**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:

1. Computer fundamentals and evolution
2. Computer hardware
3. Computer Software
4. Basic Computer Operations
5. Computer Applications
6. Managing Computer files
7. Developing Problem-solving skills
8. Information and Communication Technology
9. 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

1. basic concepts of computer and its operations;
2. manipulative, computational and problem-solving skills;
3. application of software packages;
4. operation of computer - related simple devices;
5. on-line skills and their applications;
6. safe attitudes and good practices on effective use of computer;
7. 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**

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| **TOPIC** | **CONTENT** | **NOTE** |
| **COMPUTER EVOLUTION**1. Computing Devices I (Pre-computing age- 19th century)
 | 1. Features , components and uses of early computing devices:
* Abacus;
* Slide Rule ;
* Napier’s bone;
* Pascal’s calculator;
* Leibnitz multiplier;
* Jacquad loom;
* Charles Babbage’s analytical engine;
* Hollerith Census Machine;
* Burrough’s Machine.
1. Contribution of each of the founder of these devices to modern computers.
 |  Trend of development in computing devices from one to the other. |
| 1. 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** 1. 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  computerCharacteristics of Computers- Electronic in nature;- Accuracy;- Speed;- Interactive etc. | Differences between hardware and software should be treated. |
| 1. Data and Information
 | - Definition and  examples of data and  information;* Differences between data and information.
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| **COMPUTER ETHICS AND HUMAN ISSUES**Security and Ethics | 1. 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 treatedDefinition of hackers and spammers should be treated |
|  | 1. 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
1. 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 requiredDefinition of encryption should be treated |
| **COMPUTER HARDWARE**1. Input devices
 | Definition and examples of input devicesThe use of keyboard, mouse, scanner, joystick, light pen, etcClassification 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 unitFunction 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 RAMDifferences and uses of ROM and RAMExamples 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, terabytesInterconversion 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 anotherSize 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, ORSymbols of AND, NOT, OR gates-Construction of truth table for standard logic gates-Differences between AND, NOT, OR gates-NAND and NOR as alternative logic gates should be treatedConstruction of Truth Table for NAND and NORConstruction of a simple comparator with -XOR( Exclusive OR) -NOR gate | Logic equation for AND, NOT, OR gate should be treated.Uses of logic gates are required.Simple definition of a comparator is required. |
| **COMPUTER SOFTWARE**1. System Software
2. Operating System
 | 1. 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
1. Examples of Operating System
* MS Windows
* Linux
* UNIX
* MS-DOS etc
1. Examples of Translators
* Assemblers
* Compilers
* Interpreters
1. (v) Examples of Utility
2. Programs
* Editor
* Anti-virus etc
1. Definition, types, examples and function of Operating System
* Graphic User Interface(GUI)
* GUI (MS Windows, Linux, etc)
* Command line (MS DOS, UNIX, etc)
 | Differences between system and application software is requiredOperating 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. |
| 1. Application Software
 | 1. Definition and types of application software
2. Common Application

 Packages and their  examples* Word processing(MS Windows)
* Spreadsheet(MS Excel)
* Database(MS Access)
* Graphics
1. 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 |
| **COMPUTER APPLICATION**1. Word Processing
 | 1. Definition and examples of word processing and word processor

-MS Word-Wordstar-WordPerfect1. Features of Word Processing programs in general.
2. Application areas of Word Processing programs

-Office -Publishing -Journalism-Education, etc. (iv) Features of MS  Word1. Steps in activating and exiting MS Word
2. 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. |
| 1. Spreadsheet
 | (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 -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, etcPie chart, histogram, bar chart, etc |
| 1. Database
 | (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 -Row containing  related  information about a record. -Column  containing  specific type of  informationabout 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 |  |
| 1. 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 |  |
| 1. Presentation package
 | (i)Definition of presentationpackage(ii)Examples of presentation package-MS PowerPoint, etc(iii)Features of  PowerPoint  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**1. Concept of Computer Files
2. Handling 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(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 | Differences among the organization methods are requiredFile processing using BASIC programming is required. |
| **BASIC COMPUTER OPERATIONS**1. Booting and shutting down process
2. Computer Data Conversion
 | (i) Description and types  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(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. | Difference between cold and warm booting should be treatedFetch-execute cycle is not required |
| **INFORMATION AND COMMUNICATION TECHNOLOGY(ICT)**1. Communication Systems
 | (i)What‘ICT’ acronym stands for.(ii) Types of ICT  -Broadcasting  -Telecommunication -Data Network -Information  Systems -Satellite  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)  |  |
| 1. Application areas of ICT

(c)Internet (d) Electronic Mail(e- mail)Services | (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(i)Definition of Internet  and some Internet terms: -Homepage -Browse  -Browser -Chatroom -Cybercafe -HTTP -HTML -ISP -Webpage  -Website,etc(ii)Types of internet  browsers -Internet explorer -Netscape navigator -Opera -Firefox  -Cometbird ,etc(iii)Features of Internet  browsers:  -Title bar -Menu bar  -Tool bar -Address bar,etc(iv)Types of Internet  services -Electronic mail (e- mail) -e-mail discussion  group -Instant messaging -Telnet  -Usenet -File Transfer  Protocol(FTP) -Worldwide  web(www) -Chatting, etc(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 | Definition and description of these terms are requiredKnowledge on the operations on these ICT-based gadgets is required.Demonstration of these terms through Internet access is required  Access Internet through these browsers.Application of the features of Internet browser window is requiredBenefits of Internet to our society should be stressedProcedure for sending and receiving e-mail is required |
| (e)Networking(f) Introduction to Worldwide web (W.W.W.) | (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 -homepage -protocol, etc(iv)Protocol -HTTP -HTML(v)Uses/benefits of www(vi)Navigating through  websites [www.waeconline.org](http://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 | Differences in the various topologies should be treatedKnowledge of “Bridge” as a networking device is required.Nigeria’s contribution to www should be mentionedUse of HTTP and HTML should be mentionedVisits 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** 1. 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. |
| (c)Algorithm and  Flowchart(d)BASIC Programming  | (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-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  (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 DATA(v)Arithmetic operators (-,+,\*,/)(vi)Arithmetic  Expressions(vii)Evaluation of  Arithmetic  expressions(viii)Simple BASIC Programs(ix)Running Simple  Programs(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  -$\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$ -(x-y)/(x+y) -(a+b) +c/sind -ex+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  | Types of data should be treatedProgram to calculate  -Area of triangle -Area of a rectangle -Average of 3 numbers,etcThe simple BASIC program developed should be executable on the computer.Numbers of iterations should not exceed eight (8). |
| 1. 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  documentation(v)Description of each of  stages in program  development(vi)Examples of : -Interpreted  program (BASIC) -Compiled program (COBOL,  FORTRAN) | Flow diagram on how a compiler and interpreter works is required |

1. **LIST OF FACILITIES AND MAJOR EQUIPMENT/MATERIALS REQUIRED:**
2. Computer set
3. Laptops
4. Scanners
5. Printers
6. Fax Machine
7. GSM Phone
8. Memory chips
9. Hard disks
10. Flash drives
11. Internet connectivity
12. DVD
13. Compact disks
14. Cables (power and data)
15. Word processing packages, database package, BASIC program and

 CorelDraw