COMPUTER STUDIES

PREAMBLE

This examination syllabus is developed from the National Curriculum for Senior Secondary School Computer Studies. It highlights the scope of the course for Computer Studies examinations at this level. Its structuring revolves around conceptual approach. The major thematic areas considered in the entire syllabus include:

- Computer fundamentals and evolution
- Computer hardware
- Computer Software
- Basic Computer Operations
- Computer Applications
- Managing Computer files
- Developing Problem-solving skills
- Information and Communication Technology
- Computer ethics and human issues

Each thematic area forms a concept which is further divided into sub-concepts. This examination syllabus is not a substitute for the teaching syllabus. Therefore, it does not replace the curriculum.

OBJECTIVES

The objectives of the syllabus are to test candidates' understanding, knowledge and acquisition of

- basic concepts of computer and its operations;
- manipulative, computational and problem-solving skills;
- application of software packages;
- operation of computer - related simple devices;
- on-line skills and their applications;
- safe attitudes and good practices on effective use of computer;
- potential for higher studies in Computer related areas.

EXAMINATION SCHEME

There will be three papers, Papers 1, 2 and 3, all of which must be taken. Papers 1 and 2 shall be a composite paper to be taken at one sitting.

> **Paper 1:** will consist of 50 multiple-choice objective questions all which are to be answered in 1 hour for 25 marks.
>
> **Paper 2:** will consist of five essay questions. Candidates will be required to answer any three in 1 hour for 30 marks.
>
> **Paper 3:** will test actual practical skills of school candidates and knowledge of practical work for private candidates. It will consist of three questions to be answered in 2 hours for 45 marks.

DETAILED SYLLABUS

TOPIC	CONTENT	NOTE
	• Features , components and uses of early computing devices: • Abacus;	

COMPUTER EVOLUTION • Computing Devices I (Pre-computing age-19th century)	• Slide Rule ; • Napier's bone; • Pascal's calculator; • Leibnitz multiplier; • Jacquad loom; • Charles Babbage's analytical engine; • Hollerith Census Machine; • Burrough's Machine. • Contribution of each of the founder of these devices to modern computers.	Trend of development in computing devices from one to the other.
• Computing Devices II (20th century to date)	Features, components and uses of: -ENIAC -EDVAC -UNIVAC 1 -Desktop Personal Computers -Laptop and Notebook computers -Palmtop.	Sizes and basic components should be considered in a comparative form.
FUNDAMENTALS OF COMPUTING • Overview of Computing System	- Definition of a Computer; - Two main constituents of a Computer • Computer hardware; • Computer software - Classification and examples of hardware and software. - Functional parts of a computer Characteristics of Computers - Electronic in nature; - Accuracy; - Speed; - Interactive etc.	Differences between hardware and software should be treated.
• Data and Information	- Definition and examples of data and information; • Differences between data and information.	

COMPUTER ETHICS AND HUMAN ISSUES Security and Ethics	• Sources of security breaches: • Virus, worms and Trojan horses; • Poor implementation of network; • Poor implementation or lack of ICT policies; • Carelessness- giving out personal and vital information on the net without careful screening. • Hackers, spammers etc.	Definition and effects of viruses and worms should be treated Definition of hackers and spammers should be treated

	• Preventive measures
	
	• Use of antivirus software e.g. Norton, McAfee, Avast, etc
	• Use of firewall;
	• Exercising care in giving out vital and personal information
	• Encryption
	• Proper Network Implementation and Polies
	• Using sites with web certificates
	• Exercising care in opening e-mail attachments
	
	• Legal Issues
	
	-Copyright (software copyright)
	-ownership right to
	  -text;
	  -images;
	  -audio;
	  -video
	       -Privacy of audio and video software
	       -Cyber crimes
	       -identify theft;
	       -internet fraud
	        -Hacking
		Explanation of firewall is required
		
		Definition of encryption should be treated

	Definition and examples of	

COMPUTER HARDWARE • Input devices	input devices The use of keyboard, mouse, scanner, joystick, light pen, etc Classification of keys on the keyboard into Function, Numeric, Alphabetic -Cursor keys -Features, function and operation of the mouse -Differences in keyboard, mouse, light pen and scanner	
Output Devices	-Definition and examples -Output devices: monitor, printer, speaker, plotter – Type, features and uses. -Differences between input and output devices -Similarities and differences in inkjet, laser and line printer	Examples and types of printers and monitors should be treated.
Central Processing Unit	Components of C.P.U.: Arithmetic and logic unit, control unit Function of ALU and Control Unit	Combination of the CPU and Memory Unit as system unit should be mentioned.
Memory Unit	Types of Memory Unit: Primaryand Secondary memory -Components of Primary memory unit: ROM and RAM Differences and uses of ROM and RAM Examples of Seconadry memory devices: floppy disk, hard disk, compact disk(CD), flash disk, digital-video-disk(DVD) Unit of storage in memory devices: bits, nibble, bytes, kilobytes, megabytes, gigabytes, terabytes Interconversion of unit of storage. -Comparative study of auxiliary storage devices in respect of their size, speed and technology	Physical identification of RAM and ROM devices required. Simple calculation involving the conversion from a unit to another Size and shape variation of floppy, flask/USB and compact disks should be noted
Logic Circuits	-Definition, types and uses of standard logic gate: AND, NOT, OR Symbols of AND, NOT, OR gates -Construction of truth table for standard logic gates -Differences between AND, NOT, OR gates	Logic equation for AND, NOT, OR gate should be treated. Uses of logic gates are required.

	-NAND and NOR as alternative logic gates should be treated Construction of Truth Table for NAND and NOR Construction of a simple comparator with -XOR(Exclusive OR) -NOR gate	Simple definition of a comparator is required.
COMPUTER SOFTWARE • System Software	• Definition and types of software • System software • Application software (ii) System software and their examples • Operating System e.g. MS Windows • Translator e.g. Compiler • Tools/ Utility e.g. Anti-virus • Examples of Operating System • MS Windows • Linux • UNIX • MS-DOS etc • Examples of Translators • Assemblers • Compilers • Interpreters • (v) Examples of Utility • Programs • Editor • Anti-virus etc	Differences between system and application software is required Operating systems of phones, ipad and other computerized devices should be treated. E.g. Android, Blackberry, etc. Differences among the translators should be noted Differences between GUI and Command line Operating Systems are required.
• Operating System	• Definition, types, examples and function of Operating	

	System	
	• Graphic User Interface(GUI)	
	• GUI (MS Windows, Linux, etc)	
	• Command line (MS DOS, UNIX, etc)	
• Application Software	• Definition and types of application software • Common Application Packages and their examples • Word processing(MS Windows) • Spreadsheet(MS Excel) • Database(MS Access) • Graphics • Packages for spreadsheet purpose • Accounting software • Payroll program • Banking software • Education management software • Statistical packages • Hospital management software	Differences between user application program and application packages are required

	• Definition and examples of word processing and word processor
	
	   -MS Word
	   -Wordstar
	   -WordPerfect
	
	• Features of Word Processing programs in general.
	• Application areas of Word Processing programs
	
	   -Office
	   -Publishing	

COMPUTER APPLICATION
 	
• Word Processing
	-Journalism
	-Education, etc.
	(iv) Features of MS
	    Word
	
	• Steps in activating and exiting
	  MS Word
	• Basic operations in MS Word
	
	      -Create
	      - Edit
	      - Save
	      -Retrieve
	      -Print
	      - Close
	(vii) Further operations
	    in MS Word
	      -move
	      -copy
	      -cut
	   -use of different
	   Types
	   and sizes of fonts
	    -formatting
	    -justifying
	    -search/explore
	    -spell checking
	    -file merging, etc
		Definition of each operational term is required.

	(i) Definition and examples of spreadsheet program
	    -VisiCALC
	    -MS Excel
	    -SuperCALC
	    -Autocad, etc
	(ii) Feature of
	   spreadsheet program
	(iii)Application areas of
	    Spreadsheet
	    programs:
	    -Accounting
	    -Statistical
	    calculation
	    -Student result, etc
	(iv)Features of MS Excel
	    Environment
	    -status bar
	    -menu bar
	    -formula bar, etc
	(v)Definition of basic
	   terms in MS
	   Excel
	    -worksheet
	    -workbook	

• Spreadsheet		

• Spreadsheet	-cells
	-cell ranges
	(vi)Data types in Excel
	    -Number
	    -Labels
	    -Formula
	(vii)Basic operation in
	    Excel
	    -Data Entry
	    -Saving
	    -Retrieve
	    Copy
	    -Move
	(viii)Arithmetic
	    calculations using
	    formula and built-in
	    function
	(ix)Additional operation
	    in Excel
	    -Editing
	    -Formatting
	    -Printing
	    -Drawing charts, etc
		Simple calculations with and without built-in function e.g. sum, average, etc
		
		Pie chart, histogram, bar chart, etc	

	(i)Definition of database
	  and database packages
	(ii)Examples of database
	  packages
	    -Dbase IV,
	    -Foxbase
	    -MS Access
	    -Oracle, etc
	(iii)Basic terms in
	  Database
	    -File
	    -Record
	    -Field
	    -Key
	(iv)Types of database
	  organization
	  methods and their
	  features
	    -Hierarchical
	    -Network
	    -Relational
	(v)Features of database
	  format
	    -Files designed as
	    tables
	    -Tables comprise
	    row and
	    columns		

• Database	-Row containing related information about a record. -Column containing specific type of information about a field. (vi)Steps in creating database -define the structure -indicate field type(numeric, character, data, text, etc) -enter data -save data (vii)Basic operations on already created database. Database -searching -modifying -sorting -reporting -selecting -inserting, etc	
• Graphics	(i)Definition of Graphics (ii)Examples of Graphics packages -Paint -Harvard graphics -Photoshop -Coreldraw, etc (iii)Features in activating and existing Coreldraw (iv)Simple design using Coreldraw -Business card -School logo -National flag -Invitation card -Certification, etc	
	(i)Definition of presentation package (ii)Examples of presentation package -MS PowerPoint, etc (iii)Features of PowerPoint	

● Presentation package	environment
	(iv)Steps in activating
	  and exiting
	  PowerPoint
	(v)PowerPoint operation
	  -create new
	   presentation
	 -insert pictures, text,
	  graphs
	-animated contents
	-add new slide
	 -save presentation
	  -run slide show
	  -print presentation
	  -close presentation	

MANAGING COMPUTER FILES
 	
● Concept of Computer Files
	(i)Definition of some
	  terms
	  -computer file
	  -record
	  -field
	  -data item
	(ii)Types of data item
	  -numeric
	  -alphabetic
	  -alphanumeric
	(iii)File structure
	organisation
	(Data item—record—
	 file—database)
	(iv)Types of file
	  organization
	  -serial
	  -sequential
	  -index
	  -random
	(v) Methods of accessing
	  files
	  -serial
	  -sequential
	  -random
	(vi) File classification
	  -master file
	  -transaction file
	  -reference file
	(vii)Criteria for
	   classifying files:
	  -nature of
	  content(program
	  and data)
	   -organisation
	    method
	   -storage medium
		Differences among the
		organization methods are required

• Handling Computer Files	(i)Basic operation on computer files
	    -file
	    -delete
	    -retrieve
	    -insert
	    -copy
	    -view
	    -update
	    -open
	    -close
	(ii) Effect of file insecurity
	    -data loss
	    -data corruption
	    -data becomes unreliable
	(iii)Causes of data loss
	    -over-writing
	    -inadvertent deletion
	(iv)Methods of file security
	    -use of backup
	    -use of antivirus
	    -password
	    -proper labelling of storage devices, etc
	(v)Differences between computer files and manual files
	(vi)Advantages of computer files
	    -more secure
	    -fast to access,etc
	(vii)Disadvantages of computer files
	    -expensive to set up
	
	    -irregular supply of electricity
		File processing using BASIC programming is required.

BASIC COMPUTER OPERATIONS • Booting and shutting down process	(i) Description and types of booting process	

	of booting process
	(ii)Types of booting process
	   -cold booting
	   -warm booting
	(iii)Steps involved in :
	   -booting a computer;
	   -shutting down a computer
	(iv)Identification of features on a desktop
		Difference between cold and warm booting should be treated

• Computer Data Conversion	(i)Definition of registers, address, bus
	(ii)Types and functions of registers: MDR, CIR, SCR
	(iii)Differences between register and main memory
	(iv)Steps involved in how a computer converts data to required information (Input-Process-Output)
	(v)Factors affecting speed of data transfer:
	   -bus speed;
	   -bus width.
		Fetch-execute cycle is not required

	(i)What 'ICT' acronym stands for.
	(ii) Types of ICT
	   -Broadcasting
	   -Telecommunication
	   -Data Network
	   -Information Systems
	   -Satellite	

INFORMATION AND COMMUNICATION TECHNOLOGY(ICT) ● Communication Systems	Communications -Examples of Broadcasting 　-Radio broadcasting 　-Television broadcasting 　-Satellite system 　-Examples of Telecommunication 　-Public Switched Telephone Network(PSTN)-Landline 　-Mobile phone systems 　-Circuit Switched Packet Telephone System(CSPT) 　-Satellite telephone system 　-Fixed wireless telephone system 　-Examples of data networks 　-Personal Area Network(PAN) 　-Local Area Network(LAN) 　-Metropolitan Area Network(MAN) 　-Wide Area Network(WAN) 　-Internet 　-Examples of Information Systems 　-Data Processing System 　-Global Positioning System(GPS)	
● Application areas of ICT	(i)Application Areas of ICT include 　the following: 　-Teleconferencing 　-Video conferencing 　-Telecommuting 　-Telecomputing 　-Messaging 　-Information search, retrieval	

	and archival.
	(ii)ICT based gadgets
	  and their
	  operations
	    -Mobile phones
	    -Computers
	    -Fax machines
	    -Automated Teller
	      Machines(ATM)
	    -Dispensing
	      machines
	    -Point of Sale
	      Machines
	    - Automated Cash
	      Register(ACR)
	    -Radio sets
	    -Television sets, etc
		Definition and description of these terms are required

		Knowledge on the operations on these ICT-based gadgets is required.

(c)Internet	(i)Definition of Internet
	  and some
	   Internet terms:
	    -Homepage
	    -Browse
	    -Browser
	    -Chatroom
	    -Cybercafe
	    -HTTP
	    -HTML
	    -ISP
	    -Webpage
	    -Website,etc
		Demonstration of these terms through Internet access is required

	(ii)Types of internet
	   browsers
	    -Internet explorer
	    -Netscape navigator
	    -Opera
	    -Firefox
	    -Cometbird ,etc
		Access Internet through these browsers.

	(iii)Features of Internet
	   browsers:
	    -Title bar
	    -Menu bar
	    -Tool bar
	    -Address bar,etc
		Application of the features of Internet browser window is required

	(iv)Types of Internet
	   services
	    -Electronic mail (e-
	     mail)
	    -e-mail discussion
	    group
	    -Instant messaging
	    -Telnet
	    -Usenet
		Benefits of Internet to our society should be stressed

	-File Transfer Protocol(FTP) -Worldwide web(www) -Chatting, etc		

(d) Electronic Mail(e-mail)Services	(i)Definition of electronic mail
	(ii)E-mail Services:
	  -sending/receiving e-mail
	  -chatting, etc
	(iii)Steps involved in creating e-mail account
	(iv)Steps involved in opening mail box
	(v)Features in an e-mail address e.g. fmemail@fmegovng.org
	(vi)Definition and steps involved in chatting
		Procedure for sending and receiving e-mail is required	

(e)Networking	(i)Definition of a Computer Network
	(ii)Types of Network
	  -PAN
	  -LAN
	  -WAN
	  -MAN
	  -Internet
	(iii) Network topology
	  -Star
	  -Bus
	  -Ring
	(iv)Network devices
	  -Hub
	  -Modems
	  -Switches
	  -Routers
	  -Network Interface Card(NIC)
	(v)Advantages of Networking
	(i)What is the 'W.W.W.' acronym stands for
	(ii)Brief history of W.W.W.
	(iii)Basic terminologies:
	  -W.W.W.
	  -website
	  -webpage
		Differences in the various topologies should be treated
		
		Knowledge of "Bridge" as a networking device is required.	

(f) Introduction to Worldwide web (W.W.W.)	-homepage
	-protocol, etc
	(iv)Protocol
	    -HTTP
	    -HTML
	(v)Uses/benefits of www
	(vi)Navigating through
	  websites
	www.waeconline.org
	   -www.itbeginswithu.org
	   -www.servenigeria.com
	   -www.phillipemeagwali.com
	   -www.jambonline.org
	(vii)Difference between
	  e-mail and website
	  address features:
	e.g.www.waeconline.org and
	waec@yahoo.com
	(viii)Software for web
	  development
	  -Frontpage
	  - etc
		Nigeria's contribution to www should be mentioned
		
		Use of HTTP and HTML should be mentioned
		
		Visits to these websites are essential

(g) Cables and Connectors	(i)Types of Network Cables and
	  Connectors
	  -Cables: Twisted pair,
	  coaxial, fibre optic,
	  telephone
	  -Connectors: RJ45, RJ11, T-
	  connectors
	(ii)Types of Computer Cables
	  and Connector
	  -Cables:Power cables
	  Data cables
	  – Printer
	Cable,universal serial
	  bus(USB), monitor
	  cable, serial cable
	  -Connectors: Male and
	  female
		Identification of different Network Cables Connectors should be treated

DEVELOPING PROBLEM-SOLVING SKILLS
 	
• Programming Language(PL)
	(i) Programming Language: Definition, examples, levels and features:
	(ii)Levels and examples of programming language
	  -Machine Language(ML) ,
	  e.g.100011001
	  -Low Level	

	Language(LLL),
	    e.g. Assembly Language
	-High Level
	Language(HLL)
	e.g. BASIC,C++, FORTRAN,
	etc.
	(iii)Comparison of ML,
	    LLL, HLL.
	(iv)Advantages and
	   disadvantages of ML,
	   LLL and HLL.	

(b)High Level
   Languages
	(i) Definition and
	   examples
	(ii)Classification of HLL
	  as
	  -Scientific
	  -Gen-purpose
	  -Business
	  -AI
	  -String processing
	  language(SPL)
	(iii)Features of BASIC,
	   C, PASCAL,
	   COBOL –
	   Comparative study
		Other programming languages
		such as Java, Python, etc. should
		be mentioned.

	(i)Definition of :
	Algorithhm and
	  Flowchart
	(ii)Functions of
	  Algorithm
	(iii)Characteristics of
	   Algorithm:
	  -Finite
	  -Effective
	  -Unambiguous
	(iv)Writing algorithm
	  for:
	  -Computing average
	  of a given
	  set of numbers
	  -Evaluation of
	   equation:
	   $y=a(b\text{-}c)^2/(d+2)$
	  -Computing out the
	  first ten odd
	  numbers, etc
	(v)Flowchart symbols:
	   - I/O, Process, decisions,
	etc
	(vi)Use of each flowchart
	symbol	

	(vii)Flowchart diagrams for given programming problem	
(c)Algorithm and Flowchart		
	(i)What BASIC acronym stands for	
	(ii)BASIC characteristics	
	(iii)Types of data	
	-variable	
	-constant/literal	
	-numeric	
	-string/alphanumeric	
	(iv)BASIC Statements	
	INPUT	
	PRINT, LPRINT	
	LET	
	END	
	REM	
	READ	Types of data should be treated
	DATA	
	(v)Arithmetic operators	
	(-,+,*,/)	
	(vi)Arithmetic Expressions	
	(vii)Evaluation of Arithmetic expressions	
	(viii)Simple BASIC Programs	
(d)BASIC Programming		
	(ix)Running Simple Programs	
		Program to calculate
		-Area of triangle
		-Area of a rectangle
		-Average of 3 numbers,etc
		The simple BASIC program developed should be executable on the computer.
	(i)Built-in functions in BASIC	
	-SQR(X)	
	-INT(X)	
	-SIN(X)	
	-ABS(X)	

	-RND(X)
	-COS(X)
	-TAN(X)
	-LOG(X)
	-EXP(X)
	(ii)BASIC Notation of
	-
	    -(x-y)/(x+y)
	    -(a+b) +c/sind
	    -e^{x+y} – sin(x+ny), etc
	(iii)BASIC program to
	   -find the square root
	   of numbers
	   -find square root of S,
	   round up to an
	   integer
	   -find the cosine of
	   known values
	   -find the tangent of
	given angles.
	   -plot sine wave curve
	(iv)Additional BASIC
	  Statements
	  -DIM Statement
	  -FOR – NEXT
	  statement
	  -WHILE-END
	  statement
	(v)Defining one-
	  dimensional array ,
	using DIM statement.
	(vi)Operating on Array
	  elements
	  -Input of array
	  -Output of array
	  -Arithmetic
	  operations on array
	(vii)Write BASIC
	  program to :
	  -store a vector of 10
	  numbers
	  -calculate the mean
	  of 100 numeric
	  values
	  -calculate area of 10
	  different
	  rectangles
	  -Compute the sum of
	  the first 100 integers
		Numbers of iterations should not exceed eight (8).	

• Systems Development Cycle	(i)Definition of system development cycle
	(ii)Description of system development cycle
	(iii)Stages in system development Cycle
	  -Preliminary study
	  -Feasibility
	  -Investigate study
	  -Analysis
	  -Design
	  -Implementation
	  -Maintenance
	  -Study review
	(iv)Description of each stage of system development cycle
	(v)Diagram of system development cycle	

(e)Program Development Cycle	(i)Definition of program
	(ii)Characteristics of a good Program
	  -Accuracy
	  -Readability
	  -Maintainability
	  -Efficiency
	  -Generality
	  -Clarity
	(iii)Precautions in developing a program
	  -Be stable, steady and patient
	  -No step skipping
	  -Follow order of execution
	(iv)Steps involved in program development
	  -Problem definition
	  -Problem analysis
	  -Flow chatting
	  -Desk checking
	  -Program coding
	  -Program compilation
	  -Program testing/debugging
	  -Program
		Flow diagram on how a compiler and interpreter works is required

	documentation
	(v)Description of each of
	stages in program
	development
	(vi)Examples of :
	    -Interpreted
	    program
	    (BASIC)
	    -Compiled program
	    (COBOL,
	    FORTRAN)	

- **LIST OF FACILITIES AND MAJOR EQUIPMENT/MATERIALS REQUIRED:**

- Computer set
- Laptops
- Scanners
- Printers
- Fax Machine
- GSM Phone
- Memory chips
- Hard disks
- Flash drives
- Internet connectivity
- DVD
- Compact disks
- Cables (power and data)
- Word processing packages, database package, BASIC program and

      CorelDraw