sequence of random numbers given are as displayed in the table

Days #	Random Number	Simulated Demand
1	54	25
2	94	30
3	25	20
4	86	25
5	50	25

Thus, total demands for the 5 days = 25 + 30 + 20 + 30 + 25 = 125 units.
Hence, the average daily demand is

$$\frac{125}{5} = 25 \text{ units}$$

18. Coordinates	Value of the objective function
(0, 30)	$400(0) + 600(30) = 18,000$
(20, 40)	$400(20) + 600(40) = 32,000$
(50, 0)	$400(50) + 600(0) = 20,000$

$\therefore$ point (0,30) gives the minimum value of objective function of 18,000

Examiner's comment

Section A is made up of 30 Multi-choice Questions (MCQs) and 20 Short-Answer Questions (SAQs). Both MCQs and SAQs fairly cover the current syllabus. The average score of the candidates in MCQ is 18 out of maximum of 30 marks. For the SAQ, average score was 10 out of maximum of 20 marks.

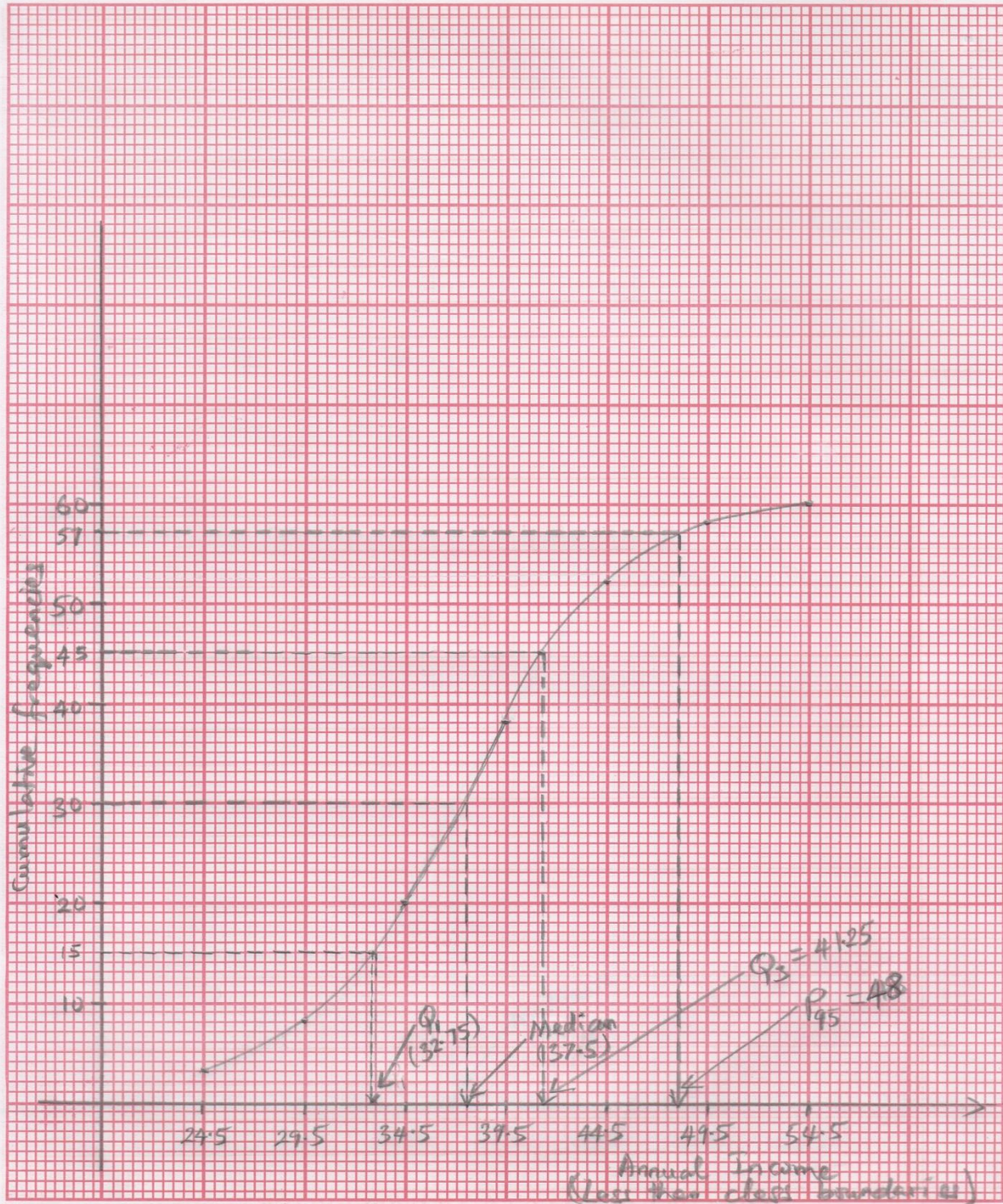
SECTION B

SOLUTION 1

a.

Annual Income	Frequency (f)	Cumulative frequency (cf)	Class boundaries
20 – 24	3	3	19.5 – 24.5
25 – 29	5	8	24.5 – 29.5
30 – 34	12	20	29.5 – 34.5
35 – 39	18	38	34.5 – 39.5
40 – 44	14	52	40.5 – 44.5
45 – 49	6	58	44.5 – 49.5
50 – 54	2	60	49.5 – 54.5

The ogive is drawn using the data in the third and fourth columns of the table.



b. i. Note that $N = 60$.

The median score is the score corresponding to half the total cumulative frequency, i.e. the score corresponding to a cumulative frequency of 30. From the graph, this is equal to 37.5. This corresponds to annual income of ~~₦~~37,500.

ii. Quartile deviation (QD) is obtained from the quartile range and is defined by:

$$QD = \frac{Q_3 - Q_1}{2}$$

where Q_1 = First (lower) quartile, Q_3 = Third (upper) quartile and the numerator $Q_3 - Q_1$ is known as the interquartile range.

The lower quartile (Q_1) corresponds to the 25th percentile, i.e. a cumulative frequency = 25% of 60 = 15.

Thus, $Q_1 = 32.75$ (reading from the graph).

The upper quartile (Q_3) corresponds to the 75th percentile, i.e., a cumulative frequency = 75% of 60 = 45. From the graph, Q_3 reading is 41.25

Therefore, the quartile deviation is

$$QD = \frac{Q_3 - Q_1}{2} = \frac{41.25 - 32.75}{2} = 4.25$$

$$QD = \text{₦}4,250$$

iii. nth percentile is at $\frac{\sum f}{100} \times n$

$$\therefore 95\text{th percentile is at } \frac{\sum f}{100} \times 95 = \frac{60}{100} \times 95 = 57\text{th}.$$

P_{95} reading from the cumulative frequency curve = 48. This corresponds to annual income of ~~₦~~48,000.

Examiner's comment

The questions tests candidates' knowledge on descriptive statistics. The candidates' ability to construct and use the cumulative frequency (also called ogive) to estimate some management decisions such as the median, quartile deviation and the 95th percentile is tested in the question. The question was popular with the candidates. About 95% of the candidates attempted the question with about 75% of the candidates obtaining pass mark of 40% and above.

The major pitfalls identified include the inability of some of the candidates to deduce the values of both the lower and upper quartiles from the curve from which the Quartile deviation can be calculated, not able to draw the curve using the class boundaries and not using the correct formula to calculate the 95th percentile.

Generally, the candidates demonstrated good understanding of what the question entails.

SOLUTION 2

a.

Regression Line $y = a + bx$

Where:

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

$$a = \bar{y} - b\bar{x} = \bar{y} - b\bar{x}$$

X	y	xy	x^2	y^2
26	80	2080	676	6400
35	88	3080	1225	7744
42	98	4116	1764	9604
48	120	5760	2304	14400
56	182	10192	3136	33124
60	135	8100	3600	18225
74	130	9620	5476	16900
$\sum x = 341$	$\sum y = 833$	$\sum xy = 42,948$	$\sum x^2 = 18,181$	$\sum y^2 = 106,397$

$$b = \frac{7(42,948 - (341)(833))}{7(18,181) - (341)^2}$$

$$= \frac{300,636 - 284,053}{127,267 - 116,281}$$

$$= \frac{16,583}{10,986}$$

$$b = 1.509$$

$$a = \bar{y} - b\bar{x}$$

$$= \frac{\sum y}{n} - \frac{b \sum x}{n}$$

$$= \frac{833}{7} - 1.509 \frac{341}{7}$$

$$= 119 - 1.509(48.714)$$

$$= 119 - 73.509$$

$$\therefore a = 45.491$$

$$\mathbf{y = 45.49 + 1.51x}$$

(b) When $x = 40$, $y = ?$

$$y = 45.49 + 1.51(40)$$

$$= 45.49 + 60.4$$

$$= 105.89$$

$$= \text{N}105,890,000$$

$$= \text{N}106\text{m}$$

(c) $x = \alpha + \beta y$

where:

$$\beta = \frac{n \sum xy - \sum x \sum y}{n \sum y^2 - (\sum y)^2}$$

$$\alpha = x - \beta y$$

$$\beta = \frac{7(4298) - (341)(833)}{7(106397) - (833)^2}$$

$$= \frac{165583}{744779 - 693889}$$

$$= \frac{165583}{50890}$$

$$\mathbf{= 0.3258}$$

$$\mathbf{\beta = 0.33}$$

$$\begin{aligned}
 a &= \bar{x} - \beta \bar{y} \\
 &= \frac{\sum x}{n} - \beta \frac{\sum y}{n} \\
 &= \frac{341}{7} - 0.3258 \left(\frac{833}{7} \right) \\
 &= 48.714 - 38.7702 \\
 \alpha &= 9.9438
 \end{aligned}$$

Therefore the regression line of x on y is given by $x = 9.9438 + 0.3258y$.

ALITER Q2(a)

X	Y	$x - \bar{x}$	$y - \bar{y}$	$(x - \bar{x})^2$	$(x - \bar{x})(y - \bar{y})$	$(y - \bar{y})^2$
26	80	-22.71	-39	515.7441	885.69	1,521
35	88	-13.71	-31	187.9641	425.01	961
42	98	-6.71	-21	45.0241	140.71	441
48	120	-0.71	1	0.5041	-0.71	1
56	182	72.29	63	53.1s441	459.27	3969
60	135	11.29	16	127.4641	180.64	256
74	130	25.29	11	639.5841	278.19	121
$\sum x = 341$	$\sum y = 833$			$\sum (x - \bar{x})^2$ = 1,569.4287	$\sum (x - \bar{x})(y - \bar{y})$ = 2,368.8	$\sum (y - \bar{y})^2$ = 7,270

$$\bar{x} = \frac{\sum x}{n} = \frac{341}{7} = 48.71$$

$$\bar{y} = \frac{\sum y}{n} = \frac{833}{7} = 119$$

The regression line of y on x is given as $y = a + bx$

Where $b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$

$$b = \frac{2,368.8}{1,569.4287}$$

$$b = 1.5093$$

$$\text{and } a = \bar{y} - b \bar{x}$$

$$a = 119 - (1.5093)(48.71)$$

$$a = 119 - 73.518p$$

$$a = 45.482$$

The regression line is

$$y = 45.482 + 1.5093x$$

(b) when $x = 40$ million Naira i.e $x = 40$

$$y = 45.482 + 1.509(40)$$

$$y = 45.482 + 60.36 = 105.842$$

Revenue is 105.84 million Naira

(c) The least squares regression line of x on y is $x = \alpha + \beta y$

$$\text{Where } \beta = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (y - \bar{y})^2}$$

$$\beta = \frac{2,368.8}{7,270}$$

$$\beta = 0.3258$$

$$\alpha = \bar{x} - \beta \bar{y}$$

$$\alpha = 48.71 - (0.3258)(119)$$

$$\alpha = 48.71 - 38.7702$$

$$\alpha = 9.9398$$

$\therefore$ The least squares regression line is $x = 9.9398 + 0.3258y$

Examiner's comment

The question tests the candidates' knowledge of regression analysis and prediction. Fitting of regression line to establish relationship between two related variables is the main focus of the question.

About 82% of the candidates attempted the question with about 78% of them obtaining 40% and above. The pitfalls of the candidates include computational inaccuracy, some candidates appeared confused in identifying dependent variable from the wording of the question.

SOLUTION 3

(a)

Daily Demand	Probability	Cumulative Probability	Cumulative Probability (%)	Random Number Interval
0	0.01	0.01	1	0
10	0.14	0.15	15	1-14
25	0.20	0.35	35	15-34
35	0.38	0.73	73	35-72
45	0.25	0.98	98	73-97
50	0.02	1.00	100	98-99

(b)

S/N	Random Number	Simulated Demand
1	46	35
2	72	35
3	08	10
4	50	35
5	54	35
6	62	35
7	17	25
8	24	25
9	65	35
10	12	10

$$\begin{aligned}\text{Average Daily Demand} &= \frac{\sum(\text{simulated demand})}{10} \\ &= \frac{35 + 35 + 10 + 35 + 35 + 35 + 25 + 25 + 35 + 10}{10} \\ &= \frac{280}{10} = 28 \text{ cakes}\end{aligned}$$

(c) Total cakes baked by Mr. Akup = $36 \times 10 = 360$ cakes

The total number of cakes that remains in stock = $360 - 280$
= 80 cakes

ALITER for Q3(C)

Based on the random number interval established in (i) above, the demand for the next 10 days for the given sequence of random numbers can be simulated as follows:

Day	Random number	Number of Cakes baked (C_b)	Daily demand (C_d)	Cakes in the Stock ($C_s = C_b - C_d$)
1	46	36	35	1
2	72	36	35	1
3	08	36	10	26
4	50	36	35	1
5	54	36	35	1
6	62	36	35	1
7	17	36	25	11
8	24	36	25	11
9	65	36	35	1
10	12	36	10	26

iii. The total number of cakes remaining = $1+1+26+1+1+1+11+11+1+26$
=80

Examiner's comment

Ability of the candidates to simulate the daily demand of number of cakes baked over 10 days period is tested in the question.

Generally, it tests the ability of candidates to apply simulation technique to business problems. 63% of the candidates attempted the question with about 70% of them obtaining 40% and above. The main pitfall of the candidates was their inability to generate random number intervals. They also suffered from rounding errors.

SOLUTION 4

(a) Minimize: $\text{Min } Z = x_1 + 9x_2 - 20x_3$

Subject to:

$$x_1 + 2x_2 + 3x_3 \leq 9$$

$$3x_1 + 2x_2 + 2x_3 \leq 15$$

$$x_1, x_2, x_3, s_2, \geq 0$$

Convert the problem to standard form by introducing slack or surplus variable

Minimize: $Z = x_1 + 9x_2 - 20x_3 + 0s_1 + 0s_2$

Subject to: $x_1 + 2x_2 + 3x_3 + 1s_1 + 0s_2 = 9$

$3x_1 + 2x_2 + 2x_3 + 0s_1 + 1s_2 = 15$

$x_1, x_2, x_3, s_1, s_2 \geq 0$

initial Simplex Tableau is obtained as follows:

C	1	9	-20	0	0		
Basic Variable	x_1	x_2	x_3	s_1	s_2	q	R
0 s_1	1	2	3	1	0	9	$\frac{9}{3} = 3$
0 s_2	3	2	2	0	1	15	$\frac{15}{2} = 7.5$
Z	0	0	0	0	0	0	
C-Z	1	9	-20	0	0		

(b) most negative in the C – Z is -20

∴ The entering variable is x_3

Minimum of R column is 3

∴ The leaving variable is s_1

Pivotal quantity is 3

(c) The Table for the first iteration is obtained from initial simplex tableau in (a) above

C	1	9	-20	0	0	
Basic Variable	x_1	x_2	x_3	s_1	s_2	q
-20 x_3	$\frac{1}{3}$	$\frac{2}{3}$	1	$\frac{1}{3}$	0	3
$(R_2 - R_1)$ 0 s_2	$\frac{7}{3}$	$\frac{2}{3}$	0	$-\frac{2}{3}$	1	9
Z	$-\frac{20}{3}$	$-\frac{40}{3}$	-20	$-\frac{20}{3}$	0	-60
C-Z	$\frac{23}{3}$	$\frac{67}{3}$	0	$\frac{20}{3}$	0	

(d) The minimum value of Z = -60

Examiner's comments

Candidates are required to solve linear programming problem involving three variables using the simplex method. Candidates to set up appropriate tableau and differentiate between slack and surplus variables. They should be able to identify the “entering” and “leaving” variables in the construction of tableau.

38% of the candidates attempted the question with about 29% of them having scores of 40% and above. The major pitfall identified was in the ability of some candidates to state the given minimization problem in the standard form using slack variables. They could not form the required tableau and their inability to identify both the “entering” and “leaving” variables also constitute some pitfalls.

SOLUTION 5

ai. The marked price for Mr. Wade's goods is the same as his selling price.

Let the marked price for Mr. Tunde's goods be $\text{₦}x$, then selling price of Mr. Tunde's goods

$$= 95\% \text{ of } \text{₦}x = 95x/100 = \text{₦}0.95x$$

The goods sold by Mr. Wade for $\text{₦}2240$, was sold by Mr. Tunde for $\text{₦}2208.00$.

Thus,

$$0.95x = 2208.$$

Therefore,

$$x = 2208/0.95 = \text{₦}2,324.21$$

Hence, Mr. Tunde's marked price = $\text{₦}2,324.21$

For every good Mr. Wade sells for $\text{₦}y$,

$$\text{Mr. Tunde's marked price} = \text{₦} \left(\frac{2,324.21}{2,240} \right) \times y$$

For the goods Mr. Wade sells for $\text{₦}1,120$,

$$\begin{aligned} \text{Mr. Tunde's marked price} &= \text{₦} \left(\frac{2,324.21}{2,240} \right) \times 1,120 = \text{₦}1,162.105 \\ &= \text{₦}1162.11 \end{aligned}$$

ii. Mr. Tunde's selling price for the goods marked ₦1,162.11 = $0.95 \times \text{₦}1162.11$
 $= \text{₦}1,104.004 = \text{₦}1,104.00$

iii. Mr. Tunde's marked price for the goods he sold for ₦1472.00 = $\frac{1472}{0.95}$
 $= \text{₦}1549.47$

Hence, Mr. Wade's marked price for the goods which Mr. Tunde sold for ₦1472.00
 $= \text{₦} \left(\frac{2,240}{2,324.21} \right) \times 1,549.47 = \text{₦}1493.33$

Recall that Mr. Wade's marked price for his goods is the same as his selling price.

Hence, his selling price for the goods Mr. Tunde sells for ₦1,472.00 is ₦1,493.33

b. Cost = ₦30,000.00

% profit = 25%

Profit = 25% of ₦30,000.00 = ₦7,500.00

% increase in cost = 18%

Increment in cost = 18% of ₦30,000.00 = ₦5,400.00

New cost = ₦30,000.00 + ₦5,400 = ₦35,400.00

Let the increment in the selling price be y .

Old selling price = Cost + profit = ₦30,000.00 + ₦7,500.00 = ₦37,500.00

New % profit = old % profit = 25%

$$= \frac{\text{new selling price} - \text{new cost}}{\text{new cost}} \times 100\%$$

$$= \frac{(y + 37,500) - 35,400}{35,400} \times 100\%$$

That is, $25\% = \frac{(y + 37,500) - 35,400}{35,400} \times 100\%$

$$25 = \frac{(y + 37,500) - 35,400}{35,400} \times 100 = \frac{y + 37,500 - 35,400}{354} = \frac{y + 2,100}{354}$$

$$25 \times 354 = y + 2,100 \implies 8,850 - 2,100 = y$$

Thus,

$$y = 6,750$$

Therefore, the selling price increased by ~~₦~~6,750.00.

ALITER Q5b

$$CP = \text{₦}30,000$$

$$\text{Profit \%} = 25\%$$

$$CP = 100\%$$

$$SP = 125\%$$

$$SP = \frac{30,000 \times 125}{100} = \text{₦}37,500$$

CP increased by 18% i.e

$$\text{New CP} = 30,000 \times 118\% = \text{₦}35,400$$

SP at the same profit percentage

$$SP = \frac{30,000 \times 125}{100} = \text{₦}44,250$$

$$SP \text{ is increased by } 44,250 - 37,500 = 6,750$$

Examiner's comments

This is strictly based on business mathematics. Candidates are expected to solve profit, loss and discount problems based on sales. 45% of the candidates attempted the question with about 60% of them obtaining 40% and above.

The Major pitfall identified was the inability of the candidates to differentiate between market price and selling price.

SOLUTION 6

- a. Determine the profit maximizing output for a product whose demand function is $p = 302 - 2q$ and whose cost function is $C = 500 + 8q + 5q^2$ where q is the quantity produced and sold in thousand units

$$p = 302 - 2q$$

Revenue = price x quantity

$$R = (302 - 2q)q = 302q - 2q^2$$

$$MR = 302 - 4q$$

$$C = 500 + 8q + 5q^2$$

$$MC = 8 + 10q$$

For maximum profit, $MR = MC$

$$302 - 4q = 8 + 10q$$

$$302 - 8 = 10q + 4q$$

$$294 = 14q$$

$$q = 294/14 = 21$$

Therefore, the output that will maximize profit is 21,000 units.

- bi. Profit = TR - TC

$$p = 100 - 1.5q$$

$$TR = \text{Price} \times \text{Quantity} = (100 - 1.5q)q = 100q - 1.5q^2$$

$$TC = 10 + q.$$

$$\text{Profit} = TR - TC = 100q - 1.5q^2 - (10 + q) = 100q - 1.5q^2 - 10 - q$$

$$\text{That is, the Profit} = 99q - 1.5q^2 - 10$$

- ii. at $q = 15$

$$\text{Profit} = 99(15) - 1.5(15)^2 - 10 = 1,485 - 337.5 - 10 = 1,137.5 = \text{₦}1,137.50\text{k}$$

iii. For maximum profit, $MR = MC$

$$MR = 100 - 3q$$

$$MC = 1$$

$$100 - 3q = 1$$

$$100 - 1 = 3q$$

$$99 = 3q$$

$$q = 99/3 = 33$$

Therefore, the sales level at which the producer makes maximum profit is 33 units.

iv. Profit = $99q - 1.5q^2 - 10$

$$\text{Maximum profit} = 99(33) - 1.5(33)^2 - 10 = 3,267 - 1,633.5 - 10 = 1,623.5$$

That is, maximum profit = ₦1,623.50

ALITER Q6a

$$R = Pq = (302 - 2q)q = 302q - 2q^2$$

$$C = 800 + 8q + 5q^2$$

$$\text{Profit} = R - C = 302q - 2q^2 - (800 + 8q + 5q^2)$$

$$\text{Profit, } P = 294q - 7q^2 - 800$$

$$\frac{dp}{dq} = 294 - 14q$$

$$\frac{dp}{dq} = 0$$

$$\frac{dp}{dq} = 0 \quad \frac{d^2p}{dq^2} = -14 \leq 0$$

$$q = \frac{294}{14} = 21$$

$$Q = 21,000 \text{ units}$$

ALITER 6b (ii)

$$\text{Profit, } P = 99q - 1.5q^2 - 10$$

$$\frac{dp}{dq} = 99 - 3q$$

$$\frac{d^2p}{dq^2} = -3 < 0 = \text{maximum}$$

$$\text{At } \frac{dp}{dq} = 0$$

$$99 - 3q = 0$$

$$3q = 99$$

$$q = 33$$

Examiner's comment

This is the application of calculus to practical business problems.

The question intends to measure candidates' knowledge in the application of the concept of differential calculus to determine the profit function for a particular product and to also determine the sales level at which a product makes a maximum profit.

About 48% of the candidates attempted the question with about 65% of them scoring 40% and above.

The identified Pitfall was the candidates' inability to differentiate between Demand/Price and Revenue.

THE ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA**ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
SEPTEMBER 2023 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, 26, SEPTEMBER, 2023

**ASSOCIATION OF ACCOUNTANCY BODIES IN WEST AFRICA
ACCOUNTING TECHNICIANS SCHEME, WEST AFRICA
PART II EXAMINATIONS – SEPTEMBER 2023**

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 attribute of information?

- A. Useful
- B. In a raw form
- C. About current circumstances
- D. Needed by managers
- E. A derivative of data

2. Four bytes has how many binary digits?

- A. 256
- B. 32
- C. 16
- D. 8
- E. 4

3. Convert 566_8 to binary

- A. 100110110
- B. 101010110
- C. 101110110
- D. 111000110
- E. 101110100

4. How will you best describe a form filled online?

- A. Online transaction
- B. Data entry
- C. Form filling
- D. Online application
- E. Data collection

5. The stage of data processing where data is converted to computer compatible form is known as data
 - A. Collection
 - B. Transformation
 - C. Manipulation
 - D. Input
 - E. Preparation
6. An accountant in a company can make use of computer to
 - A. Forecast sales
 - B. Predict winner of election
 - C. Restore normalcy in ATSWA exams
 - D. Prepare examination questions
 - E. Prepare students results
7. Multiuser operating system was introduced in which computer generation?
 - A. First
 - B. Second
 - C. Third
 - D. Fourth
 - E. Fifth
8. What is the difference between a microcomputer and a laptop?
 - A. Laptop is smaller than a microcomputer
 - B. Laptop is more powerful than a microcomputer
 - C. Microcomputer is more powerful than laptop
 - D. Microcomputer has more storage space than laptop
 - E. No difference because a laptop is a microcomputer
9. Which of the following is an advantage of using a computer?
 - A. Fragility
 - B. Compactness
 - C. Portability
 - D. Accuracy
 - E. Connectivity
10. Which of the following is a graphics input device?
 - A. Scanner
 - B. Keyboard
 - C. Hard disk drive
 - D. Digital camera
 - E. Floppy disk drive

11. A device that uses light in the process of reading from a storage medium is
- A. Light emitting reader
 - B. Optical scanner
 - C. Light emitting scanner
 - D. Light character reader
 - E. Optical reading system
12. Which of the following can be described as a computer softcopy?
- A. A photocopy of a document
 - B. A copy of result of data processing
 - C. A computer output under processing
 - D. A computer output stored on a flash disk
 - E. A copy of result printed on paper
13. What is a cache memory?
- A. A temporary storage area that the computer's processor can retrieve data from easily
 - B. A high speed portion of hard disk
 - C. A ROM
 - D. A primary storage
 - E. A secondary storage
14. What is the meaning of CPU?
- A. Cumulative processing unit
 - B. Centre processing unit
 - C. Central processing unit
 - D. Control processing unit
 - E. Current processing unit
15. Which of the following is found in the computer processor?
- A. Central unit
 - B. System Bus
 - C. Register
 - D. Communication unit
 - E. Data bus
16. Apart from password, which of the following can also be used for authorisation check?
- A. Visual check
 - B. Fingerprint check
 - C. Security guard patrol
 - D. Firewall check
 - E. Antivirus check

17. Which of the following is **NOT** a system software?
- A. Operating system
 - B. Compiler
 - C. Editor
 - D. Word processor
 - E. Service program
18. Which software translates high level language program to equivalent in machine language?
- A. Assembly
 - B. Compiler
 - C. Translator
 - D. Language Translator
 - E. Assembler
19. Which of the following is a component of an operating system?
- A. File management system
 - B. Program creation and editing
 - C. File exchange program
 - D. Database management
 - E. Spreadsheet management
20. Which computer operational environment allows interconnectivity of computers and some other peripheral devices?
- A. Single-user
 - B. Network
 - C. Multi-user
 - D. Windows based
 - E. Off-line
21. Which computing technology allows for off-site processing of data through the internet?
- A. Remote job processing
 - B. Online processing
 - C. Cloud computing
 - D. Off-site processing
 - E. Network computing

22. Which of the following is a disadvantage of using an application software?
- A. It solves general problems
 - B. It is restricted to scope defined by programmer
 - C. It is cheap
 - D. It is easy to use
 - E. Encourages use of computers
23. Which of the following is a function of a presentation package?
- A. Word processing
 - B. Editing
 - C. Desktop publishing
 - D. Slides creation, editing and display
 - E. Graphics show
24. Which of the following is **NOT** a communication medium?
- A. Broadcast channel
 - B. Fibre optics
 - C. Twisted cable
 - D. Electro-magnetic wave
 - E. Coaxial cable
25. Computer program design outlined as a sequence of diagrammatic blocks is called
- A. Block chart
 - B. Procedural chart
 - C. Program chart
 - D. Logical chart
 - E. Flow chart
26. Which of the following is a characteristic of a third generation programming language?
- A. They have mnemonic codes
 - B. They are procedural
 - C. They are non-procedural
 - D. They have one to one correspondence to machine language
 - E. They use binary digits

27. On a windows based computer, the display that comes up after a successful booting is called
- A. Display screen
 - B. Icon
 - C. Desktop
 - D. GUI
 - E. Taskbar
28. What terminology is used to describe processing system where processor can attend to multiple jobs at the same time?
- A. Multiprogramming
 - B. Multiprocessing
 - C. Multitasking
 - D. Good computing
 - E. Parallel computing
29. In a simplex transmission system,
- A. Receiver and sender communicate together
 - B. Only receiver gets message
 - C. Receiver and sender are not synchronised but they communicate together
 - D. Receiver can also send message
 - E. Only a computer is used for communication
30. How many layers does the OSI model have?
- A. 3
 - B. 4
 - C. 5
 - D. 6
 - E. 7

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 type of MIS where manager's computer is connected to the organisation's network providing quick responses to requests to and from the manager, is known as
2. A company's private network that gives access to an authorised set of customers, partners, etc to a subset of information available is known as an
3.is the equipment that converts data signals from analog to digital and vice-versa in a data communication system
4. A computer network device that examines message received and directs it to specific device address for which message is intended is
5. The terminology that describes a publicly accessible interlinked webpages that share a single domain name is
6. The name that describes a website containing information where the information content is presented in reverse chronological order is
7. The terminology that describes the ability of an employee to complete work assignments from outside the traditional workplace by using telecommunication tools is
8. In system development, the development of a small version of the system with low functional capabilities but representing a working version of the system is referred to as
9. Criminality involving internet or computer networks generally is tagged as.....

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

- a.
 - i. What is a language processor? State **TWO** examples. (2 Marks)
 - ii. Enumerate **TWO** differences between a compiler and an interpreter. (2 Marks)
- b.
 - i. What is a utility software? State **TWO** examples. (3 Marks)
 - ii. Apart from language processor and utility software, state any other **TWO** computer system software. (1 Mark)

- c. Define the following:
- i. Off-the-shelf application package. (1½ Marks)
 - ii. Altered off-the-shelf application package. (1½ Marks)
 - iii. Custom tailored application package. (1½ Marks)
- (Total 12½ Marks)**

QUESTION 2

- a. i. Define the term 'peripheral' and state **ONE** example. (2 Marks)
- ii. State two ways on how peripherals are enabled for use on a computer system. (2 Marks)
- iii. Give three distinctions between impact printers and non-impact printers. (3 Marks)
- b. i. State **THREE** functions of the central processing unit (CPU). (4½ Marks)
- ii. State **ONE** relationship between the central processing unit and the main memory. (1 Mark)
- (Total 12½ Marks)**

QUESTION 3

State **THREE** advantages and **TWO** disadvantages for each of the following processing methods:

- a. Centralised processing. (2½ Marks)
 - b. Time Sharing. (2½ Marks)
 - c. Batch processing. (2½ Marks)
 - d. Decentralised processing. (2½ Marks)
 - e. Distributed processing. (2½ Marks)
- (Total 12½ Marks)**

QUESTION 4

- a. State **TWO** functions each of the following data transmission equipment
- i. Multiplexor (2 Marks)
 - ii. Router. (2 Marks)
 - iii. Repeater. (2 Marks)
- b. List sequentially the layers of the OSI model. (3½ Marks)
- c. State **THREE** advantages of a wired network over a wireless network. (3 Marks)
- (Total 12½ Marks)**

QUESTION 5

List two features of the following system development activities:

- a. Problem identification. (2½ Marks)
- b. Feasibility study. (2½ Marks)
- c. System investigation. (2½ Marks)
- d. System specification. (2½ Marks)
- e. System design. (2½ Marks)

(Total 12½ Marks)

QUESTION 6

- a. In scientific environment, how many binary digits can be found in:
 - i. 1 kilobyte. (1½ Marks)
 - ii. 1 megabyte. (1½ Marks)
 - iii. 1 gigabyte. (1½ Marks)
 - iv. 1 terrabyte. (1½ Marks)
 - v. 1 byte. (1½ Marks)
- b. State **THREE** advantages and **TWO** disadvantages of using computers systems. (5 Marks)

(Total 12½ Marks)

SECTION A: PART 1

MULTIPLE CHOICE SOLUTIONS

- 1. B
- 2. B
- 3. C
- 4. B
- 5. E
- 6. A
- 7. C
- 8. E
- 9. D
- 10. B
- 11. B
- 12. D
- 13. A
- 14. C
- 15. C
- 16. B
- 17. D
- 18. B

19. A
20. B
21. C
22. B
23. D
24. D
25. E
26. B
27. C
28. C
29. B
30. E

Examiner's comment

This part consists of thirty multiple choice questions and the performance is very satisfactory as over 60% of the candidates scored above 50% of the allotted scores.

The questions test every section of the syllabus and the standard of the question is adequate for the candidates.

SECTION A: PART II

SHORT-ANSWER SOLUTIONS

1. Executive Decision Support System / Executive Information System (EIS)
2. Extranet
3. MODEM – Modulator Demodulator
4. Switch
5. Website
6. Blog (Weblog)
7. Telecommuting
8. Prototyping
9. Cybercrime
10. Malware or Computer Virus
11. Compiler/Interpreter
12. Business to Consumer (B2C)
13. American Standard Code for Information Interchange
14. Port
15. Multiprocessing
16. Homepage
17. Feasibility study
18. Data Encryption
19. digital
20. Cloud

Examiner's comment

This part consists of twenty questions demanding short answers. It covers a significant part of the syllabus.

Unfortunately, the performance is not good.

Majority of the candidates score very low marks.

Candidates need to get more familiar with Information Technology (I.T) terms. This is the core of the examination.

SECTION B

SOLUTION 1

a.i. LANGUAGE PROCESSOR

A language processor is a program that can convert source code to object code. That is, it converts program written in other languages to machine language and vice versa. It is also known as language translator.

Examples are:

- i. Assembler
- ii. Compiler
- iii. Interpreter

ii. Differences between compiler and interpreter

S/N	COMPILER	INTERPRETER
1.	It translates all the line of instruction written in high level language into machine language at once	It translates program written in high level language into machine language statement by statement
2.	It converts the code ahead of time before the program runs	It translates the code when the program is running
3.	It takes in the entire program and requires a lot of time to analyse the source code	It takes a single line of code and requires little time to analyse it
4.	It runs faster	It runs slower
5.	It displays all errors after compilation therefore any code that has bug will not be compiled	It displays bugs (errors) of each line one after the other

6.	Errors are difficult to trace	Errors are very easy to trace
7.	Expensive	Less expensive
8.	Used for large programs	Not suitable for large programs
9.	Not suitable for interactive work	Suitable for interactive works
10.	Make use of more RAM space	Requires less RAM space

b. i. Utility software

It is a software that can be used to carry out day-to-day processing activities on computer. It is designed to help users manage, maintain, and optimizes the computer system.

Examples are:

1. Antivirus
2. Disk cleaner
3. Disk partitioner
4. Disk compressor
5. Screen saver
6. File manager
7. Back up software
8. Sorting program

ii. Examples of computer system software apart from language processor and utility software are:

1. Text editor
2. Loader
3. Linker
4. Device driver
5. Media player

c. i. Off the shelf application package

It is a software developed for users' immediate use. It is a comprehensive software solution that user can buy and use instantly.

ii. Altered off the shelf application package

It is a type of software solution that can be modified and customized after being purchased from the developer which means it can be customized by the user or a third party so as to better align with the needs of the user.

iii. Custom tailored application package

It is a software solution developed by the user himself or commissioned agent to be used by the user alone. It is also known as bespoke or user software.

Examiner's comment

This question tests the understanding of the candidates on the computer software. It demands for the meaning and examples of the language processor and the Utility Software.

It also demands for the definition of certain application packages.

The candidates are very familiar with this aspect of the syllabus and the performance is very encouraging as over 70% of the candidates who attempted this question score over 60% of the allocated mark.

SOLUTION 2

a) i. Peripheral

Peripherals are devices connected to the system unit in order to make it easier and faster to operate. It refers to devices that are connected to the computing unit but is not part of the core architecture of the system computing unit.

There are four major types of peripherals which are input devices, output devices, storage devices and communication unit which include dual input/output devices.

Examples are:

1. Printer
2. Scanner
3. Mouse
4. Joystick
5. Light pen
6. Digital camera
7. Speaker
8. Microphone
9. Projector
10. Webcam

ii. How peripherals are enabled on a computer System:

The peripherals must be plugged into the correct port on the computer system or connected wirelessly, then in order to make the device work optimally or smoothly the device driver must be installed in the system unit.

iii. Differences between impact printer and non-impact printer

S/N	IMPACT PRINTER	NON-IMPACT PRINTER
1	It is old technology	It is new technology
2	It is very slow	It is very fast
3	It does not have good quality output	It has good quality output
4	It makes noise when printing	It does not make noise when printing
5	It cannot print a page at a time	It can print a page at a time
6	It uses the technology of manual typewriter	It uses the technology of photocopy machine

b) i. Functions of Central processing unit

- Fetch instruction
- Decode instruction
- Execute instruction
- Store intermediate and final results
- Communicates with I/O devices

ii. Relationship between the central processing unit and the main memory

- Data to be processed by CPU is obtained from the memory
- Intermediate results of processing are passed to the memory from the CPU
- Final results of processing are passed to the memory from the CPU

Examiner's comment

This question tests the candidates' knowledge on the Computer Hardware System. It demands for the definition and examples of the peripheral equipment and the Central Processing Unit (CPU).

Majority of the candidates attempted this question, and the performance is good as over 60% of the candidates score over 50% of the allocated mark.

SOLUTION 3

a. Advantages of Centralised Processing

1. It enhances the effectiveness of the information system department
2. It increases the ability to maintain standards for quality, consistency and maintainability
3. It is less expensive
4. Data manipulation and reporting are faster
5. Security of data can be easily enforced at the centre
6. It prevents duplication of data from the departments
7. Easy resource management

Disadvantages of Centralised Processing

1. It results in delay in generating output.
2. Information from other departments has to be formatted and directed towards the central departments.
3. Other department cannot maintain independent information.
4. When the systems fail, it fails completely crippling all processing activities involving computers for all branches and departments.
5. Data from other departments are not secured
6. It uses highly skilled staff for maintenance which increase cost
7. Insecurity due to severe hacking

b. Advantages of Time-Sharing Processing

1. Memory is economically utilized
2. Computer time is economically used
3. No room for monopoly, since there is time slice for each job
4. It provides quick response
5. It avoids duplication of software
6. It reduces CPU idle time

Disadvantages of Time-Sharing Processing

1. It is relatively expensive in terms of acquisition, installation, programming and maintenance
2. A break down in the system would definitely affect all the terminals
3. It has problem of reliability

c. Advantages of Batch processing

1. handles large amounts of non-continuous data.
2. It can process data quickly,
3. minimize or eliminate the need for user interaction
4. improve the efficiency of job processing.

Disadvantages of Batch processing

1. Computer operators must be trained for using batch systems.
2. It is difficult to debug batch systems.
3. Batch systems are sometime costly.
4. If some job takes too much time i.e. if error occurs in job then other jobs will wait for unknown time.

d. Advantages of Decentralized processing

1. Reduces the burden on top executives
2. Facilitates diversification
3. To provide product and market emphasis
4. Executive Development
5. It promotes motivation
6. Better control and supervision
7. Quick Decision-Making

Disadvantages of Decentralized processing

1. Coordination Difficulty
2. Waste of Resources
3. Larger Interests of the Enterprise Neglected
4. Emergency Decision not Possible
5. Lack of Qualified Managers
6. Certain Activities Decentralization not Possible

e. Advantages of Distributed Processing

1. Easy to replace remote computers
2. Optimized processing
3. Easy to expand
4. Parallel processing
5. Better performance
6. Backup of data
7. Local data synchronization
8. It minimizes monopoly of information processing
9. It reduces delay in obtaining output from the computer
10. Information are provided as at when required

Disadvantages of Distributed Processing

1. Difficult to deploy
2. Difficult to maintain
3. Difficult to troubleshoot/debug
4. It is very expensive
5. Duplication of information by different units within the organization
6. There is reduction in control of data

Examiner's comment

This question tests the candidates' understanding of the computer processing techniques. It demands for the advantages and disadvantages of each processing technique.

Many candidates attempted this question, but the performance is poor, since less than 50% of the candidates score above 40% of the allocated mark.

The major pitfall is that candidates could not give precise advantages and disadvantages of these techniques. The distinctive nature of these techniques must be learnt using the ICAN INSIGHT and other recommended textbooks.

SOLUTION 4

a. (i) Functions of multiplexor

- It transmits multiple data packets simultaneously through only one channel.
- It generates a single output for data and signals.
- It routes only one selected data input to its single output.

(ii) Functions of router

- It routes data packet to their intended destination.
- It filters network address.
- It acts as an intermediary between networks.
- It forwards data packets between networks.
- It calculates the best way for data packet to reach its destination and forwards it accordingly.

(iii) Functions of repeater

- It cleans corrupt data.
- It regenerates or amplifies information and ensure that the data get to the final recipient without data loss.
- It can be used to extend the Wi-Fi signal strength away from the router.
- It receives network signal from the transmitter.
- Retiming and synchronization function.

b. Layers of OSI model:

- 1st layer - Physical layer
- 2nd layer - Data link layer
- 3rd layer - Network layer
- 4th layer - Transport layer
- 5th layer - Session layer
- 6th layer - Presentation layer
- 7th layer - Application layer

C. Advantages of wired network over wireless network

- i. It is very reliable due to physical connection therefore the chance of losing connection is very low.
- ii. It does not give room for interference with the connection because it is not visible from other wired network.
- iii. It is faster than wireless network because it will not be affected by unexpected network traffic.
- iv. It is more protected than wireless network because unauthorized users will not be able to connect to the network unless their device is connected using an Ethernet cable.
- v. The devices needed for a wired network have longer lifecycle than a wireless network.

Examiner's comment

This question tests the candidates' knowledge on communication devices. It demands for the functions of the Multiplexer, Router and Repeater. It also demands for the layers of the OSI model and the advantages of wired network over wireless network.

Only few candidates attempted this question on data transmission and the performance is very poor.

Data transmission is a major aspect of the syllabus.

The major pitfall is lack of understanding of the precise nature of these network devices.

For future examinations, candidates should consult ICAN INSIGHT and other recommended textbooks.

SOLUTION 5

a. Problem identification

This is the stage where the problem will be identified and the scope of implementation will be defined. It defines or clarifies the problems, change from an existing system is intended to solve, as well as outlining management requirements.

It also involves the development of clear, straightforward problem statements that can be linked directly with the specific goals and objectives which should clarify how the problem might prevent the achievement of these goals and objectives.

b. Feasibility study:

A feasibility study is the study carried out on an existing system and the reasons why the existing system should be changed to new system by considering the cost and benefits of the proposed system. It is a study carried

out on an existing system to evaluate the viability of a proposed project or software. It assists in identifying and assessing the opportunities and threats present in the proposed system, the resources needed for the project, and the chances of success.

c. System Investigation

This refers to investigating the existing system, in a given situation in order to identify the processes that need to be computerized. It involves interviews with staff to specifically identify what information is being processed, where it comes from, and where it goes. It investigates new approaches to existing problems, unbiased and careful questioning of whether system elements are related in the most effective and efficient manner. It uncovers answers to questions such as: What primary problems might a new or enhanced system solve?

d. System specification

This is formal document prepared which specifies the requirements of the system in terms of inputs, processes, outputs, costs, hardware, software and documentations.

System specification serves the following purposes:

1. It serves as a contract document between the Electronic Data Processing (EDP) and user department
2. It acts as a reference document during development, testing and implementation stages.
3. It is needed by Systems Analysts and programmers to enable design systems and write programs.
4. It serves as an operating manual for users

e. System design

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development.

Objectives of System Design

1. To design a system within the funds available to the organization.
2. To design a system which meet the user's needs.
3. To design a system that is simple in operation.
4. To design a system which processes data most accurately.
5. To design a system that is flexible for maintenance and which, provides for future expansion.

Examiner's comment

This question tests candidates' knowledge on Computer Systems Development. It demands for the features of the stages of the Computer Systems Development Life Cycle (SDLC). This is a major aspect of the syllabus and infact a major topic in Information Technology. Only Scanty number of candidates attempted this question and the performance was very woeful.

The major pitfall is lack of understanding of the precise definition of these stages of SDLC.

For future examinations, candidates are advised to use ICAN INSIGHT and other recommended texts.

SOLUTION 6

- a. (i) 1 kilobyte = 1×2^{10} bytes
 = 1×1024 bytes
 1 kilobyte = $1 \times 1024 \times 8$ binary digits (since 1 byte is 8 bits)
 = 8,192 binary digits
- (ii) 1 megabyte = 1×2^{20} bytes
 = $1 \times 1,048,576$ bytes
 = $1 \times 1,048,576 \times 8$ binary digits (since 1 byte is 8 bits)
 = 8,388,608 binary digits
- (iii) 1 gigabyte = 1×2^{30} bytes
 = $1 \times 1,073,741,824$ bytes
 = $1 \times 1,073,741,824 \times 8$ binary digits (since 1 byte is 8 bits)
 = 8,589,934,592 binary digits
- (iv) 1 terabyte = 1×2^{40} bytes
 = $1 \times 1,099,511,627,776$ bytes
 = $1 \times 1,099,511,627,776 \times 8$ binary digits (since 1 byte is 8 bits)
 = 8,796,093,022,208 binary digits
- (v) 1 byte = 8 bits
 = 8 binary digits

b. **Advantages and disadvantages of using computers**

Advantages

- Increase your productivity
- Connects you to the Internet
- Can store vast amounts of information and reduce waste

- Helps sort, organize, and search through information
- Get a better understanding of data and information
- High speed of operation
- Accuracy
- Reliability
- Versatility, etc.
- Reduce repetitive work in Word-processing

Disadvantages

- Extensive usage can lead to back ache and eye strain
- Short attention span and too much multitasking
- Can limit learning and create a dependency
- Potential loss of privacy
- Can cause lots of distractions when operating
- Components are fragile
- Can reduce jobs opportunities

Examiner's comment

This question tests the candidates' knowledge on the Arithmetic implication of conversion from one unit of data communication to another unit.

This is a very simple question for ordinary literate candidates but needs special handling for IT students.

Conversion in the "Open Market" is different from conversion in the scientific environment. This question demands for conversion in the scientific environment. Many candidates attempted it but answered it on the open market basis. The performance on this simple question is extremely woeful.

One 'Kilo' in the open market is $10^3 = 1000$ while it is $2^{10} = 1024$ in the scientific environment. Many candidates use the open market definition.

Candidates are advised to NOTE that accounting environment is an Open Market. If the environment is not mentioned, candidates should use the open market basis.

Question 6(b) is very simple and all the candidates that attempted it got very good scores.