NATIONAL BOARD FOR TECHNICAL EDUCATION

CURRICULUM AND COURSE SPECIFICATIONS

NATIONAL DIPLOMA (ND)

IN

COMPUTER SCIENCE

GENERAL INFORMATION

1.0 Title of the Programme

The title of the programme and certificate awarded shall be National Diploma (ND) in Computer Science

2.0 Goal and Objectives of the programme

2.1 Goal

The National Diploma programme is designed to produce diplomates capable of applying computer in various areas of computing.

2.2 Objectives

Diplomates of this programme should be able to:-

i. Operate Computer systems
ii. Use various Computer packages
iii. Maintain hardware
iv. Solve simple hardware problems
v. Use various programming languages:
    - Visual BASIC
    - JAVA
    - C Programming
    - Unified Modelling Language (UML)
    - Hyper Text Mark-up Language
vi. Use Internet
vii. Set up Network
viii. Set up and manage an enterprise

3.0 Entry Requirements

3.1 National Diploma

The entry requirements into National Diploma Computer Science programme are as follows:-

a) Five credit level passes in GCE "O" level, Senior Secondary School Certificate (SSCE), NECO and NABTEB at not more than two sittings.

The five subjects must include:

I. English Language, Mathematics, Physics and two other subjects chosen from the following:
II. Economics, Geography,
III. Further Mathematics, Physics, Chemistry,
IV. Biology/Agricultural Science.
V. A Pass in Physics is compulsory for

VI. Computer Science.
VII. And Relevant NTC/NBC & NVC Trades

Plus JAMB Examination as resolved by National Policy on Education.

b) A pass in Computer Foundation Examination (CFE) of Computer Professionals Registration Council of Nigeria (CPN). The student must be prima fascia qualified as in (a) above.

4.0 Curriculum

4.1 The curriculum of the ND programme consists of four main components. These are:-

i. General studies/Education
ii. Foundation courses
iii. Professional courses
iv. Supervised Industrial work experience scheme (SIWES).

4.1.1 The General Education component shall include courses in

English Language
Communication
Citizenship Education
Entrepreneurship

The General Education component shall account for not more than 15% of total contact hours for the programme.

4.2 Foundation Courses include courses in Mathematics, and Statistics etc. The number of hours will vary with the programmes and may account for about 10 –15% of the total contact hours.

Professional Courses are courses, which give the student the theory and practical skills he needs to practice his field of calling at the technical/technologists level.

Student Industrial Work Experience Scheme (SIWES) shall be taken during the long vacation following the end of the second semester of the first year. See details of SIWES at paragraph 8.0.

5.0 Curriculum structure

5.1 ND programmes

The structure of the programme courses of four semesters of classroom, laboratory and workshop activities in the college – and a period (3-4 months) of supervised industrial work experience scheme (SIWES). Each semester shall have 17 weeks duration made up as follows:-

15 contact weeks of teaching, i.e. recitation, practical exercises, quizzes, test, etc; and

2 weeks for examinations and registration. SIWES shall take place at the end of the second semester of the first year.

6.0 Accreditation

Programme offered at the ND level shall be accredited by the NBTE before the diplomats can be awarded National Diploma certificate. Details about the process of accrediting a programme for the award of the ND is available from the Executive Secretary, National Board for Technical Education, P. M. B. 2239, Kaduna, Nigeria.

7.0 Conditions for the Award of the National Diploma

Institution offering accredited programme will award the National Diploma programme after passing the prescribed course work, examinations, diploma project and the supervised industrial work experience. Such candidates should have completed a minimum of between 72 and 80 semester credit units depending on the programme.

7.1 Unified Grading System

The unified grading system to be applied in scoring all course work, examinations, project, etc is as stated on table below:

Marked Range	**Letter Grade**	**WEIGHTING**
75 and above	A	4.0
70 – 74	AB	3.5
65 – 69	B	3.25
60- 64	BC	3.0
55 – 59	C	2.75
50-54	CD	2.50
45 – 49	D	2.25
40-44	E	2.0
Below 40%	F	0.0 0

7.2 Classification of Diplomas

The final Cumulative Grade Point Average (CGPA) shall be determined (calculated) and applied to the classification of the National Diploma as follows:

Class (Level of Pass)	**CGPA**
Distinction	3.50 and Above
Upper Credit	3.00 – 3.49
Lower Credit	2.50 – 2.99
Pass	2.00 – 2.49
Fail	Below 2.00

8.0 Guidance notes for Teachers teaching the programme

8.1 The new curriculum is drawn in unit courses. This is in keeping with the provisions of the National Policy on Education which stress the need to introduce the semester credit units which will enable a student who so wish to transfer the units already completed in an institution of similar standard from which he is transferring.

8.2 In designing the units, the principle of the modular system by product has been adopted; thus making each of the professional modules, when completed provides the diplomates with technician skills, which can be used for recognition as in self-employed or for employment purposes.

8.3 As the success of the credit unit system depends on the articulation of programmes between the institutions and industry, the curriculum content has been written in behavioural objectives, so that it is clear to all the expected performance of the student who successfully completed some of the courses or the diplomats of the programme. There is a slight departure in the presentation of the performance based curriculum which requires the conditions under which the performance are expected to be carried out and the criteria for the acceptable levels of performance. It is a deliberate attempt to further involve the staff of the department teaching the programme to write their own curriculum stating the conditions existing in their institution under which the performance can take place and to follow that with the criteria for determining an acceptable level of performance. The Academic Board of the institution may vet departmental submission on the final curriculum. Our aim is to continue to see to it that a solid internal

evaluation system exists in each institution for ensuring minimum standard and quality of education in the programmes offered throughout the polytechnic system.

8.4 The teaching of the theory and practical work should, as much as possible, be integrated. Practical exercises, especially those in professional courses and laboratory work should not be taught in isolation from the theory. For each course, there should be a balance of theory to practice in the ratio of about 40:60.

9.0 Guidelines on SIWES programme

9.1 For the smooth operation of the SIWES, the following guidelines shall apply:

Responsibility for placement of Students

a. Institutions offering the ND programme shall arrange to place the students in industry. By April 30 of each year, six copies of the master list showing where each student has been placed shall be submitted to the Executive Secretary, NBTE which shall, in turn, authenticate the list and forward it to the industrial Training Fund, Jos
b. The Placement officers should discuss and agree with industries on the following:
    I. A task inventory of what the students should be expected to experience during the period of attachment. It may be wise to adopt the one already approved for each field.
    II. The industry-based supervisor of the students during the period, likewise the institution based supervisor.
    III. The evaluation of the student during the period. It should be noted that the final grading of the student during the period of attachment should be weighted more on the evaluation by his industry-based supervisor.

9.2 Evaluation of Students during the SIWES

In the evaluation of the student, cognizance should be taken of the following items: a) Punctuality

b) Attendance
c) General attitude to work
d) Respect for authority
e) Interest in the field/technical area
f) Technical competence as a potential technician in his field.

9.3 Grading of SIWES

To ensure uniformity of grading scales, the institution should ensure that the uniform grading of students' work which has been agreed to by all polytechnics is adopted.

9.4 The Institution based Supervisor

The institution-based supervisor should initial the log book during each visit. This will enable him/her to check and determine to what extent the objectives of the scheme are being met and to assist students having any problems regarding the specific given to them by their industry-based supervisor.

9.5 Frequency of visit

Institution should ensure that students placed on attachment are visited within one month of their placement. Other visits shall be arranged so that:

I. There will be another visit six weeks after the first visit;
and

II. A final visit in the last month of the attachment.

9.6 Stipend for Students in SIWES

The rate of stipend payable shall be determined from time to time by the Federal Government after due consultation with the Federal Ministry of Education, the Industrial Training Fund and the NBTE.

9.7 SIWES As a component of the Curriculum

The completion of SIWES is important in the final determination of whether the student is successful in the programme or not. Failure in the SIWES is an indication that the student has not shown sufficient interest in the field or has no potential to become a skilled Technician in his/her field. The SIWES should be graded on a fail or pass basis. Where a student has satisfied all other requirements but failed SIWES, he may only be allowed to repeat another four months SIWES at his/her own expense

COMPUTER SCIENCE NATIONAL DIPLOMA

YEAR I SEMESTER I

S/N	Course Code	Course Title	L	P	CU	CH	Prerequisite
1	COM 111	Introduction to computing	2	2	3	4	
2	COM 112	Introduction to Digital Electronics	2	2	3	4	
3	COM 113	Introduction to Programming	2	2	4	4	
4	COM 114	Statistics for Computing 1	2	0	2	2	
5	COM 115	Computer application packages I	2	2	3	4	
6	MTH 111	Logic and Linear Algebra	2	0	2	2	
7	GNS 101	Use of English I	2	0	2	2	
8	GNS 102	Citizenship Education I	2	2	4	4	
			16	10	23	26	

COMPUTER SCIENCE NATIONAL DIPLOMA

YEAR I SEMESTER 2

S/N	Course Code	Course Title	L	P	CU	CH	Prerequisite
1	COM 121	Programming using C Language	2	2	3	4	COM 113
2	COM 122	Introduction to Internet	1	2	3	3	COM 111
3	COM 123	Programming Language using Java I	2	2	3	4	
4	COM 124	Data structure and Algorithms	2	1	3	3	COM 113
5	COM 125	Introduction to Systems Analysis and Design	2	1	3	3	None
7	COM 126	PC Upgrade & Maintenance	1	3	3	4	None
8	GNS 128	Citizenship Education II	2	0	2	2	GNS 127
9	GNS 102	Communication in English	2	0	2	2	
10	EED 126	Practice of Entrepreneurship	2	0	2	2	
11	GNS 228	Research Methods	2	0	2	2	
			18	10	25	28	

COMPUTER SCIENCE NATIONAL DIPLOMA

YEAR II SEMESTER I

S/N	Course Code	Course Title	L	P	CU	CH	Prerequisite
1	COM 211	Programming Language using Java II	2	2	4	4	COM 113
2	COM 212	Introduction to systems Programming	1	1	2	2	COM 111
3	COM 213	Unified Modelling Language (UML)	2	2	3	4	COM 113
4	COM 214	Computer Systems Troubleshooting	1	2	3	3	COM 111
5	COM 215	Computer Application Packages II	2	2	3	4	COM 111
6	COM 216	Statistics for Computing II	2	0	2	2	COM 123
7	SIW 219	SIWES	0	4	4	4	None
8	GNS 201	Use of English II	2	0	2	2	None
9	EED 216	Practice of Entrepreneurship	2	0	2	2	GNS 101
			15	18	25	27	

COMPUTER SCIENCE NATIONAL DIPLOMA
YEAR II SEMESTER 2

S/N	Course Code	Course Title	L	P	CU	CH	Prerequisite
1	COM 221	Basic Computer Networking	1	3	3	4	COM 113,
2	COM 222	Seminar on Computer and Society	2	-	2	2	COM 111
3	COM 223	Basic Hardware Maintenance	1	2	2	3	None
4	COM 224	Management Information system	2	1	2	3	COM 112
5	COM 225	Web Technology	2	3	3	5	COM 111, 103
6	COM 226	File Organisation and Management	2	1	2	3	COM 111
7	GNS 204	Communication in English II	2	0	2	2	COM 122
8	COM 227	Project	2	4	6	6	COM 216
			12	13	20	25	

Programme: (National Diploma) Computer Science	**Course Code: COM 111**	**Contact Hours: 4**
Course: Introduction to Computing	**Semester: 1**	**Theoretical: 2 hours /week**
Year: 1	**Pre-requisite:**	**Practical: 2 hours /week**
Goal: This course is designed to enable students to acquire a basic knowledge of computing		
General Objectives: On completion of this course the student, should be able to: 1.0 Understand the history, classification and impact of computers. 2.0 Understand the concept of computer hardware and software 3.0 Understand computer data processing systems. 4.0 Understand the procedures for computer and data preparation method. 5.0 Know security and safety procedures within a computer environment. 6.0 Know the concept of computer networks 7.0 Understand the use of the internet, its tools and resources		

	Theoretical Content			**Practical Content**		
	General Objective 1.0: Understand the history, classification and impact of Computers					
Week	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1	Define Computer Describe the basic components of the computer systems Describe the development of computers, in particular: Abacus, Pascal, Babbage, Hollerith, ENIAC etc. Classify computers according to generations from 1st – 5th generation (any subsequent generation)	Define computer and computer systems Trace the history of computer. Classify the computer according to generations	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Identify computer systems.	Guide students to identify computer systems	Discuss the history and generations of computers?
2	1.5 Distinguish between analogue, digital and hybrid computers	Explain types and classes of computers. Discuss the benefits	White Board. Charts, PC loaded with	Identify different classes of computer	Guide students in the identification of computer	Classify computer by type, size and purpose

	1.6 Classify computer by size and purpose 1.7 List the benefits of computers to the society. 1.8 Explain the social implication of computers on society in particular privacies and quality of life.	and implications of computers to the society.	Presentation software package and connected to multimedia Projector		systems	

	General Objective 2.0: Understand the concept of computer hardware and software					
3	2.1 Explain elements of computer systems 2.2 Describe computer hardware Components 2.3 Describe three major components of computer hardware (input, processing and output) 2.4 Describe the functions of the peripheral devices.	Explain the meaning of hardware, its various components and functions Explain various peripheral devices and their functions	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Identify the various components of a computer system	Guide students to identify the various component of a computer system	List the components of computer system and their various functions.
4	2.5 Describe the function of C.P.U. 2.6 List some auxiliary Units. 2.7 Describe the function of the auxiliary memory 2.8 Define bits, byte, nibble, and word and storage size.	Explain the functions of CPU and its components. Explain the auxiliary memory Explain measurement of storage	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Identify the various auxiliary units and distinguish between the memory sizes.	Guide the students on how to identify the various auxiliary units	What are the various measurement units of memory?

Weeks	General Objective 3.0: Know the Concept of Computer Software					
5	3.1 Explain software and its various types 3.2 Distinguish between the machine level, low – level and high – level languages. 3.3 Explain source and object programs. 3.4 Define a translator. 3.5 Explain types of translators: assembler, compiler, and interpreter. 3.6 Explain the use of bespoke application packages and user application software programs.	Explain system software and application software. Explain the different levels of languages used in computers. Explain the various types of translators and their functions. Explain computer packages and user application software	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Be able to differentiate between different levels of languages used in a computer system Identify various translators and computer packages on computer system	Guide the students on how to differentiate between different levels of languages. Guide students on how to identify various translators and computer packages on computer systems	What are the levels associated with a source and object code respectively? Differentiate the three translators and be able to identify the different application software.

Week/s	General Objective 4.0: Understand Computer Data Processing Systems					
6	4.1 Explain Data Processing 4. 2 Explain different data processing methods: batch processing, real time, time sharing and distributed processing etc. 4.3 Explain advantages and disadvantages of the various data processing methods	Explain offline and online concepts Explain different data processing methods with their advantages and disadvantages.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Identify life situations requiring the application of the various methods.	Guide students to identify real life situations requiring the various data processing methods	Mention situations requiring the use of batch, real-time, time sharing and distributed processing.

Week/s	General Objective 5.0: Know the procedures for Computer Operations and Data Preparation Method					
7	5.1 Explain the principles and procedures of operating the computer system: start up, fix up, format, and shut-down procedures 5.2 Explain system initialization and formatting of storage media.	Explain the principles and procedures of perform various computer operations.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector Compact Discs Flash Discs, External hard disk drives etc.	Boot and shut down computer system Format diskettes Copy , Edit, Save and other basic file operations Format diskettes and other removable media, and save documents into them.	Guide students on how to operate the computer system. Guide students to identify different storage media Guide the students on how to format storage media and save documents into them	Demonstrate how to perform various computer operations. What are the steps to take in formatting storage media such as diskettes, flash disks etc.

Week/s	General Objective 6.0: Understand Security and Safety Procedures within a Computer Environment					
8 -9	6.1 Explain Computer Security 6.2 Explain the need for computer room safety and security 6.3 Explain methods of preventing hazards fire, flooding sabotage etc 6.4 Explain Malware infections and Prevention e.g. virus and worms 6.5 Explain standard procedure for installing anti-virus 6.5 Explain data control techniques. 6.6 Explain computer system auditing 6.7Explain the user passwords and Username	Discuss Computer Security and the need for computer room safety and security Explain methods of preventing hazards fire, flooding sabotage etc. Discuss Malware infections and prevention Explain system security using user passwords and username Explain Computer Ergonomics	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Identify devices for computer room security Identify actions that could lead to fire hazards, sabotage, viral and worm infections etc. formulate passwords (weak, strong and very strong). Set up computer system following ergonomics standard	Guide students on how to secure computer room and computer systems Guide students to formulate simple password that they could easily remember Guide students to set up systems to meet ergonomics standard	What are the actions to take in case of fire or sabotage? List some hard to guess passwords

	6.8 Explain Computer Ergonomics					
Week/s	**General Objective 7 (COM 101): Understand the Concept of a Computer Network**					
10	7.1 Explain Computer Network and its importance 7.2 Describe different types of network topologies such as star, ring and bus.	Define computer network. Explain different types of network topology such as star, ring, bus etc.	White Board. Charts, Networked PCs loaded with Presentation software package and connected to multimedia Projector	Identify various computer topologies Point out organizations using the different topologies.	Guide students to identify various network topologies	Describe the different network topologies, their advantages and disadvantages?
11	7.3 Describe different types of network: LAN, MAN and WAN 7.4 Describe various LAN Components	Describe different types of networks: LAN, MAN and WAN Describe various LAN Components	White Board. Charts, Networked PCs loaded with Presentation software package and connected to multimedia Projector	Identify various types of computer Networks. Identify organizations using specific types of networks Identify various LAN components	Guide the students to identify LAN components, network types and organizations using them.	Describe situations whereby LAN, MAN and WAN are preferable.

Week/s	General Objective 8.0: Understand the use of the internet and contemporary computing					
12-15	8.1 Define Internet and explain its resources 8.2 Explain the processes involvedin browsing, searching the internet for information.	Explain Internet and its resources Explain browsing and searching the internet for information	White Board. PC loaded with Presentation software package and internet browser	Browse and search the Internet for information	Guide students to browse and search the Internet for information	Demonstrate how to browse and search the Internet for information
	8.3 Explain the concepts of Electronic Mail (e-mail), World Wide Web(www), Uniform Resource Locator (URL) etc. 8.4 Explain the concept of e-mail and acquiring email address 8.5 Explain the process of sending and receiving an e-mail. 8.6 Explain Internet Service Provider (ISP) and their functions	Explain the concept of e-mail, sending and receiving an e-mail. Explain Internet Service Provider (ISP) and their functions Discuss Cloud Computing, Internet of Things (IoT) etc.	White Board. PC loaded with Presentation software package and internet browser and connected to Multimedia projector	Compose and send E-mail. Make use of any facility, connected to cloud, IoT etc.	Guide students to compose and send E-mail. Guide students to use Cloud and IoT services	Demonstrate how to compose and send E-mail. Demonstrate how to use Cloud and IoT services

	8.7 Explain Cloud Computing, Internet of Things (IoT), etc.					

Assessment: Give details of assignments to be used:

Coursework/ Assignments %; Course test %; Practical %; Projects %; Examination %

Type of Assessment	Purpose and Nature of Assessment (COM 101)	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 2 progress tests for feed back.	20
Practical	At least 5 home works to be assessed by the teacher	20
Total		100

Recommended Textbooks & References:

Programme: (National Diploma) Computer Science	**Course Code: COM 112**	**Contact Hours: 4**
Course: Introduction to Digital Electronics	**Semester: 1**	**Theoretical: 2 hours /week**
Year: 1	**Pre-requisite: none**	**Practical: 2 hours /week**
Goal: This course is designed to enable students to acquire basic knowledge of and skills in digital electronics		
General Objectives: On completion of this course, the students should be able to 1.0 Understand number system, codes and code conversion 2,0 Know the fundamental of Boolean algebra 3.0 Understand the logic gates, addition and subtraction operations in the computer 4.0 Understand small-scale Integrated Circuits 5.0 Understand the concept and methodology of sequential circuit design 6.0 Understand counter and Data transfer		

	Theoretical Content			**Practical Content**		
	General Objective 1.0: Understand number system, codes and code conversion.					
Week	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1 - 3	1.1 Explain number systems. 1.2 Convert from one number system to another e.g. from binary to decimal and vice-versa 1.3 Explain code systems. 1.4 Explain the conversion from one coding system to another. 1.5 Describe BCD (8421), 2421, excess-3, gray codes, etc. 1.6 Describe the conversion from one code to another e.g. from BCD to excess-3 code.	Explain the number systems. Describe conversion from one code to another. Describe BCD, Excess-3, gray and 2421 codes. Describe the seven-segment display code.	PC loaded with Presentation package Multimedia Projector Logic gate simulator	Convert numbers from one base to another Demonstrate BCD Conversion or any other code system Identify seven-segments display code	Guide the students to carryout number system and codes conversion Guide students to construct seven-segment display code	Convert given numbers from Binary to Hexadecimal Convert from binary coded decimal (BCD) to Excess-3 code Construct seven-segment display code using common cathode or anode

	1.7 Describe the seven-segment display code.					
	General Objective 2.0: Know the fundamentals of Boolean algebra					
4 - 7	2.1 State the Boolean postulates: the Commutative , Associative, Distributive law, Identity, Negation , Redundancy laws, and De Morgan's theorem. 2.2 Explain truth tables 2.3 Explain how to form logic expressions from statements of conditions. 2.4 Explain how to minimize logic expressions algebraically. 2.5 Explain sum of product (SOP) and product of sum (POS) 2.6 Explain a Karnaugh map	Explain the Boolean postulates Explain with examples Boolean postulate's application. Explain how construct truth tables Explain how to design logic expressions from statements of condition. Using the stated Boolean postulates, explain the steps in minimizing	PC loaded with Presentation package Multimedia Projector Logic gate simulator	Apply Boolean postulates to real life problems Use Boolean postulates to minimize complex expressions Construct truth tables variables Apply Karnaugh map to minimize logic expressions	Guide the students on how to prove the Boolean postulates as well as De Morgan's theorem Aid students to Guide students how to construct truth tables Aid students to construct Karnaugh map Demonstrate the use of Karnaugh map to resolve complex logic expressions	State the Boolean postulates Construct truth table for De Morgan's theorem State the steps required to minimize algebraic expressions using the Karnaugh map

	(K.Map) 2.7 Explain how to construct a .K Map for 2,3,4 variables 2.8 Explain how to minimize a logic expression using a k-map	logic expressions algebraically, thereafter, demonstrate the action. Using the stated Boolean postulates, explain the SOP and POS 2.6 Define and discuss the Karnaugh map. 2.8 Progressively design a Karnaugh map for 2, 3 and 4 variables and explain each step. 2.9 Use the principles in K-Map and minimize logic expression.				

	General Objective 3.0: Know the implementation of logic gates, addition and subtraction operations in the computer					
8	3.1 Construction of logic gates (AND, OR, NOR, XOR, NAND, INVERT/NOT, XNOR) 3.2 Design of combinational logic circuits of 4 bit adder/subtractor hardware	Explain the construction of logic gates Explain the design of Half Adder. Explain the design of Full Adder. Explain the serial adder Explain the parallel adder	PC loaded with Presentation package Multimedia Projector Logic gate simulator	Construct and implement various logic gates Construct and implement various adder hardware. (Half, Full, serial, parallel adder)	Aid in construction of logic gates Aid in construction of Adder and Subtractor Hardware	Identify different types of logic gates Identify different types of adder hardware
	General Objective 4.0: Understand small-scale Integrated Circuit					
9 - 11	4.1 List the various terminologies used to characterize integrated circuits e.g. fan-out, fan–in threshold, heat dissipation, noise margin etc. 4.2 Explain pin connections/arrangement of ICs.	Explain the various terminologies used to characterize integrated circuits (ICs). Describe some pin	PC loaded with Presentation package Multimedia Projector	Understand integrated circuits technologies and its implementations	Assist students to simulate the construction of ICs	Identify the basic integrated circuits Evaluate the speed of various

	4.3 Explain the technology of Transistor-Transistor Logic (TTL). 4.4 Explain all the characteristics of DTL, Emitter Couple Logic (ECL) technologies. 4.5 Explain pulse and pulse shaping.	arrangement of ICs (Dual in-line, straight-line and circular) and apply same to solve given problem. Draw, explain and construct electronic circuits using DTL (Diode-Transistor Logic). Explain the limitations of DTL gates. Explain and demonstrate the applications of the up and down followers. Draw and construct the electronic circuits of logic expressions using	Logic gate simulator			ICs

		DTL. Draw and explain the structure of TTL, ECL, and Enhanced Extended Loop (EEL) and then construct the electronic circuit.				
	General Objective 5.0: Understand the concept and methodology of sequential circuit design					
12	5.1 The design and operations of various bi-stables (flip-flops) 5.2 Digital pulse and methods of pulse shaping	Explain the design and operations of various flip-flop (R.S., D-Type, J-K,) - Explain the digital pulse and shaping.	PC loaded with Presentation package Multimedia Projector Logic gate simulator	Know the usefulness of bi-stables as a storage device in computer memory	Help the students to design and construct flip-flop bi-stables	Identify how flip-flop can be implemented

	General Objective 6.0: Understand counter and Data transfer.					
13 -15	6.1 Describe the operations of the basic binary Ripple counter. 6.2 Describe the operation of the Modulus counter. 6.3 Describe a shift and transfer of data through registers.	Describe the operation of the basic binary Ripple counter. Describe the operation of the Count-down counter. Describe and explain the operation of the Modulus counter using Mod-6 as an example counters. Define and explain a shift, a shift-right and a shift- round register. Describe the parallel transfer of	PC loaded with Presentation package Multimedia Projector Logic gate simulator	Understand how counters are used in digital electronics for counting specific events happening in the circuits	Aid the students to implement different counters in digital electronics and application of input-pulses as utilized in almost all digital electronic systems	Identify the different types of counters How are counters used in counting in digital electronics

		data through registers. Describe a serial transfer of data through registers. Describe the serial-parallel transfer operations.				

Assessment: Give details of assignments to be used: Coursework/Assignments 10%; Course test 10%; Practical 20%; Examination 60%

Type of Assessment	Purpose and Nature of Assessment **(COM 112)**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feedback.	10
Practical / Projects	To be assessed by the teacher	20
Course work/ assignment	To be assessed by the teacher	10
Total		100

Programme: (National Diploma) Computer Science	**Course Code: COM 113**	**Contact Hours: 4**
Course: Introduction to Programming	**Semester: 1**	**Theoretical: 2 hours /week**
Year: 1	**Pre-requisite:**	**Practical: 2 hours /week**

Goal: This course is designed to enable students to acquire basic knowledge of programming

General Objectives: On completion of this course the students should be able to:

1.0 Understand features of a good program.

2.0 Understand the concept of Algorithms and flowcharting.

3.0 Understand the principles of designing algorithms for common programming problem.

4.0 Understand General modular program design principles.

5.0 Understand the procedure in solving programming problems.

6.0 Understand the various levels of programming language.

7.0 Understand the concept of debugging and maintaining program.

8.0 Understand good programming practices.

9.0 Understand the concept of object oriented programming

	Theoretical Content			**Practical Content**		
	General Objective 1.0: Understand features of a good program.					
Week	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1	1.1 Explain features of good program (Accuracy, maintenance, efficiency, reliability, etc.) 1.2 Explain the steps involved in developing a good program (Defining the program, Analyzing the program, Designing the algorithm, coding or writing the program, test execution, debugging, final documentation)	Define and explain program with concrete illustration. Explain in details the features and steps involved in developing a good program.	Charts and PC loaded with Power point connected to multimedia Projector On-line Notes	Identify the steps involved in developing good programs	Explain each steps involved in developing good programs	List and explain the steps involved in developing good programs
	General Objective 2.0: Understand the concept of Algorithms and flowcharting					
2 - 4	2.1 Define algorithm on a general basic. 2.2 Explain features of an algorithms (e.g. precision,	Describe the concept of algorithm with its features.	Charts and PC loaded with Power point connected to	Identify the steps involved in developing good algorithm	Identify and explain the steps in developing an algorithm	Explain algorithm and its characteristic Draw a flowchart

	uniqueness, effective, finite) 2.3 Describe the methods of algorithm representation of English language, Flowchart, pseudo code, decision table, data flow diagram (DFD) etc. 2.4 Describe main ANSI flowcharts as describe algorithms. 2.5 Draw flowcharts to implement some simple programming tasks	Give concrete examples of algorithms. Illustrate the various methods of processing algorithm with examples.	multimedia Projector Online note	Know various algorithmic representations	Demonstrate the construction of flowchart, DFD and decision table in problem solving	to find the sum and average of specific numbers
	General Objective 3.0: Understand the principles of designing algorithms for common programming problem					
5-6	3.1 Design algorithm for problems involving. 3.2 Strictly sequence control structure 3.3 Selection control structure	Show the Structure and how to develop simple programming problems involving each of basic control structure. Give class exercise, assignments to	Charts and PC loaded with Power point connected to multimedia Projector Online	Understand the control structure and its uses	Demonstrate the use of algorithm in solving specific problems Guide the students on how to use the	Explain the use of algorithm in problems solving Explain the various control structures

	3.4 Iteration control structure	practice on. Correct the algorithm developed by the students.	books and textbooks		various control structures	
	General Objective 4.0: Understand General modular program design principles					
7-8	4.1 Explain modular programming concept. 4.2 Explain top-down design technique. 4.3 Illustrate program design with program structure charts, hierarchical, relational and Network. 4.4 Demonstrate each of the 4.1 –43 above.	Discuss the concept and advantage of modular programming Discuss and illustrate with programs e.g. payroll, student records, result computation, etc. Top-down design principles.	ditto	Understand and explain the concept of modular programming, top-down design, program structures like hierarchical, relational and network	Demonstrate the concept of modular programming; top-down design and other program structures Guide the students in developing specific program to solve problems	Explain modular programming using top-down design technique Explain program design structures
	General Objective 5.0: Understand the procedure in solving programming problems					
9	5.1 Identify the problem and confirm it solvable.	Discuss the Stages involved in developing program.	ditto	identify the stages involve in developing program and apply it in real life situation	Demonstrate the use of algorithm, program coding, testing and	Explain the stages involved in problem solving

	5.2 Describe algorithm for the chosen method of solution with flowcharts or pseudo codes. 5.3 Code the algorithm by using a suitable programming language. 5.4 Test and run the program on the computer.	Demonstrate the stages above with real life program possible.		Identify the use of algorithm, code program and implement Design algorithm for the chosen method of solution with flowcharts or pseudo codes	running real life programs	Explain the use of algorithm and program coding. Design and run program to solve real life programs.
	General Objective 6.0 Understand the various levels of programming language					
10 -11	6.1 Explain machine, low-level and High level languages 6.2 Give examples of the languages stated above. 6.3 Explain the distinguishing features of languages in 6.1. 6.4 Distinguish between systems commands and program statements.	Discuss the features of machine, low level, and high level languages. Highlight the advantages and disadvantage of level of programming layouts	ditto	identify the various levels of programming languages and its features identify the difference between system command programming statements	Guide students in the identification of various programming levels and its features And system command program statements	Explain the various levels of computer language and its features Distinguish between system command program statements

	General Objective 7.0: Understand the concept of debugging and maintain program					
12	7.1 Explain debugging. 7.2 Explain the sources of bugs in a program 7.3 Explain different types of errors (syntax, run-time and logical errors) 7.4 Explain the techniques of locating bugs in a program	Discuss various methods of debugging, aids. Highlight classes of debugging Differentiate between debugging and maintenance. Discuss sources of bugs in program	PC loaded with traditional languages such as Cobol, Fortran etc. and OO languages Such as VB, Java, C++, C# connected to a projector	Demonstrate debugging and debugging techniques identify the sources of bugs identify different types of errors in a program	Demonstrate debugging and debugging techniques Guide students in the identification of different types of errors in a program and how handle them	Explain debugging and debugging techniques Identify errors in a source code

	General Objective 8.0: To understand good programming practices					
13 - 14	8.1 Explain structured approach to flowcharting and program development. 8.2 Explain program documentation techniques, data flow diagram and pseudo code. 8.3 Explain graphic user interface, GUI. 8.4 Explain interactive processing.	Discuss structured approach to flowcharting and programming	PC loaded with traditional languages such as Cobol, Fortran, and C etc. and OO languages Such as VB, Java, C++, C# connected to a projector	Use flowcharts to develop programs Use program documentation DFD and pseudo code Use interactive processing	Demonstrate program development from flowcharts, pseudo code and DFD	Explain flowcharting for program development Explain interactive processing
	General Objective 9.0: Understand the concept of object oriented programming					
15	9.1 Explain the concept of Object Oriented Programming (OOP). 9.2 Explain the features of OOP(Encapsulation, Inheritance, Polymorphism and	Explain Object Oriented Programming (OOP). State the features of OOP	PC loaded with traditional languages such as Cobol, Fortran etc. and OOP	Use the concept of properties, events, methods and classes Explain the features of OOP	Write codes in Visual Basic to demonstrate the concept of OOP Write codes in	Explain the concept of OOP Write visual basic programs to solve common problems

	Abstraction) 9.3 Explain the concept of properties, events, methods (function and sub procedure) and classes. 9.4 Explain how OOP is implemented in Visual Basic	Explain the concept of properties, events, methods and classes Discuss methods, properties events, and classes. State The advantages of OOP	languages Such as VB, Java, C++, C# connected to a projector	Identify the above features and how they are implemented in Visual Basic	visual basic to solve common problems Demonstrate extensively how visual basic can be used in problem solving	Identify the methods, properties, events and classes in the program written above

Assessment: Give details of assignments to be used: Coursework/ Assignments %; Course test 20%; Practical %; Project 20%; Examination 60%

Type of Assessment	Purpose and Nature of Assessment **(COM 113)**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feedback.	20
Practical / Projects	To be assessed by the teacher	20
Total		100

Programme: Computer Science (National Diploma)	**Course Code: COM 114**	**Contact Hours: 3**
Course Title: Statistics for Computing 1	**Semester: 1**	**Theoretical: 2 hour /week**
Year: 1	**Pre-requisite:**	**Practical: 1 hour /week**

Goal: This course is designed to enable students to acquire a basic knowledge of Statistics for Computing.

General Objectives: On completion of this course the diplomate, should be able to:

1. Understand the concept of statistics, nature of statistical data, their types and uses
2. Understand the procedures for collection of statistical data
3. Understand the methods of data compilation
4. Understand the methods of data presentation
5. Understand the concept of set and set operations
6. Understand the concept of Permutations and Combination as used in probability
7. Understand the basic concept of probability

	Theoretical Content			**Practical Content**		
	General Objective 1: Understand the concept of statistics, nature of statistical data, their types and uses					
Week	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
1	1.1 Define Statistics 1.2 Identify various sources of statistical data 1.3 State important uses of statistics 1.4 Explain the importance of computer in statistics	Explain the nature of statistics Explain various sources of statistical data and their uses (e.g. social, economic, health, biological, demographic and industrial) Explain the importance of computer in statistics	Books of recorded statistics Internet Multi media PCs			Define Statistics Identify sources of statistical data
2	1.5 State uses of statistical data 1.6 Explain quantitative data 1.7 Identify various scales of measurement	Explain uses of data Explain nature of quantitative data Explain various scales of measurement (e.g. nominal, interval, ratio and ordinal).	Books of recorded statistics Internet Multi media PCs			Describe the uses of statistical and quantitative data
	General Objective 2: Understand the procedures for collection of statistical data					

3	2.1 Describe basic sampling techniques: Random, Systematic, Stratified, Quota Sampling etc 2.2 Distinguish between the following methods of data collection: Interviews. Questionnaires, Observation and Surveys. 2.3 Use computer system to generate data	Explain basic sampling techniques Define and Explain various methods of data collection Describe how to generate data using computer system	Textbooks Lecture notes Internet PCs	Demonstrate the concept of random sampling using simple data Use computer system to generate data	Demonstrate simple random sampling Illustrate how to generate data online	Describe any two basic sampling techniques Explain the various methods of data generation and collection
4	2.3 Design questionnaires and formats for data collection 2.5 Identify the types of errors that arise in data collection. 2.6 Identify IT tools for collecting data	Explain the process of designing a questionnaire. Explain different errors in data collection. Explain the IT tools for collecting data	Sample of questionnaires Textbooks PCs Internet	Design a simple questionnaire	Illustrate with example format of a simple questionnaire	Explain how to design a simple questionnaire and outline problems in data collection
	General Objective 3: Understand methods of data compilation					
5	3.1 Identify the different categories of collected data 3.2 Classify the data into the various categories	Explain different categories of data collected Explain how to classify the various categories of data	Textbooks Spread sheet package PCs	Categorise various data collected	Supervise student on categorizing the collected data	Identify and classify different categories of data using spread sheet package

6	3.3 Verify the sorted data using computer system 3.4 Identify the different data storage methods 3.5 Compile discrete and continuous data	Explain how to sort data using computer system Explain different storage media Explain discrete and continuous data	Textbooks Spread sheet Hard disk, Flash drive, CD, internet etc	Illustrate how to sort and store data Illustrate how to compile discrete and continuous data	Illustrate how to store data in storage media Demonstrate how to compile data	Explain how to sort and store data Explain how to compile discrete and continuous data
	General Objective 4 : Understand the methods of data presentation					
7	4.1 Identify the various types of statistical table (frequency and contingency tables etc) Informative tables, table for reference, complex tables) 4.2 Explain various methods of data presentation (tabular, graphical, pictorial, text etc)	Explain various types of statistical tables Explain various methods of data presentation	Textbooks Statistical tables Multi media PCs Suitable computer packages, Charts	Identify the various types of statistical tables Demonstrate various methods of data presentation	Demonstrate how to identify the various types of statistical tables Present data using various methods	Enumerate the various types of statistical tables Use any computer package to present data
8	4.3 Explain how to construct scatter diagrams, frequency tables and graphs. 4.4 Explain merits and demerits of chart/diagrams above.	Explain how to construct scatter diagrams, frequency tables and graphs Explain merits and demerits of chart/diagrams	Statistical tables, PCs, Charts, spread sheet	Construct scattered diagrams, frequency tables and graphs	Demonstrate by examples how to construct scattered diagrams, frequency tables and graphs	Explain how to construct frequency tables and graphs Enumerate the merits and demerits of charts and diagrams

General Objective 5: Understand the concept of set and set operations						
9	5.1 Define a set and set notation '{ }' and examples 5.2 Define a set, a subset and use set notation such as 'A' 5.3 Define elements of a set with notation 'A' 5.4 State the Law of Algebra of set 5.5 Explain set operations using Venn diagram 5.6 Prove some simple set identities	Explain and discuss examples to illustrate sets, subsets, and notations for sets and subsets	Textbooks and lecture notes	Generate sets of data and classify them as sets, subsets; using appropriate notations for sets and subsets.	Supervise exercises and assess students' work	Define a set, subset and set notation. Explain set operations using Venn diagram
General Objective 6: Understand the concept of Permutations and Combination as used in probability						
10	6.1 Define Permutation and Combination with examples 6.2 State and prove the fundamental principle of permutations	Explain and give examples of Permutation and Combination Explain the fundamental principle of permutation	Textbooks and lecture notes			Define Permutation and Combination Explain the fundamental principle of Permutation
11	6.3 Explain permutation Problem with restriction on Object in which object is repeated and problems of N identical Object. 6.4 Explain problems of combination with restrictions on some objects and solve problems	Explain the problems with permutation on Object in which object is repeated Explain the problems of combination with restrictions on some objects	Textbooks and lecture notes			Explain the problems with Permutation and Combination

	of "n" different objects	Explain the processes of solving problems of "n" different objects				
	General Objective 7: Understand the basic concept of probability					
12	7.1 Define an event 7.2 Define probability of an event 7.3 State the properties of an event	Describe an event Explain probability and properties of an event	Text books PCs Coins and coin tossers Simulation software	Demonstrate probability of an event using coins, colored balls, dices and the simulation software	Group students to simulate events	Describe an event and its probability
13	7.4 Calculate the probability of an event 7.5 Define probability as a function of sample space	Demonstrate how to calculate the probability of an event Explain the concept of probability as a function of sample space	Text book Calculators	Calculate the probability of an event Demonstrate the concept of probability as a function of sample space	Demonstrate how to calculate the probability of an event and the concept of probability as a function of sample space	Calculate the probability of an event Define probability as a function of sample space
14	7.6 Explain the various probability-sampling methods 7.7 State addition law of probability	Explain the various probability sampling methods Explain addition law of probability Explain multiplication	Text books PCs Calculator Spread sheet	Identify the various probability sampling methods Apply addition law of probability Apply	Guide students in the identification of the various probability sampling methods Demonstrate how to apply addition law of probability Demonstrate how to apply multiplication law of probability	State the different probability sampling methods Apply the addition and multiplication law of probability to

	7.8 State multiplication law of probability	law of probability		multiplication law of probability		solve problems
15	7.9 Collect data using the sampling methods	Explain how to collect data using the sampling methods	PCs Textbook spread sheet	Collect data using the various sampling methods	Guide students to collect data using the various sampling methods	Apply any sampling methods to collect data

Assessment: Give details of assignments to be used:
Coursework/ Assignments %; Course test %; Practical %; Projects %; Examination %

Type of Assessment	Purpose and Nature of Assessment **COM 114**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feed back.	10
Practical	At least 10 home works to be assessed by the teacher	30
Total		100

Recommended Textbooks & References:

PROGRAMME: ND Computer Science						
COURSE: Computer Application Packages l			**COURSE CODE**: COM 115	**CONTACT HOURS:** WEEKS **HOURS -**		
GOAL: This course is designed to introduce the student to basic computer packages.						
COURSE SPECIFICATION: THEORETICAL CONTENT				**COURSE SPECIFICATION:** PRACTICAL CONTENT		
Week						
	General Objectives: On completion of this course, the diplomate will be able to: 1. Understand What are Application Packages, Apps and their functions 2. Understand Basic Typing Skills 3. Understand Word Processing Package and how to work with it. 4. Understand Spreadsheet Package and how to work with it. 5. Understand Presentation Package and how to use it. 6. Understand App Culture					

PROGRAMME: National Diploma Computer Science						
COURSE: **Computer Application Packages l**		COURSE CODE: COM 115	CONTACT HRS:			
Course Specification: Theoretical Content				Practical Content		
	General Objective 1. Understand Common Apps/Application features and functions					
Week	**Specific Learning Outcome**	**Teachers Activities**	**Resource**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1	1.1 Describe the following: System Software, Program Generators, Applications Packages and Apps.	Explain System Software, Program Generators, Applications Packages (Word Processor, Spreadsheet, Database) and Apps	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Install software Applications, Web Applications and Apps downloaded from App Store.	Demonstrate how to Install and work with Softwares and Web Application	Differentiate between Desktop Softwares and Web Applications
2	1.2 Identify various types of application software and the tasks for which they are suited 1.3 Explain how to install, use, delete and recover web apps. 1.4 Describe the strengths and weaknesses of apps and applications	Discuss various types of application software and the tasks for which they are suited Explain the use of web apps, App store, App Installation, recovery and	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Identify the various packages and their uses Install, delete and recover apps Demonstrate the strengths and weaknesses of apps and applications	Guide students on how to Install and work with Packages Guide the student on how to install and work with an App downloaded from App Store	Explain the various types of application software and the tasks for which they are suited

		deletion Describe the strengths and weaknesses of apps and applications				
	General Objective 2. Understand Basic Typing Skills					
3	2.1 Describe process of use of keyboard for typing	Explain keyboards and its layout Explain how to type with a keyboard	PC with Typing Tutor Installed Multimedia Projector Projector Screen	Demonstrate the use of keyboard for typing	Guide students on how to type with a standard keyboard	List the functions of keyboard.
4	2.2 list the functions of key board in typing	Explain keyboards and its layout Explain how to type with a keyboard	PC with Typing Tutor Installed Multimedia Projector Projector Screen	Identify the functions of keyboard	Guide students to Identify the functions of keyboard	Explain the functions of keyboard
	General Objective 3. Understand Word Processing Activities and work with Word.					
5	3.1 Explain Microsoft word windows 3.2 Describe process of using Microsoft Word	Explain Word common features and applications, starting and exiting word and some common screen elements Explain how to carryout basic	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Carryout basic operations in Microsoft word	Guide students to create and save files as well as some basic operations in word and carry out basic formatting operations in word	Explain how to start and exit Microsoft Word Identify some common screen elements

		operations in word				
6	3.2 Explain how to create tables, import and crop graphics/images 3.3Explain how to manipulate text using common features, such as: ruler to create, modify or delete tab settings	Describe how to create tables, import and crop graphics/images in word Explain how to manipulate text using common features, use the ruler to create, modify or delete tab settings	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Create tables and insert objects/images and graphics in word	Demonstrate how to create tables, insert objects and graphics in word	Explain how to create tables, import and crop
7	3.3 Explain more advance word processing activities such as: formatting, Text manipulation	Explain how to carryout Design, Layout, Mailings and Review operations in word	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Carry out more advance word processing activities such as: formatting, Text manipulation etc.	Guide students to carryout the following operations (change margins, paper size, or the orientation, remove page breaks, mail merge) Guide students on how to insert or remove page numbers and others	Explain processing activities such as: formatting, Text manipulation

	General Objective 4. Understand Spreadsheet Activities and work with Excel.					
8	4.1 Describe spreadsheet package 4.2 Describe the use of Spreadsheet Package 4.3 Explain process of carrying out basic spreadsheet operation	Explain basic terminologies and concepts for spreadsheets such as Cell, Column, Row Range, Worksheet, Workbook etc	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Open a spread sheet document Create a spread sheet document Carryout some key spreadsheet operations	Guide students to open, save and close workbooks Guide students to carryout the following activities in Excel: select cells for a variety of purposes; copy and move data; change the column width or row height; create simple formulas and use common built-in functions. Merge and unmerge cells, cut, copy, and paste data	Explain how to create simple formulas and use common built-in functions Explain how to format the data in a worksheet to enhance it
9	4.3 Explain how to use spreadsheet to carry out general statistical functions using cell references in a spreadsheet	Describe ways of using spreadsheet to carry out general statistical functions using cell references in a spreadsheet.	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Carryout some key spreadsheet operations using cell references	Guide students to format the data in a worksheet, create charts; sort or filter information in a worksheet; work with tables; and how to preview	Explain how to use spreadsheet to carry out general statistical functions using cell references in a spreadsheet

					and print a report; insert/delete rows and columns; modify cell sizes; filter and sort data	
10	4.4 Explain how to perform specific accounting functions using spread sheet 4.5 Highlight data security requirements on spread sheet data.	Explain how to perform specific accounting functions and highlight data security requirements on spread sheet data.	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	4.6 Carryout some key spreadsheet operations to perform specific accounting functions using spread sheet Show data security requirements	Guide students to use accounting functions in a workbook	Explain how to sort or filter information in a worksheet Explain how to work with tables
11	4.4 Explain the use of a spread sheet in a forecasting project, financial analysis, production scheduling and control and other forms of modeling	List the use of a spread sheet in a forecasting project, financial analysis, production scheduling and control and other forms of modeling.	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Carryout some key spreadsheet operations in a forecasting project, financial analysis, production scheduling and control and other forms of modeling	Guide students to carryout forecasting and analysis in excel	Explain the following: forecasting project, financial analysis, production scheduling and control and other forms of modeling
	General Objective 5. Understand Presentation Package.					

12	5.1 Describe Presentation Package 5.2Explain how to use a Presentation Package to prepare presentations	Explain how to plan and design a presentation Explain how to create a presentation and use basic formatting features on a slide Explain how to manipulate text or objects on slides	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Create a PowerPoint presentation	Demonstrate how to connect to external/extended monitors to display presentation (Cables, Audio) Demonstrate how to use presentation views and modes Demonstrate how to add animations, effects, and slide transitions	
13	5 Explain how to insert and animate multimedia objects on slides Explain how to apply transitions to slides, share presentations and publish slides Explain file types compatible with presentation		PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Apply transitions to slides, share presentations and publish slides Demonstrate file types compatible with presentation Demonstrate the design slides (show how to use templates)	Demonstrate how to create and organize slides (Slide management, Inserting and managing media files) Demonstrate presentation software options (Presentations, Add slides, Delete slides, revise slide	Explain how to apply transitions to slides, share presentations and publish slides

					order, Layout)	

	General Objective 6. Understand App Culture					
15	6.1 Explain what App Culture is. 6.2 Explain the different App Genres 6.3 Explain Strength and Limits of Apps	Explain App Culture and how to obtain apps explain the different app genres (Productivity, Reference, Content Creation, Social media, Music Health) Explain strengths and limits of apps and applications	PC with Office Software and Apps connected to the internet Multimedia Projector Projector Screen	Differentiate App culture and its trends in the society	Guide students on studies on App Culture	Explain the different app genres (Productivity

PROGRAMME: NATIONAL DIPLOMA(ND) COMPUTER SCIENCE			
COURSE: Programming Using C Language	**Course Code: COM 121**	**Contact Hours:4 Hours/week**	
GOAL: This course is designed to provide the students with knowledge of and skills in C Programming			
Year: 2 Semester: 1	**Pre-requisite: COM 113**	**Theoretical:**	**2 hours /week**
		Practical:	**2 hours /week**

GENERAL OBJECTIVES:

On completion of this course the student should be able to:

1.0 Understand Basic Concepts of C Programming Language

2.0 Understand Data types, Constants, Variables and programming procedure

3.0 Understand Storage Classes, Operators and Type Casting

4.0 Understand Standard Inputs and Output Operations

5.0 Understand Control Structures (Decision Making and Loops)

6.0 Understand the Functions and Scope Rules

7.0 Understand Arrays and Strings

8.0 Understand Pointer operations

9.0 Understand Structures and Union data types

10.0 Understand File Input/Output (I/O) Operations

11.0 Understand Preprocessors and Header Files

PROGRAMME: NATIONAL DIPLOMA (ND) COMPUTER SCIENCE						
COURSE TITLE : Programming using C Language				**COURSE CODE: COM 121**	**CONTACT HRS: 4/Week**	
COURSE SPECIFICATION: Theoretical Contents				**COURSE SPECIFICATION: Practical Contents**		
	General Objective 1.0 : Understand basic concept of C Programming Language					
Week	**Specific Learning Outcomes**	**Teachers Activities**	**Resources**	**Specific Learning Outcomes**	**Teachers Activities**	**Evaluation**
1-2	1.1 Define Programming Language, 1.2 Define Program 1.3 Explain Program Structure 1.4 Explain Program Syntax 1.5 Outline the reasons for using C Language 1.6 Explain Local Environment setup and installation procedure on various platforms	Explain Program and Program structure Explain the reasons for using C language Explain Local Environment setup and installation procedure on various platforms	White Board. PCs with C Programming Language PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Install C compiler and setup the environment .	Guide students to Install C compiler and setup the environment	Demonstrate how to install C compiler and setup a local environment?

General Objective 2.0: Understand Data types, Constants, Variables and programming procedure						
3-4	2.1 Explain Data types: Integer, floating point etc. 2.2 Distinguish between Variables, Constants and Literals 2.3 Explain Variable and Constant declaration 2.4 Explain symbolic constant using #define pre-processor and constant keyword 2.5 Explain the procedure for coding and running C program	Explain Data types: integer, floating-point, void types etc. Explain variable, and Constant declaration Explain the procedure for coding and running C program	White Board. PCs with C Programming Language PC loaded with Presentation package and connected to multimedia Projector nline lecture notes	Write, run and execute C Program with various Data types, Variables, Constants and Literals	Demonstrate how to write, run and execute C Program with various Data types, Variables, Constants and Literals	Distinguish between Variables, Constants and Literals? Demonstrate how to code and run C programs?
General Objective 3.0: Understand Storage Classes, Operators and Type Casting						
5	3.1 Explain Storage Classes 3.2 Explain Operators and Operator precedence 3.3 Explain Type Casting Operation: e.g. integer promotion and arithmetic conversion	Explain Storage Classes such as auto storage, register storage, static storage and external storage Explain operator types and operator precedence. Explain type	PCs with C compiler PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Code and run C Programs with storage classes, operators and type casting	Demonstrate how to Code and run C Programs with storage classes, operators and type casting	What are the types of storage classes? List operators in order of precedence? Demonstrate how to

		casting operation				perform type casting?
General Objective 4.0: Understand Standard Inputs and Output Operations						
6-7	4.1 Explain Standard Inputs and operations 4.2 Explain Output and Operations 4.3 Explain Input functions: get(), getchar(), putchar, scanf() etc. 4.4 Explain output functions: printf()	Explain Standard Inputs and Output Operations Explain Input and Output functions	PCs with C Programming Language PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Code and run C Programs with various Input and Output statements	Guide students to Code and run C Programs with various Input and Output statements	What is the difference between Output and input Operations? Demonstrate how to use input and output functions in programs?

General Objective 5.0: Understand Control Structure (Decision Making and Loops)						
5-6	5.1 Explain Control Structure 5.2 Explain types of control structures: sequential, looping etc. 5.3 Explain various types of IF statements: IF...Else Nested IF etc. 5.4 Explain while loop, for loop, Do … while loop 5.5 Explain Switch and Nested switch statements 5.6 Explain Goto statement And Infinite loop statement.	Discuss control structure and types Explain various types of IF statements Explain different loop structures	PCs with C Programming Language PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Code and run C Programs with Control Structures	Show students how to code and run C Programs with Control Structures	Demonstrate how to use different control structures in program?
General Objective 6.0: Understand the Functions and Scope Rules						
7	6.1 Define Function 6.2 Differentiate between User-defined and library function 6.2 Explain Scope Rules: local and global variables 6.3 Explain Function arguments 6.4 Explain function calls and types: call	Discuss Function and Scope rules Differentiate between User-defined and library function Discuss Function arguments, function calls and types	PCs with C Programming Language PC loaded with Presentation package and connected to multimedia Projector	Code and run C programs with user defined functions and libraries functions	Guide students to code and run C Programs with user defined functions and libraries functions	What is functions and scope rules? Demonstrate how to perform function calls in program?

	by value, call by reference		Online lecture notes			
General Objective 7.0: Understand Arrays and Strings						
8-9	7.1 Define Arrays 7.2 Explain types of Arrays: One-dimensional, two dimensional etc. 7.3 Explain Array elements and initialization 7.4 Explain Array access and operations 7.3 Define Strings 7.4 Explain String operations: concatenation etc.	Discuss Arrays and types Discuss Array initialization access and operations Explain Strings and String operations	PCs with C Programming Language PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Code and run C Programs with arrays and strings	Guide students to code and run C Programs with arrays and strings	What is Array? Demonstrate how to implement arrays in programs?

General Objective 8.0: Understand Pointer operations						
10	8.1 Define Pointer 8.2 Explain uses of Pointers 8.3 Explain Pointer Arithmetic 8.4 Explain Pointer operations: Incrementing and decrementing pointers, pointer comparison etc. 8.5 Explain Array of Pointers 8.6 Explain Passing and returning arrays from functions	Explain Pointers and their uses Discuss Pointer Arithmetic and operations Explain Array of Pointers and uses Discuss Passing and returning arrays from functions	PCs with C Programming Language Sample programs PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Code and run C Programs with pointers	Guide students to code and run C Programs with pointers	What is Pointer? Demonstrate how to use pointers in programs?
General Objective 9.0: Understand Structures and Union data types						
11	9.1 Explain Structures and Unions types 9.2 Explain structures Definition 9.3 Explain Typedef and #define 9.4 Explain union definition and members access	Explain Structures and Unions types Explain structures Definition using Typedef and #define etc. Discuss union definition and members access	PCs with C Programming Language Sample programs PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Code and run C Programs with Typedef structures and union types	Show students to code and run C Programs with Typedef, structure and union data type	What are structures and union types? Demonstrate how to implement structures and union types in programs

General Objective 10.0: Understand File I/O Operations						
12	10.1 Explain File I/O Operations 10.2 Explain the process of opening and closing files 10.3 Outline the process of writing to/from file 10.4 Explain Binary Input and Output functions	Explain File I/O Operations Discuss the process of opening and closing files Explain the process of writing to/from file Discuss Binary Input and Output functions	PCs with C Programming Language Sample programs PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Write and execute C Programs with file I/O operations	Assist students to write and execute C Programs with file I/O operations	What is file input/output operations? Demonstrate how to open and close files? Demonstrate how to write to/from files?
Objective 11:UnderstandPreprocessors and Header Files						
13	11.1 Explain Preprocessors and Header Files 11.2 Explain Preprocessors operators: macro continuation (\), stringize (#), token pasting (##), and defined () 11.3 Explain Parameterized Macros 11.4 Explain Header file processing	Discuss Preprocessors and Header Files Discuss Preprocessors operators Explain Parameterized Macros and Header file processing	PCs with C Programming Language Sample programs PC loaded with Presentation package and connected to multimedia Projector Online lecture notes	Write and execute C Programs with different preprocessors and header files directives	Guide students to write and execute C Programs with different preprocessors and header files	What are Preprocessors ? Demonstrate how to use preprocessors in programs?

Assessment: Give details of assignments to be used: Coursework/ Assignments %; Course test %; Practical %; Projects %; Examination %

Type of Assessment	Purpose and Nature of Assessment **(COM 101)**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 2 progress tests for feed back.	20
Practical	At least 5 home works to be assessed by the teacher	20
Total		100

Recommended Textbooks & References:

1. Rufai M.M., **Aigbokhan E. E**., Lawal O.N., Sokunbi M. A., "Fundamental of C Programming language" Al-Irshad Publishers, Illorin, Nigeria, ISBN: 978-978-50228-9-6
2. Brian W. Kernighan and Dennis M Ritchie, " The C Programming Language", 2nd Edition, Prentice Hall software Software Series, Englewood Cliffs, New jersey, 1988.

PROGRAMME: National Diploma in Computer Science		
COURSE: INTRODUCTION TO INTERNET	**COURSE CODE**: COM 122	**CONTACT HOURS:** WEEKS **HOURS -**
COURSE SPECIFICATION: THEORETICAL CONTENT	**COURSE SPECIFICATION:** PRACTICAL CONTENT	
GOAL: The course is to enable the student understand the fundamentals, uses and operations of the Internet		

General Objectives: On completion of this course, the student should be able to:

1. Know the meaning and historical background of Internet
2. Understand how to Navigate the Internet and Common Website Functionalities
3. Understand the Configuring Email Clients and Calendaring
4. Understand Social Media and Various Internet Communication Methods
5. Understand Online Conferencing and Streaming
6. Understand Digital Principles, Ethics, Skills and Citizenship
7. Know the challenges to Internet growth and penetration in Nigeria

Course Specification: Theoretical Content				Practical Content		
	General Objective 1: Know the meaning and historical background of Internet					
Week	**Specific Learning Outcome**	**Teachers Activities**	**Resource**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1	1.1 Define Internet 1.2 Narrate the History of Internet 1.3 Explain Intranet and Extranet 1.4 Distinguish between internet and intranet	• Explain Internet concept • Explain historical background of the Internet. • Explain Intranet and Extranet • Distinguish between Internet, Intranet and Extranet.	White Board /marker pen Computer Lab with Internet Connectivity Multimedia Projector Projector Screen	Browse the internet for information	Assist students to browse for information on the internet	What is internet? How did internet come about? What are the difference s among Intranet, Extranet and Internet?
	General Objective 2: Understand how to Navigate the Internet and Common Website Functionalities					
2	2.1 Describe how the Internet works and how devices communicate.	Describe how the internet works	White Board /marker pen	Connect a system to the internet	Guide the students on how to connect to the internet and show hot works.	Differentiate between public and private

	2.2 Define and describe Domain Name System DNS and explain how to name servers in the DNS. 2.3 Define IP addressing (IPv4 and IPv6) and explain subnetting;	Differentiate between Internet and intranet Explain TCP/IP and Network Topology Briefly explain the OSI reference model Explain the Components of World Wide Web (www) Explain the differences between Internet and intranet (closed network and open network), DNS, IP addresses (IPV4 and IPV6), subnetting, how devices communicate on a network Explain the various domain types [.gov, .edu, .com, .us, .uk, etc.]	Computer Lab with Internet Connectivity Multimedia Projector Projector Screen Network Simulation Application Packages (eg GNS3)	Know how devices communicate on a network Identify various domain types	Guide students on how to name servers in Domain Name System Show various domain types	networks Describe packets and how they make their way across the internet

3	2.4 Define Bandwidth, explain its characteristics and how it is managed. 2.5 Describe how to search the internet and explain browser resources 2.6 Gain an understanding of research fluency and validity of resources from the internet. 2.7 Explain Intellectual Property and its rights usage, licensing rules/laws regarding Intellectual Property and Software Programs; and creative common licence	Explain Bandwidth and its characteristics and management. Explain how to use search engines and browsers to search on the internet, how to search using keywords and hashtags and advance searches and other search techniques. Explain browser resources and their functions: (HTML/CSS, Cookies, Cache, Breadcrumbs, Plugins, Widget, Add-ons, In-browser apps, Popups, Browser navigation (URLs, scroll bars, etc.), New window, tabs, bookmarks, favorites, synchronize bookmark Explain what research	White Board /marker pen Computer Lab with Internet Connectivity Multimedia Projector Projector Screen Network Simulation Application Packages (eg GNS3)	Search the Internet using keywords and hashtags Access valid and invalid sites Know how to search for resources on the internet using search engines and browser	Guide students on how to search and apply advance searches using keywords and hashtags Show students valid and invalid sites to observe their features Show the following browser resources : Cookies, Cache, Breadcrumbs, Plug ins, Widget, Add-ons, In-browser apps, Popup, Browser navigation(URLs, scroll bars, etc.), New window, tabs, bookmarks, favorites, synchronize	Describe how to search for items on a specific web site Describe how to search for items using search engines Use tools to narrow the search criteria

		fluency is and how to validate online resources. Explain Intellectual Property rights regarding images and articles, which have owners; Explain creative common licence and analyse licensing rules/laws with regards Intellectual Property and Software Programs			bookmark in a browser	
4	2.8 Explain copyrights, plagiarism, its rules/laws and the implication of their violation;	Explain plagiarism, its laws and punishments as well as how to detect plagiarism and fair use of internet Explain copyrights with respect to internet usage and censorship and why censorship is needed; Explain why there are rules around explicit	White Board /marker pen Computer Lab with Internet Connectivity Multimedia Projector Projector Screen	Know plagiarism, its laws and punishments as well as how to detect plagiarism and fair use of internet Know copyrights with respect to internet usage and censorship;	Demonstrate how to validate online resources. Guide students on how to detect copyrighted content and how to sensor contents on the internet.	Evaluate the validity of the information Define intellectual property Briefly discuss censorship and filtering

		content and the reason we should know about it from an organization standpoint; Explain appropriate use of the Internet in a business setting so as not to offend others or search for offensive material; Explain the legality and appropriateness of companies blocking sites such as youtube, facebook or other sites;	Network Simulation Application Packages (eg GNS3)		Guide students on how to detect plagiarism using anti plagiarism software	Explain plagiarism
5	2.9 Explain a URL and identify its parts 2.10 Describe how to use common website navigation conventions such as click, double-click, mouse over, drag and drop 2.11 Describe the basic web navigation principles	Explain how to navigate a website by: ➢ Click / delayed / double-click ➢ Mouse-over ➢ Drag and drop Explain the basic web navigation principles	White Board /marker pen Computer Lab with Internet Connectivity Multimedia Projector Projector Screen	Know how to use common website navigation conventions such as click, double-click, mouse over, drag and drop Know basic web navigation principles	Show students the parts of a URL Guide students on to how to navigate a website	Differentiate the Internet from the World Wide Web Describe browser functions and features

	General Objective 3: Understand the Configuration , Email Clients and Calendaring					
6	3.1 Explain email applications 3.2 Describe how to use desktop email application platform eg Outlook 3.3 Explain how to use web-based email application eg mail, yahoo	Explain email application. Explain how to use desktop email application platform ie outlook Explain how to use web-based email platform (gmail, yahoo etc) Explain the following: (Reply vs. reply all, forward, cc vs bcc, Signature, Header, SPAM, Junk mail, archiving; Trash; Folders) Explain how to manage an email. Describe how to attach documents to an email and	• White Board /marker pen • Computer Lab with Internet Connectivity • Multimedia Projector • Projector Screen	Create an email Link an email to a desktop email application platform ie outlook Create a web-based email platform using gmail and yahoo) Create an email an attach documents to an email and show how to determine the size limits Create and manage an address book	Guide students on how to carry out e-mail operations Guide students on how to create a desktop email application platform ie outlook Guide students on how to create a web-based email platform (g- mail, yahoo etc) Demonstrate use of the following • Reply vs. reply all, forward	Describe how to create and send a new message to one or more recipients Describe how to attach items in a message Describe when to reply, reply to all, or forward a message Describe how to set up a signature Describe how to deal with spam or junk mail Describe how to manage mail for

		determine the size limits Explain the differences between web applications and desktop applications Describe how to manage address book			• cc vs bcc • Signature • Header • SPAM • Junk mail Guide students on how to attach documents to an email and determine the size limits Guide students on how to manage address book	deletion or archiving
7	3.4 Explain how to create events and appointments 3.5 Explain how to share calendars and invitations 3.6 Explain how to view multiple calendars;	Explain events, appointments and how they are created. Explain how to share calendars and invitations Explain how to view	• White Board /marker pen • Computer Lab with Internet Connectivity • Multimedia Projector • Projector Screen	Know events, appointments and how they are created Recurring Details (location, time zone, notes)	Guide students on how to create events and appointments Guide students on how to share calendars and invitations	Explain how to manage contacts Explain how to create single and recurring events or appointments

	3.7 Explain how to connect multiple calendars; 3.8 Explain how to show multiple calendars in different colours in same user interface. 3.9 Describe how to subscribe to calendars; 3.10 Explain the differences between a public calendar (like a municipal calendar) and personal calendar	multiple calendars; Explain how to connect multiple calendars; Explain how to show multiple calendars in different colours in same user interface. Describe how to subscribe to calendars; Explain the differences between a public calendar (like a municipal calendar) and personal calendar		Know how to share calendars and invitations Know how to view multiple calendars; Explain how to connect multiple calendars; Explain how to show multiple calendars in different colours in same user interface. Subscribe to Public Calendar (municipal calendar) and Personal Calendar	Guide students on how to view multiple calendars; Guide student on how to connect multiple calendars Guide student on how to show multiple calendars in different colours in same user interface. Guide student on how to subscribe to calendars; Demonstrate differences	Explain how to manage and share calendars

					between a public calendar (like a municipal calendar) and personal calendar	
	General Objective 4: Understand Social Media and Various Internet Communication Methods					
8	4.1 Define Digital Identity and explain the concept of digital identity (identity on social media) 4.2 Explain social networks and how they are used (Facebook, LinkedIn etc.); 4.3 Describe LinkedIn and how it functions as a social network and how it is a valuable social network for business	Explain the concept of digital identity (identity on social media) Explain social networks and how they are used (Facebook, LinkedIn etc.); Define social network; Describe how Facebook is a social network; Describe LinkedIn and how it functions as a social network; Explain how LinkedIn is a valuable social network for business	• White Board /marker pen • Computer Lab with Internet Connectivity • Multimedia Projector • Projector Screen	Create a Facebook and LinkedIn account Create a YouTube and Instagram page; Know internal (school/business) and open media sites (eg Neo and Yammer and Slack) Know open social media site and a closed site; Know Neo and	Guide student on how to create a social media account using Facebook, LinkedIn, etc Demonstrate how to use Neo and Yammer	Define Digital Identity Explain Social Networks and give examples Identify the social media application that can be used to create a professional identity for employment opportunities.

	4.4 Explain other types of networks (YouTube, Instagram, etc.); 4.5 Describe followership and its influence on social networks such as YouTube, twitter, Facebook, Instagram etc; 4.6 Differentiate between internal (school/business) and open media sites (eg Neo and Yammer and Slack) 4.7 Explain Blogs, Wikis and Forums and how they are used. 4.8 Explain cyber bullying and inappropriate	Explain the other types of networks (YouTube, Instagram, etc.); Describe followership and its influence on social networks such as YouTube, twitter, Facebook, Instagram etc; Explain factors that influence choice of Describe how you are choosing your digital identity based on the networks choices you make on all of these networks; Differentiate between internal (school/business) and open media sites (eg Neo and Yammer and Slack)		Facebook Know Blogs, Wikis and Forums and used them.		

	behaviors on the internet.	Differentiate between an open social media site and a closed site; Neo vs Facebook (What makes it different from Facebook) Explain Blogs, Wikis and Forums and how they are used. Define cyber bullying. Explain inappropriate behaviors on the internet				
	General Objective 5: Understand Online Conferencing and Streaming					
9	5.1 Describe internet communication technologies. Eg emails, sms, Instant Message (IM), Voice Over IP (VOIP), internet phone calls, web ex, web-conferencing etc	Explain the various communication technologies on the internet. (emails, sms, Instant Message (IM), Voice Over IP (VOIP), internet phone calls, web ex, web-conferencing etc)	• White Board /marker pen • Computer Lab with Internet Connectivity	Know the various communication technologies on the internet. (emails, sms, Instant Message (IM), Voice Over IP (VOIP), internet phone calls, web ex,	Guide students on how to create emails. Guide students on how to use various internet	Describe email and texting Describe how to select the best communications tool for a given

	5.2 Explain the advantages of the various internet communication technologies 5.3 Explain the use of chat platforms and its advantages in teaching and learning 5.4 Explain the concept of e-learning (distant learning technologies) and its advantages. List some distant learning technologies. 5.5 Describe and identify various platforms for web and video conferencing. 5.6 Explain the common feature of such platforms	Explain the different circumstances that will require each of the various communication technology and their advantages. Explain the use of chat platforms and its advantages in teaching and learning Explain the concept of e-learning (distant learning technologies) with examples and its advantages. Describe and identify various platforms for web and video conferencing. Discuss the common feature of such platforms	• Multimedia Projector • Projector Screen	web-conferencing etc) Use chat platforms. Use e-learning Describe and identify various platforms for web and video conferencing. Know how to screen share Edit a document collaboratively.	technologies. Demonstrate the use of chat platforms. Demonstrate the use of Skype as platform for learning and business. Describe how to use a distant learning technology eg MOODLE	situation Describe the benefits and function of online conferencing tools Describe benefits and function of business collaboration tools Describe distance learning technologies

	eg screen sharing etc. 5.7 Explain collaborative document editing.	eg screen sharing etc. Describe collaborative document editing.				
10	5.1 Explain the various online conferencing offerings 5.2 Explain how to use the following online conferencing offerings: VOIP, Video Conferencing (Google hangouts, Skype, Face Time) 5.3 Explain how to use phone conferencing and Screen sharing	Explain the various online conferencing offerings Describe how to use the following online conferencing VOIP, Video Conferencing (Google hangouts, Skype, Face Time) Explain phone conferencing and describe how to use phone conferencing and Screen sharing	• White Board /marker pen • Computer Lab with Internet Connectivity • Multimedia Projector • Projector Screen	Carry out a video and VOIP online conference using Google hangouts, Skype, Face Time Carry out a phone conferencing and Screen sharing	Demonstrate how to use the following online conferencing offerings: VOIP, Video Conferencing (eg. Google hangouts, Skype, Face Time) Demonstrate how to use phone conferencing and Screen sharing	Describe various phone calling technologies Describe how to manage status and profile settings in Skype Describe how to conduct group conversations in Skype Describe how to conduct group conversations in Google Hangouts
11	5.4 Explain streaming and	Explain streaming and	• White Board	Carry out a video	Demonstrate how	Describe how to stream a live

	how it works. 5.5 Differentiate between streaming and downloading. 5.6 Define live audio. 5.7 Explain how to stream the video of a live recording.	how it works. Explain the difference between streaming and downloading. Define live audio. Describe how to stream the video of a live recording.	/marker pen • Computer Lab with Internet Connectivity • Multimedia Projector • Projector Screen	streaming and Know how to download. Know how to present a live audio. Carry out a video streaming of a live recording.	to stream Demonstrate how to download Demonstrate how to stream live video recording. Demonstrate how to stream live audio recording	audio. Describe how to stream a live video
	General Objective 6: Understand Digital Principles, Ethics, Skills and Citizenship					
12	6.1 Explain the difference between online and offline citizenship 6.2 Explain the importance of ethical behavior in online presence 6.3 Explain Digital	Explain the online and offline communities and the ethical behavior applicable to both Explain the need to cope with change in technology Explain the importance of demonstrating sensitivity	• White Board /marker pen • Computer Lab with Internet Connectivity • Multimedia Projector • Projector Screen	Know an online and offline communities and the ethical behaviours applicable to both Create a social media account	Show students an online community for a comparative analysis with a real life community Guide students on how to create a social media	Differentiate between Online and Offline Communities Define Digital Wellness

	Wellness basics as it affects screen time and ergonomic best practice. 6.4 Explain online identity management, branding, Digital footprint. 6.5 Explain how to create an online identity and its importance to prospective employers.	when determining most appropriate technology to use when communicating with others. Explain Digital Wellness basics as it affects screen time and ergonomic best practice. Explain Online Identity Management and how to create an online identity and its importance to prospective employers. Explain the differences between personal and professional online identity Explain Branding and Digital footprint.			account	Explain Online Identity Management

		Explain the positive and negative implications of online presence. Explain how to manage profiles on social media eg Facebook, Twitter, LinkedIn				
	General Objective 7: Know the challenges to Internet growth and penetration in Nigeria					
13	7.1 Explain obstacles to Internet growth in Nigeria. 7.2 Explain the factors militating against Internet penetration in Nigeria 7.3 Explain the challenges of Fibre connectivity and the policies of government 7.5 Explain government policies on internet access in Nigeria 7.6 Explain internet Governance and	Discuss challenges of telecommunication infrastructure in Nigeria. Explain the factors militating against internet penetration in Nigeria Explain the problems of fibre connectivity and government policies Explain government policies on internet access Nigeria.	• White Board /marker pen • Computer Lab with Internet Connectivity • Multimedia Projector			What are the challenges facing internet growth and penetration in Nigeria List three government policies on internet governance

	eCommerce	Eg Broadband Policy Explain Internet Governance and eCommerce				

Assessment: Give details of assignments to be used: Coursework/ Assignments 20%; Course test 10%; Practical 10%; Examination 60%

Type of Assessment	Purpose and Nature of Assessment **(COM 122)**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feed back.	10
Practical	To be assessed by the teacher	10
Assignment	To be assessed by the teacher	20
Total		100

At the end of this course, students will be qualified to write and pass the IC3 digital literacy certification examination in Living Online Module

	Department/ Programme: Computer Science	**Course Code: COM 123**		**Credit Hours: 6 hours/week**
	Subject/Course: PROGRAMMING LANGUAGE USING JAVA 1			**Theoretical: 2 hours/week**
	GOALS: The course is designed to enable students acquire requisite knowledge of and skills in programming using Java.			
	Year: 1 Semester: 2	**Pre-requisite:**	**COM 113**	**Practical: 4 hours /week**

General Objectives: On completion of this course, the diplomat should be able to:

1. Understand Java programming Basics.
2. Understand Object-oriented programming with Java classes and Objects
3. Understand the general concept of expression in Java.
4. Understand the use of Conditional Statements in Java
5. Understand the use of iteration statements in Java.
6. Know how to write simple Java program for string and characters manipulation.

	Course: Programming language Using JAVA 1	**Course Code: COM 123**			**Credit Hours: 6 hours/week**	
					Theoretical:2 hours/week	
	Year: 1 Semester: 2	**Pre-requisite:**			**Practical: 4 hours /week**	
	Theoretical Content			**Practical Content**		
Week/s	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
	General Objective 1: Understand Java programming Basics					
1-3	1.1 Explain the basic components of Java programs. 1.2 Explain Java constructs and its applications 1.3 Differentiate between object declaration and object creation. 1.4 Explain concept of data types, variables and constant. 1.5 Explain variable declaration and constant declaration 1.6Describe the process of creating and running Java programs.	• Explain basic components of Java programs. • Explain concept of data types, variables and constants. • Explain variable and constant declaration • Illustrate the process of Compiling and Running Java programs	White board and marker pen PC Loaded with JAVA Compiler, presentation package. Multimedia projector	Develop simple java program	Guide students to identify different components of java and compilation of a java program	Describe the processes of creating and developing a simple Java program

	General Objective 2: Understand Object-oriented programming with Java classes and Objects					
4-5	2.1 Describe Java insatiable classes and objects 2.2 Explain fields and constructors 2.3 Explain concepts of methods 2.4 Explain the concept of overloading methods, garbage collection and nested classes 2.5 Differentiate between local and instance variables 2.6 Distinguish between private and public modifiers. 2.7 Describe parameter passing method	Explain procedures of creating classes and methods Explain methods and types Explain the differences between local and instance variables, private and public modifiers.	White board and marker pen PC Loaded with JAVA Compiler, presentation package. Multimedia projector	Create simple program that uses overloading methods, garbage collection and nested classes	Guide students to Create simple program that uses overloading methods, garbage collection and nested classes	Describe how classes can be created Differentiate the following terms (a) local and instance variables, (b)private and public modifier.
Week/s	**General Objective 3: Understand the general concept of expression in Java.**					
6-7	3.1 Explain expressions using precedence rules. 3.2 Describe the process to develop simple input/output programs using Java 3.3 Describe how integer and real numbers are represented in memory.	• Explain precedence rules. • Explain the format of expressions. • Explain the process to develop simple input/output programs	White board and marker pen PC Loaded with JAVA Compiler, presentation package. Multimedia projector	Develop simple input/output programs	Guide students to develop simple I/O program	Give students simple programming assignment

Week/s	**General Objective 4: Understand the use of Conditional Statements in Java**					
7-8	4.1 Describe Boolean expressions using relational and logical operators. 4.2 Describe IF and Next-IF conditioning statement 4.3 Describe Nested IF statements correctly. .	Explain Boolean expressions using relational and logical operators Explain different syntax of IF statements. Explain with examples JAVA program containing IF statement.	White board and marker pen PC Loaded with JAVA Compiler, presentation package. Multimedia projector	Demonstrate how to write and run simple java program using IF and Next-IF Conditional statements.	Guide students to write and run simple java program using IF and Next-IF Condition-al statement.	Write a simple program to demonstrate the use of IF and Next-IF Conditional statement.
	General Objective 5: Understand the use of iteration statements in Java.					
9-10	5.1 Describe the concept of looping 5.2 Explain - WHILE statement - DO-WHILE statement - FOR statement 5.3 Describe simple recursive methods.	Explain with simple examples format of all conditional statements. Write sample program To demonstrate recursive methods using any nested loop .	White board and marker pen PC Loaded with JAVA Compiler, Presentation package. Multimedia projector	Demonstrate how write and run simple java program using DO-WHILE and Nested LOOP statement.	Guide student to write and run simple java program using DOWHILE and Nested -LOOP statement.	Demonstrate with a simple program the use of DO-WHILE and Nested LOOP statement.
Week/s	**General Objective 6: Understand how to write simple Java program for string and characters manipulation**					

11-15	6.1 Describe and manipulate character data type. 6.2 Explain the differences between string and string buffer classes 6.3 Distinguish between the primitive and reference data types. 6.4 Explain the equality and equivalence testing for string objects. 6.5 Describe objects passing	Explain string manipulation in Java. Write sample programs to teach parameter passing mechanism. Discuss the equality and equivalence testing for string objects	White board and marker pen PC Loaded with JAVA Compiler, Presentation package. Multimedia projector	Demonstrate how to write simple java program for string manipulation	Guide the student how to develop and implement simple java program for string manipulation	Develop a simple program for object passing from methods to methods

Assessment: Give details of assignments to be used:

Coursework/ Assignments %; Course test20 %; Practical %; Projects 20 %; Examination 60 %

Type of Assessment	Purpose and Nature of Assessment **(COM 127)**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feed back.	20
Practical / Projects	To be assessed by the teacher	20
Total		100

Recommended Textbooks & References:

	Department/ Programme: COMPUTER SCIENCE (ND)	**Course Code** **COM 124**		**Contact hours: 4 hours/ week**
	Subject/Course: **DATA STRUCTURE AND ALGORITHMS**			**Theoretical: 2 hours/week**
	Year: One Semester: Two	**Pre-requisite:** **COM 111**		**Practical: 2 hours /week**
GOAL: The students are expected to analyse, design, apply and use data structures and algorithms to develop efficient program and communicate technical concepts and ideas**.**				

General Objectives: On completion of this course the student should be able to:

1.0 Understand concepts of data structure and tools.

2.0 Know tools for studying data structure: symbols, relations and graph.

3.0 Understand sets relations and string structure.

4.0 Know data life cycle representation, properties of ordered and occupancy.

5.0 Understand the properties of order and linear list.

6.0 Understand simple linked lists and algorithm complexity

7.0 Understand non-linear structures.

8.0 Understand different sorting and searching techniques

	Theoretical Content			**Practical Content**		
	General Objective 1: Understand concepts of data structure and tools.					
Week	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
1	1.1 Define data structure 1.2 Define data attributes; name, value range, data types 1.3 Define unit for identifying data, character, fields, subfields, records, files .	Discuss concept of data structure Explain data attributes , name, value range and data types Explain concepts of character fields, sub field, records and files	White board and multimedia projector	Use data attributes, file, sub field, records and files	Demonstrate using relevant examples concepts of attributes, name, value range and data types character fields, sub fields, records and files	Explain data structure, name, value range, data types

	General Objective 2: Know tools for studying data structure: Symbols, relations and graph.					
2 -3	2.1 Define symbols, relations and graph 2.2 Explain the symbols for expressing relations among data 2.3Position relation cell contents, record location, transfer key 2.4 Order relation; record rank, cell rank 2.5 State properties of graph: routes, edge, sequences, directed and non-directed 2.6 Describe operations such as precede, less than points to, move to, search, change, entry	Explain the meaning of data structure. Discuss symbols, relations and graph. Discuss the symbols for expressing relations among data, position relation cell contents, record location and transfer key. Explain the properties of graph: routes, edge sequences, directed and non-directed Describe operations such	White board and Multimedia projector	Be able to use symbols, relations and graph	Demonstrate using relevant examples on how to use symbols, relations and graph	Explain the basic operation using symbols, relations and graph

		as precede, less than points to move to , search, change, entry				
	General Objective 3: Know set relations and string structure.					
4	3.1 Define sets and relation 3.2 Define the elements of sets, subsets, super sets, universal set and null set. 3.3 Describe set operations	Discuss Sets and relations Concepts of subsets, 92 super set, Universal set and null set.	White board and Multimedia projector	Be able to write simple programs to carry out set operations	Demonstrate giving real life example. Guide the students on how to develop simple programs using any data structure	Design a simple program to implement set and relation data structure

Week/s	**General Objective 4: Know data life cycle data representation, properties of ordered and Occupancy**					
5 - 6	4.1 Explain the term occupancy leans, empty, loose. 4.2 Distinguish and define birth, death and change of data. 4.3 Define a sequential list, 4.4 Explain the differences between fixed and variable length fields. 4.5 Implement fixed and variable fields.	Explain Different life cycle of data Discuss sequential list Record length outlining the fixed and variable length.	White board and Multimedia projector	Be able to use variable fixed length record	Demonstrate concept of fixed and variable length using appropriate examples.	Explain the differences between fixed and variable length fields
Week/s	**General Objective 5: Know the properties of ordered and linear list**					
7	5.1 Define ordered and linear list. 5.2 Explain operations that can be performed on an ordered list: append, search (including delete, sort, selection and exchange, merge, including multiway	Define ordered and linear list. Discuss various operations that can be performed on ordered list.	White board and Multimedia projector	Be able to Carry out ordered list operations	Demonstrate using appropriate examples concept of ordered and linear lists. Demonstrate how to perform ordered list operations	Explain operations that can be performed on an ordered list

	merge and balance merge.)					
Week/s	**General Objective 6: Know simple linked lists and algorithm complexity**					
8-9	6.1 Describe different types of linked list array, double linked list, queues, stack, dequeues, trees. 6.2 Explain the use of pointers. 6.3 Describe storage mapping 6.4 Describe time complexity issues 6.5 Definition of big 'O' 6.6 Analyse algorithms to determine their running time and the order of their running time linked lists.	Define linked list and compare it with linear list. Explain types of linked list. Discuss different types of trees. Discuss the use of pointers	White board and Multimedia projector	Apply linked list.	Demonstrate the push and pop operation possibly with diagram. Carry out operations on linked lists e.g push and pop on stacks and all operations on over list	Describe various operations that can be performed on linked list
General Objective 7.0 Know non – linear structures.						

	7.1 Discuss tree and its Structure 7.2 Define a tree properties 7.3 State properties of tree 7.4 Describe different types of binary tree. 7.5 Explain binary tree) representation. (General tree, 7.6 Define graph 7.7 State graph 7.8 Represent a graph as adjacency matrix adjacency list	routes, queued and non-directed Describe different types of graphs: circle, loops, etc. Describe operations such as proceeds, less than etc.	Ditto	Be able to write simple program to implement trees write simple program to implement graphs	Demonstrate how to write simple program to illustrate trees Demonstrate how to write simple program to illustrate graphs	Discuss the various tree and graph operations
General Objective 8: Understand different sorting and searching techniques						

13-15	8.1 Define sorting 8.2 Explain the various sorting techniques	Explain sorting Explain Comparison based sorting Explain bubble sorting algorithm Explain selection sorting algorithm	White Board, PC and Multimedia projector	Be able to implement different sorting techniques in program	Guide students on how to write programs to implement different sorting techniques Guide students on how to Perform different sorting and searching	Explain the various sorting techniques
		Explain insertion sorting algorithm Explain linear and binary search algorithm			techniques Apply sorting algorithm to sort an array of objects.	

Assessment: Give details of assignments to be used:
Coursework/ Assignments10%; Course test 10%; Practical 20%; Examination 60%

Type of Assessment	Purpose and Nature of Assessment **(COM 124)**	Weighting (%)

Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feedback.	10
Practical / Projects	To be assessed by the teacher	20
Assignment	To be set and assessed by the teacher	10
Total		100

PROGRAMME: NATIONAL DIPLOMA (ND) COMPUTER SCIENCE	Course Code: COM 125	Contact Hours: 4
Course: Introduction to Systems Analysis and Design		**Theoretical: 2 hours /week**
Year: 1 Semester: 2	**Pre-requisite:**	**Practical: 2 hours /week**
Goal: This course is designed to enable students to acquire knowledge of and Skills in Systems Analysis and Design		
GENERAL OBJECTIVES:- On completion of this course the student should be able to 1.0 Understand the Basic Concepts of Systems 2.0 Understand the Stages of Systems Analysis and Design 3.0 Understand Feasibility Study and its Objectives 4.0 Understand the Process of Systems Analysis 5.0 Understand Systems Design 6.0 Understand Database Design 7.0 Understand Systems Development 8.0 Understand Systems Implementation 9.0 Understand Systems Evaluation 10.0 Understand Systems Maintenance		

PROGRAMME: NATIONAL DIPLOMA (ND) COMPUTER SCIENCE						
COURSE:				**COURSE CODE: COM 125**		**CREDIT HOURS: 4**
YEAR: 1	**SEMESTER 3**	**PRE- REQUISITE**		**Theoretical: 1hr Practical: 3 Hours**		
GOAL: This course is designed to equip students with the Knowledge and Skills needed to design and implement Information Systems						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0 : Understand the Basic Concepts of Systems						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Evaluation**
1-2	1.1 Define a System 1.2 Explain the basic features of Systems. 1.3 Distinguish between manual and automated systems; open and closed systems; static and dynamic systems with examples 1.4 Explain the advantages and disadvantages of automated	Explain System and its basic features. Distinguish between various classes of systems with examples Discuss the advantages and disadvantages of automated system over manual systems Discuss Information Systems and types	Marker with White Board PC with Presentation package installed and connected to an multimedia projector	identify various types of system	Guide students to identify various types of system	What are advantages of automated system over manual system? What are the types of Information System?

	system over manual system 1.5 Explain Information Systems and types					
GENERAL OBJECTIVE 2.0 : Understand the Stages of Systems Analysis and Design						
3	2.1 Define System Systems Analysis and Design (SA & D) 2.2 State the importance of Systems Analysis and Design 2.3 Explain the different stages of SA & D and their deliverables	Explain System Systems Analysis and Design and its importance Discuss the different stages of SA & D and their deliverables	Marker with White Board PC with Presentation Packaged installed and connected to an multimedia projector	Draw a diagram showing the stages of Systems Analysis and Design	Assist students to draw the stages of Systems Analysis and Design	What are the stages of SA & D and their deliverables?
	General Objective 3.0: Understand Feasibility Study and its objectives					
4	3.1 Define Feasibility study 3.2 State the objectives of Feasibility Study 3.3 Explain the major factors to be considered in feasibility study	Explain Feasibility study and its objectives Discuss the major factors to be considered in feasibility study Discuss the different types of data gathering tools Discuss the features of	Marker with White Board PC with Power Point installed and connected to an multimedia projector	Design relevant data gathering tools for feasibility study of a selected system Collect relevant data from the system using the tools Write Feasibility Report of the Study	Assist students to design relevant data gathering tools, collect relevant data and write feasibility Report of the Study	Demonstrate how to design data collection tools, collect relevant data and write feasibility reports.

	3.4 Explain different types of data gathering tools 3.5 Describe the features of Feasibility Reports	Feasibility Reports				
	General Objective 4.0: Understand the Process of Systems Analysis					
5-6	4.1 Define Systems Analysis 4.2 Explain System Analysts their his qualities 4.3 Explain tools for systems Analysis: Data Flow Diagram (DFD), Decision Tree, Decision Table etc. 4.4 Define Systems Specifications 4.5 List the key elements of Systems Specifications 4.6 Explain systems descriptive	Explain Systems Analysis, Systems Analysts and their qualities Describe tools for systems Analysis . Explain Systems specifications and its key elements Discuss System descriptive techniques and tools Explain data types, Data Dictionary and its uses	Marker with White Board PC with Presentation package installed and connected to an multimedia projector Drawing package	Draw DFD, Decision Tables and Decision Trees of selected systems Create Systems specifications of understudied systems	Assist students to Draw DFD, Decision Tables and Decision Trees of selected systems Guide students create Systems specifications of understudied systems	Demonstrate how to draw Decision Tables and Decision Trees Demonstrate how to create Systems specifications

	Techniques and tools e.g. DFD, decision tree etc. 4.7 Explain data types, Dictionary and its uses					
	General Objective 5.0: Understand Systems Design					
6-8	5.1 Define Systems Design 5.2 Explain tools for systems Design: pseudocode, flowcharts, activity diagram, Program IDEs, PDL etc. 5.3 Explain the roles of System Designer 5.4 Explain the Golden rules of system design 5.5 Explain Systems Design considerations: input, output, storage design and process	Explain Systems Design and design tools Explain the roles of System Designer Explain Systems Design considerations and Golden rules of system design Describe the different forms of program inputs and outputs Discuss system interface design and human interaction	Marker with White Board PC with Presentation package installed and connected to an multimedia projector Software Integrated Development Environment (IDE) UML Software e.g. ArgoUML, MagicDraw etcc.	Design pseudocodes, flowcharts and activity diagrams of systems Design input, output, and storage components of System based on systems specifications	Guide students to design pseudocodes, flowcharts and activity diagrams of systems Guide students to design input, output, and storage components of systems based on specifications	Demonstrate how to design pseudocodes, flowcharts and activity diagrams of systems Demonstrate how to design input, output, and storage components of systems based on specifications

	5.6 Explain the different forms program inputs and outputs 5.7 Explain system interface design and human interaction 5.8 Explain Object-oriented Design: Class Diagram, activity diagram, deployment diagram etc.	Discuss Object-oriented Design using UML				
	General Objective 6.0: Understand Database Design					
9	6.1 Define Database 6.2 State the importance of database as application backend resource 6.3 Explain Database Design and its importance 6.4 Describe the structures of a database table: collection of fields and table relationships	Explain Database and its importance Explain Database Design and its importance Describe the structures of a database table	Marker with White Board PC with Presentation package installed and connected to an multimedia projector Database Management	Create database designs with structures of relevant tables for database applications Create tables based on table structures in the database design	Guide students to create database designs Guide students to create tables	Demonstrate how to create tables based on database design

			package			
	General Objective 7.0: Understand Systems Development					
10-11	7.1 Explain Systems Development and its tools 7.2 Define computer programming 7.3 Explain the stages in Computer programming 7.4 Define System Testing and debugging 7.5 Explain Test Data and procedure for generating test data 7.6 Explain program errors and Types: syntax, logical; run Time errors etc.	Discuss Systems Development and its tools Explain computer Programming and its stages Explain System Testing and debugging, Test Data and procedure for generating test data Discuss program errors and types	Marker with White Board PC with Presentation package installed and connected to an multimedia projector	Develop simple systems based on their designs Generate test data and used same to test the developed system Debug detected errors in the programs	Guide students to develop simple systems based on their designs Guide students to generate test data and used same to test the developed system, debug errors accordingly	Demonstrate how to develop, test and debug systems
	General Objective 8.0: Understand System Implementation					

12	8.1 Define System implementation 8.2 Explain hardware and software installation 8.3 Explain System Conversion strategies: direct, parallel, phased and pilot	Explain System implementation Discuss hardware and software installation Discuss System Conversion strategies: direct, parallel, phased and pilot	Marker with White Board PC with Power Point installed and connected to an multimedia projector	Perform hardware and Software installation.	Assist students to perform hardware and Software installation	Demonstrate how to install system hardware and software
	General Objective: 9.0: Understand Systems Evaluation					
13	9.1 Define system evaluation 9.2 State the need for system evaluation 9.3 Define System Amendment and Amendment Request 9.4 Explain System Amendment Cost Analysis.	Explain system evaluation Outline the need for system evaluation Explain System Amendment and Amendment Request Discuss System Amendments Cost Analysis	Marker with White Board PC with Power Point installed and connected to an multimedia projector	Design System Amendment Request Form Perform Simple Cost analysis based on amendment request	Assist students to design System Amendment Request Form Assist students to perform amendment Cost analysis	Demonstrate how to design amendment request form and perform amendment cost analysis?
	General Objective 10: Understand Systems Maintenance					
14-15	10.1 Define Systems	Explain Systems Maintenance and its	Marker with White Board	Perform System maintenance based on	Guide students to perform various types of System	Demonstrate how to perform various types of

	Maintenance 10.2 Explain the importance of Systems maintenance 10.3 Explain the different types of System Maintenance 10.4 Explain the roles of Systems users in Systems Maintenance.	importance Discuss the different types of System Maintenance Discuss the roles of Systems users in Systems Maintenance.	PC with Power Point installed and connected to an multimedia projector	Amendment request	maintenance.	systems maintenance
	Assessment Criteria					
	Course work	**Course test 20%**	**Practical 20%**	**Others(Examination/Project/Portfolio) 60%**		

PROGRAMME: NATIONAL DIPLOMA (ND) COMPUTER SCIENCE			
COURSE: PC UPGRADE & MAINTENANCE	**Course Code: COM 126**	**Contact Hours:4 Hours/week**	
GOAL: The course provides the knowledge and skills to begin PC Upgrade & Maintenance			
Year: 1 Semester: 2	**Pre-requisite:**	**Theoretical:**	**1 hours /week**
		Practical:	**3 hours /week**

GENERAL OBJECTIVES:

On completion of this course the student should be able to:

1.0 Understand the concept of upgrading and maintenance for PC.
2.0 Understand the limitation of a PC and scope for upgrading.
3.0 Understand technical specifications for PC upgrading.

PROGRAMME: NATIONAL DIPLOMA (ND) COMPUTER SCIENCE						
COURSE TITLE : PC UPGRADE & MAINTENANCE			**COURSE CODE: COM 126**	**CONTACT HRS: 4/Week**		
COURSE SPECIFICATION: Theoretical Contents				**COURSE SPECIFICATION: Practical Contents**		
	General Objective 1.0 : Understand the concept of upgrading and maintenance for PC.					
Week	**Specific Learning Outcomes**	**Teachers Activities**	**Resources**	**Specific Learning Outcomes**	**Teachers Activities**	**Evaluation**
1	To understand : The need for PC maintenance	To provide: An introduction in PC maintenance. To explain: Typical hazards threatening the normal operation of PC.	White Board. PC loaded with Presentation package and connected to	The ability to: Assess a computer maintenance requirement. Appropriate hardware tools. Protect the computer	To help: Student with their maintenance assessment of a computer. To choose appropriate	Explain typical hazards threatening the normal operation of PC.

		E.g. static electricity, power fluctuation, power surge, dusty environment, excessive ambiance temperature, viruses …….. The need for computer backups	multimedia Projector Online lecture notes	components fromstatic electricity. Clean computer from dust. Clean the computer systems from the viruses. Perform system backup.	hardware tools. How to clean a computer from dust. How to clean a computer from viruses. How to Perform system backup.	
2	To understand : The need for PC upgrade.	To explain: Technological changes in computer hardware. User demand for a higher processing power. The emergence of complicated software package	PC loaded with Presentation package and connected to multimedia Projector Online lecture	The ability to: Assess the require computing power for a new application software.	To provide advice on student assessment of new required computing power.	Explain technological changes in computer hardware.

3	To understand: The process of hardware upgrading. How to choose hardware components for upgrading.	To explain: How to open the case of a PC. How to make a list of components to upgrade. How to get prepared for a component change (obtaining the required hardware/software tools and components). How to check and verify the specifications of new components against the new requirements.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to: Open a computer case and identify components for upgrading. List the current computer components specifications. To choose components that matches the new hardware/software requirements. Verify specifications against requirements.	To show student how to: Open a computer case and identify components for upgrading. List the current computer components specifications. To choose components that matches the new hardware/software requirements. Verify specifications against requirements. To show student how to:	Make a list of components to upgrade. Describe how to check and verify the specifications of new components against the new requirements.

4	To understand : How to replace the computer case.	To explain: How to choose a suitable case which meets specifics requirements. How to dismantle the old computer. How to assemble the upgraded components and the unupgraded components in the new case	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal computers.	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and disassemble a personal computers.	Explain: i. How to choose a suitable case which meets specifics requirements. ii. How to dismantle the old computer. iii. How to assemble the upgraded components and the unupgraded components in the new case
5	To understand : How to replace the computer power supply.	To explain: How to choose a suitable power supply which meets specifics requirements. How to dismantle the old power supply computer. How to assemble the new power supply.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose appropriate new PC power supplies which match the new requirements. Assemble and disassemble computer power supply.	To provide advise and assistance on choosing computer power supply. To provide advise and assistance on Assemble and disassemble a computers power supply.	Explain how to dismantle the old power supply computer.

6	To understand : How to replace the computer mainboard	To explain: How to choose a suitable mainboard which meets specifics requirements. How to dismantle the old mainboard computer. How to assemble the new mainboard.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal computers.	To provide advise and assistance on choosing computer mainboard. To provide advise and assistance on Assemble and disassemble a personal	Explain how to choose a suitable mainboard which meets specifics requirements
7	To understand : How to replace the computer CPU.	To explain: How to choose a suitable CPU which meets specifics requirements. How to dismantle the CPU. How to assemble the new CPU.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal computers.	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and disassemble a	Explain how to assemble new CPU
8 - 9	To understand : How to replace the computer mass storage.	To explain: How to choose a suitable mass storage which meets specifics requirements. How to dismantle the mass storage. How to assemble the	PC loaded with Presentation package and connected to multimedia Projector Online lecture	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and	Explain how to choose a suitable mass storage which meets specifics requirements

	To understand : How to replace the computer display unit.	To explain: How to choose a suitable display unit which meets specifics requirements. How to dismantle the display unit. How to assemble the new display unit.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal computers.	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and disassemble a personal computers.	Explain how to replace the computer display unit
12 - 13	To understand : How to replace the computer add-on cards.	To explain: How to choose a suitable add-on cards which meets specifics requirements. How to dismantle the old add-on cards. How to assemble the new add-on cards.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal computers.	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and disassemble a personal computers.	Explain how to replace the computer add-on cards.

14	To understand : How to replace the computer keyboard and mouse.	To explain: How to choose a suitable keyboard and mouse which meets specifics requirements. How to dismantle the old keyboard and mouse. How to assemble the new keyboard and mouse.	PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	The ability to : Choose an appropriate new PC case which matches the new requirements. Assemble and disassemble personal computers.	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and disassemble a personal computers.	Explain how to replace the computer keyboard and mouse.
15	To understand : How to replace the computer modems.	To explain: How to choose a suitable modems which meets specifics requirements. How to dismantle the old modems. How to assemble the	PC loaded with Presentation package and connected to multimedia Projector Online lecture	The ability to : Choose appropriate new PC cases which match the new requirements. Assemble and disassemble personal	To provide advise and assistance on choosing computer case. To provide advise and assistance on Assemble and	Explain how to replace the computer modems.

Assessment: Give details of assignments to be used: Coursework/Assignments 10%; Course test 10%; Practical 20%; Projects %; Examination 60%

Type of	**Purpose and Nature of Assessment (COM 125)**	**Weighting**
Examination	Final Examination (written) to assess knowledge and	6
Test	At least 1 progress test for feedback.	1
Practical	To be assessed by the teacher	2
Assignment	To be assessed by the teacher	1
Total		**1**

Recommended Textbooks & References:

1. LAWAL, O. N., ADETOBA, B. T., & YEKINI, N. A. (2011). Introduction to System Analysis & Design. Lagos: Has-Fem Nigeria Enterprises. ISBN: 978-978-915-902-4.
2. NBTE (2008). Introduction to System Analysis & Design. Kaduna, Nigeria: National Board for Technical Education [NBTE].

Recommended Textbooks & References:

	Department/ Programme: Computer Science	**Course Code:** **COM 211**		**Credit Hours: 6 hours/week**
	Subject/Course: **PROGRAMMING LANGUAGE USING JAVA 2**			**Theoretical: 2 hours/week**
	GOALS: The course is designed to enable students acquire requisite knowledge of and skills in programming using Java.			
	Year: 2 Semester: 1	**Pre-requisite:**	**COM 123**	**Practical: 4 hours /week**

General Objectives: On completion of this course, the students should be able to:

1.0 Understand Array and collection Processing in Java.

2.0 Understand Event driven programs.

3.0 Know the concept of inheritance, encapsulation and Polymorphism

4.0 Know how to use Java Servlet, and Java Server Pages (JSP)

5.0 Understand Database Access with JDBC

6.0 Understand the process of general enterprise solution using Java

	Course: Programming language Using JAVA	**Course Code: COM 211**			**Credit Hours: 6 hours/week**	
					Theoretical:2 hours/week	
	Year: 1 Semester: 1	**Pre-requisite: COM 127**			**Practical: 4 hours /week**	
	Theoretical Content			**Practical Content**		
Week/s	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
Week/s	**General Objectives: 1. Understand Array and Collection Processing in Java.**					
1-2	1.1 Explain different formats of arrays (a) array of primitive data type. (b) array of objects statement 1.2 Explain with illustration the storage and retrieval process of a 1- dimensional and 2-dimensional array 1.3 Develop a simple array structure program to (a) manipulate objects using vectors, (b) Input array of strings using multi Input box	Explain array of primitive data type Explain how to manipulate objects Explain how to create Stack and Queue data structure Explain a simple array structure program to (a) manipulate objects using vectors, (b) Input array of	White board and marker pen PC Loaded with JAVA Compiler, Presentation package. Multimedia projector	Use object statement	Guide the student on how to write simple array	Write a simple program to demonstrate I and 2-dimensional array

	(c) Create Stacks and Queue data structure 1.3 Define methods that accept array as pointers in simple JAVA program	strings using multi Input box				
	General Objectives 2: Understand Event driven programs					
3-4	2.1 Explain how to place buttons on a Frame 2.2 Describe how to handle events 2.3 Explain how to place controls on a frame 2.3 Write menus 2.4 Describe events handling 2.5Describe other GUI events.	Explain events driven programming with examples -Ask students to run the examples -Give programming exercise on event driven programs.	White board and marker pen PC Loaded with JAVA Compiler, Presentation package. Multimedia projector	Write a simple java event driven program. Illustrate how to place controls on a Frame	Guide the students on how to write a simple java event driven program	Write and run a simple program to generate GUI events
Week/s	**General Objectives:3 Know the concept of inheritance, encapsulation and Polymorphism**					

5-7	3.1 Define classes with inheritance. 3.2 Explain how to apply classes effectively with polymorphism. 3.3 Explain the rules of inheritance and accessibility. 3.4 Explain how constructors of a class are affected by inheritance 3.5 Create instances of abstract super classes and write abstract methods. 3.6 Explain the process involved in writing programs using inheritance, encapsulation and polymorphism.	Explain inheritance, encapsulation and polymorphism Explain the process involved in writing programs using inheritance, encapsulation and polymorphism	White board and marker pen PC Loaded with JAVA Compiler, Presentation package. Multimedia projector	Write and run simple Java program involving inheritance, encapsulation and polymorphism	Guide students to Write and run simple Java program involving inheritance encapsulation and polymorphism	Demonstrate how to develop program involving inheritance encapsulation and polymorphism
	General Objectives:4.0 Know how to use Java Servlet, and Java Server Pages (JSP)					
	4.1 Explain Java Servlets 4.2 Describe the process of developing Servlet (a) Explain how to create and map a Servlet (b) Explain how to map a Servlet with	Explain Java Servlets Explain the process of developing Servlet	White board and marker pen PC Loaded with JAVA	Write a simple program involving sessions and cookies, Expression Language (EL), JSTL	Guide students to Write and run simple Java program involving sessions and cookies, Expression	Demonstrate how to develop program involving sessions and cookies, Expression Language

5-9	the web XML file (c) Explain how to map a Servlet with an annotation (d) Explain how to request Servlet (e) Explain how to use the HTTP GEI methods (f) Explain how to use the POST methods 4.3 Explain how to develop JavaServer Pages 4.4 Explain how to work with sessions and cookies (a) Explain session tracking 4.5 Explain how to use Expression Language (EL) 4.6 Explain how to develop JSP (a) Explain how to code EL and JSTL (b) Explain to code JavaBean (c) Explain how to use standard JSP tags with JavaBeans	Explain with examples how to develop JavaServer Pages Explain with examples how to work with sessions and cookies Explain with examples how to use Expression Language (EL) Explain how to create and use JSTL	Compiler, Presentation package. Multimedia projector		Language (EL), JSTL	(EL), JSTL

	General Objectives:5.0 Understand, Database Access with JDBC					
9-11	5.1 Explain Database access with JDBC 5.2 Discuss application design issues in the web environment 5.3 Describe the basic concept of programming using JavaScript 5.4 Explain with illustration the following (a) Embedding JavaScript in HTML (b) Event driven programming techniques (c) Program control logic (d) Concurrent enrollment 5.5 Discuss life project on Java application in web development	Explain JDBC and its usefulness in linking to remote Database Discuss the process of developing web based application using JavaScript Explain the process of developing mobile applications using JavaScrpt	White board and marker pen PC Loaded with JAVA Compiler, Power point package. Multimedia projector	Develop application using Java	Guide students on how to develop database application using Java	Explain the process of writing database application using Java
	General Objectives:6.0 Understand the process of general enterprise solution using Java					
12-15	6.1 Explain what enterprise solution is all about 6.2 Explain the process of developing enterprise solution 6.3 Explain application areas of enterprise solutions	Explain what enterprise solution is all about Explain the process of developing enterprise solution Explain application areas of enterprise solutions	PC Loaded with JAVA Compiler, Power point package. Multimedia projector	Develop different enterprise solutions	Guide students on how to develop different enterprise solutions	Explain the process of writing enterprise solution

Assessment: Give details of assignments to be used:

Coursework/ Assignments %; Course test20 %; Practical %; Projects 20 %; Examination 60 %

Type of Assessment	Purpose and Nature of Assessment **(COM 211)**	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feed back.	20
Practical / Projects	To be assessed by the teacher	20
Total		100

Recommended Textbooks & References:

	Department/ Programme: **Computer Science (ND)**	**Course Code:** **COM 212**		**Contact Hours : 5 hrs/week**
	Subject/Course: Introduction To Systems Programming			**Theoretical: 2hours/week**
	GOALS: This course is designed to enable students acquire knowledge and skills in systems programming			
	Year: II Semester: I	**Pre-requisite:**	**COM101**	**Practical: 3hours /week**

General Objectives: On completion of this course the students should be able to:

1.0 Understand the general concepts of systems programming.

2.0 Understand Assembler and Assembly Processes

3.0 Understand the compilation process

4.0 Understand the use of utilities and libraries.

5.0 Understand the functions of Operating System

6.0 Understand Input/Output (I/O) device handlers

	Course: Computer Science (ND)		**Course Code: COM 212**		**Credit Hours: 5 hrs/week**	
					Theoretical: 2hours/week	
	Year: II Semester: I		**Pre-requisite:**		**Practical: 3hours /week**	
	Theoretical Content			**Practical Content**		
	General Objective 1.0: To understand the general concepts of systems programming.					
Week/s	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
1-2	1.1 Explain the concept of system programming 1.2 Distinguish between systems programs and application programs. 1.3 Explain the following types of system programs –Assembler, operating system, firmware, I/O routines, Compilers. Interpreters, Schedulers, loaders and linkers and run time libraries.	Define systems programming. Define Application Programming Differentiate between systems programs and application programs. Discuss the types and functions of systems and application programs	PC Loaded with Assembler application programs presentation package Multimedia projector	Describe and illustrate with examples system program using assembly language	Guide the students to view a source assembly language and application programs in the computers	Demonstrate how to achieve simple tasks using system programs
	General Objective 2.0: Understand Assembler and Assembly Processes					

4-6	2.1 Explain the general format of an Assembly program statement. 2.2 Discuss the structure of assembly language fields. 2.3 Explain the meaning of symbolic operations. 2.4 Distinguish between 1-pass and 2-pass assembler with example	Describe the general format of an Assembly (language program statement. (Label, opcode, Address, correct) Explain the purpose of each field of assembly language statement. List some examples and uses of operation code List examples of symbolic operations.	White board and marker pen PC Loaded with Assembler application programs presentation package Multimedia projector	To be able to write a simple assembly language program using the general format.	To assist students in writing simple assembly language program using the general format.	Demonstrate how to write simple assembly language program using general format

	General Objective 3.0: Understand the compilation process.					
6	3.3 Define translation, compilation and interpretation. 3.4 Explain the various stages of translation. 3.5 Describe the purpose and function of the following – tokens and delimiters – sentence recognition . – scanning process 3.6 Describe multi-pass and single-pass compilation. --Explain the load and go process. 3.7 Explain code generation and code optimization	State the differences between translation, Compilation and interpretation. Identify major differences between multi-pass and single-pass compilation.	White board and marker pen PC Loaded with Assembler application programs presentation package Multimedia projector	Write and compile a simple assembly language program and handle the errors	To assist the students in writing and compiling a simple assembly language program and handle the errors	write a simple assembly language program to demonstrate the summation of two numbers
	General Objective 4.0: Understand the use of utilities and libraries.					
8-9	4.1 Explain utilities program 4.2 Describe the meaning and uses of utilities and list example of utilities and libraries. 4.3 Describe libraries and list examples on use	Explain libraries and utilities with examples Discuss the differences between the functions of libraries and utilities Explain the relationship	White board and marker pen PC Loaded with Assembler	write and compile simple libraries and utilities assembly language program.	To assist the students to write and compile simple libraries and utilities assembly language	State the differences between utilities and libraries.

	libraries 4.4 Explain the relationship between utilities and libraries	between utilities and libraries	application programs presentation package Multimedia projector		program.	
	General Objective 5.0: Understand the functions of Operating System.					
10 – 12	5.1 Define Operating System 5.2 Discuss the historical development of operating systems. 5.3 Explain the importance and uses of operating • System. 5.4 Explain Batch processing, multiprogramming; multiprocessing, time-sharing. 5.6 Explain Batch, real-time, time sharing and network operating system 5.7 Explain with examples system commands of MS-DOS, Unix, Windows operating systems.	Explain Operating System and historical development of operating systems. Explain the importance and uses of operating • System. Explain Batch processing, multiprogramming; multiprocessing, time-sharing. real-time, and network operating system Explain with examples system commands of MS-DOS, Unix, Windows operating systems., time-sharing.	White board and marker pen PC Loaded with Assembler application programs presentation package Multimedia projector	Write and run program in different operating system such as unix and windows	Guide students to write and run program in different operating system such as unix and windows	Demonstrate how to write and run simple program in different operating system such as unix and windows

	General Objective 6.0: Understand I/O device handlers.					
13 - 15	6.1 Explain the process of handling1/0 6.2 Explain the concept of interrupts s and traps. 6.3 Explain Interrupt handling process. 6.4 Explain the operation of pooling 6.5 Explain the CPU activity in interrupt mode and pooling and the CPU status.	Explain with examples the process of handling 1/0 and the concept of interrupts s and traps. Explain how Interrupt handling processes work. Explain the operation of pooling, CPU activity in interrupt mode and pooling and the CPU status.	White board and marker pen PC Loaded with Assembler application programs presentation package Multimedia projector	Write and run a simple interrupt program using assembly language	Guide the student on how to write and run a simple interrupt program using assembly language	Demonstrate how to write and run a simple interrupt program using assembly language

Programme: National Diplôma (ND) Computer Science		
Course: Unified Modelling Language (UML)	**Course Code: COM 213**	**Contact Hours: 4 hours/week**
GOAL: This course is designed to provide the students with knowledge of and skills in Unified Modeling Language		
Year: 2 Semester: 1	**Pre-requisite: COM 113**	**Theoretical: 2 hours /week** **Practical: 2 hours /week**

GENERAL OBJECTIVES: On completion of this course the student should be able to:

1.0 Understand the Basic Concepts of Systems Modelling

2.0 Understand the Principles of Unified Modeling Language

3.0 Understand Object-oriented Modeling

4.0 Understand Conceptual Models

5.0 Understand Implementation Models

6.0 Understand Use Case Diagrams

7.0 Understand Activity Diagrams

8.0 Understand State Chart Diagrams

9.0 Understand Interaction Models

10.0 Understand System Model Conversion

PROGRAMME: NATIONAL DIPLOMA (ND) COMPUTER SCIENCE						
COURSE TITLE : Unified Modeling Language				**COURSE CODE: COM 213**	**CONTACT HRS: 4/Week**	
Theoretical Contents				**Practical Contents**		
Week	**Specific Learning Outcomes**	**Teachers Activities**	**Resources**	**Specific Learning Outcomes**	**Teachers Activities**	**Evaluation**
General Objective 1.0: Understand the Basic Concepts of Systems Modelling						
1-2	1.1 Define Systems Modeling 1.2 Explain the importance Of Systems Modeling 1.3 Explain types of System Modeling: functional, architectural etc. 1.4 Explain the Principles of modelling: proper choice of model, level of precision, connection to reality etc. 1.5 Explain System Models and Types 1.6 Define System Modeling Tool 1.7 List examples of System Modeling Tools: UML, SysML Designer, Agilian etc.	Explain System Modeling, types and its importance Discuss the Principles of modelling Discuss System Models and types Explain System Modeling Tools and examples	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Identify various models of software systems	Guide students to identify various models of software systems	What are the types of system models? Explain System Modeling and list examples of modeling tools? Why is system modeling important in software process?

General Objective 2.0: Understand the Principles of Unified Modeling Language						
3-4	2.1 Define Unified Modeling Language (UML) 2.2 Explain Origin of UML 2.3 Outline the Uses of UML 2.4 Explain the types of UML diagrams 2.5 Explain the relevance of UML in Unified Software Development Process 2.6 Explain UML Symbol Set 2.7 Describe the various types of UML Software: MagicDraw, ArgoUML, Gliffy, LucidChart, MS Visio etc.	Explain UML, its Origin and Uses Describe the various types of UML diagrams and symbol sets Discuss the relevance of UML in Unified Software Development Process Describe the various types of UML Software	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Identify various UML Symbol sets	Guide students to identify various UML Symbol sets	What are the types of UML Software? What are types of UML diagrams and symbol sets?

General Objective 3.0: Understand Object-oriented Modeling						
5-6	3.1 Explain Object-oriented modeling 3.2 Explain Object oriented analysis & design 3.3 Explain the benefits of Object oriented modelling 3.4 Explain System and Object Orientation 3.5 Explain Object oriented system concepts: object, Class, polymorphism, Component, Abstraction, encapsulation, interface, Inheritance etc. 3.6 Explain State of an object, events, transitions and Messages	Discuss Object-oriented analysis, design and modeling Discuss the benefits of Object oriented modelling Explain System and Object Orientation Discuss Object oriented system concepts Discuss State of an object, events, transitions and Messages	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Identify various types of object-oriented models	Guide students to identify various types of object-oriented models	What are the benefits of Object-oriented modeling? Distinguish between object, Class, Component, polymorphism, encapsulation, and Inheritance?
General Objective 4.0: Understand Conceptual Models						
7-8	4.1 Explain conceptual diagrams and types 4.2 Define Class Diagram 4.3 Explain the uses of Class Diagrams 4.4 Define Object Diagram	Explain conceptual diagrams and types Explain Class Diagram and its uses Explain Object Diagram and its uses	White Board. PCs with UML software PC loaded with Presentation	Create conceptual models of selected systems using class diagrams Create conceptual	Demonstrate how to create conceptual models of selected systems using class diagrams Demonstrate how to create conceptual models of selected	What is conceptual diagram? State the uses of object diagrams and class diagrams? What is the

	4.5 Explain the uses of Object Diagrams 4.6 Explain the process of modeling with Class Diagrams 4.7 Explain the process of modeling with Object Diagrams	Discuss the process of modeling with Class Diagrams Explain the process of modeling with Object Diagrams	package and connected to multimedia Projector Online lecture notes.	models of selected systems using Object diagrams	systems using Object diagrams	process of modeling with object diagrams and class diagrams?
General Objective 5.0: Understand Implementation Models – (Component and Deployment Diagrams)						
9-10	5.1 Explain Implementation diagrams and Types 5.2 Define Component Diagram 5.3 Explain the uses of Component Diagrams 5.4 Define Deployment Diagram 5.5 Explain the purpose of Deployment Diagrams 5.6 Explain the process of modeling with Component diagrams 5.7 Explain the process of modeling with Deployment diagrams	Explain Component Diagram, Deployment Diagram and their uses Discuss the process of modeling with Component diagrams and Deployment diagrams	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Create implementation models of selected systems using component diagrams Create implementation models of selected systems using deployment diagrams	Demonstrate how to create implementation models of selected systems using component diagrams Demonstrate how to create implementation models of selected systems using deployment diagrams	Demonstrate how to model with component diagrams and deployment diagrams?

General Objective 6.0: Understand Use Case Diagrams						
11	6.1 Define Use Case Diagram 6.2 State the uses of Use Case diagram 6.3 Explain the Basic Elements and Notation of Use Case Diagram 6.4 Explain types of Use Cases 6.5 Explain Use Case Specification & Use Case Template 6.6 Explain the process of modeling with Use Case diagrams	Explain Use Case Diagram, its basic Elements and Notations Explain types of Use Cases, Use Case Specification and Template Discuss the process of modeling with Use Case diagrams	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Create Use Case models of selected systems using Use Case diagrams	Guide students to create Use Case models of selected systems using Use Case diagrams	What are the uses of Use Case Diagram? What are the basic elements and Notations of Use Case Diagrams? Demonstrate how to model with Use Case diagrams?
General Objective 7.0: Understand Activity Diagrams						
12	7.1 Define Activity Diagram 7.2 State the uses of Activity diagram 7.3 Explain the Basic Elements and Notation of Activity Diagram 7.4 Explain the process of modeling with Use Case diagrams	Explain Activity Diagram and its uses Discuss the Basic Elements and Notation of Activity Diagram Discuss the process of modeling with Use Case diagrams	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector	Create Activity models of selected systems using Use Activity diagrams	Guide students to create Activity models of selected systems using Use Activity diagrams	What are the uses of Activity Diagram? What are the basic elements and Notations of Activity Diagrams? Demonstrate how to model with Activity diagrams?

			Online lecture notes.			
General Objective 8: Understand State Chart Diagrams						
13	8.1 Define State Chart Diagram 8.2 State the uses of State Chart diagram 8.3 Explain the Basic Elements State Chart Diagram: Transitions, State Actions, Entry Point, Exit Point, History States, Concurrent Regions 8.4 Explain the process of modeling with State Chart diagrams	Explain State Chart Diagram and its uses Discuss the Basic Elements State Chart Diagram Discuss the process of modeling with State Chart diagrams	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Create State models of selected systems using Use State Chart diagrams	Guide students to create State models of selected systems using Use State Chart diagrams	What are the uses of State Chart Diagram? What are the basic elements and Notations of State Chart Diagrams? Demonstrate how to model with State Chart diagrams?
General Objective 9: Understand Interaction Models – (Sequence and Collaboration Diagrams)						
14	9.1 Explain Interaction diagrams and Types 9.2 Define Sequence Diagram 9.3 Explain the uses of Sequence Diagrams 9.4 Explain the Elements and Notations of Sequence Diagrams	Explain Sequence Diagrams and their types Discuss the Elements and Notations of Sequence Diagrams Discuss the process of modeling with Sequence diagrams	White Board. PCs with UML software PC loaded with Presentation package and connected to	Create Interaction models of selected systems using Sequence diagrams Create Interaction models of selected systems	Demonstrate how to create interaction models of selected systems using Sequence diagrams Guide students to create Interaction models of selected systems using collaboration diagrams	What are the uses of Sequence Diagram? Demonstrate how to model with Sequence diagrams and Collaboration Diagrams?

	9.5 Explain the process of modeling with Sequence diagrams 9.6 Define Collaboration Diagram 9.7 Explain the uses of Collaboration Diagrams 9.8 Explain the process of modeling with Collaboration diagrams	Explain Collaboration Diagram and its uses Discuss the process of modeling with Collaboration diagrams	multimedia Projector Online lecture notes.	using collaboration diagrams		
General Objective 10: Understand System Model Conversion						
15	10.1 Define System Model Conversion 10.2 Explain the importance of Model Conversion 10.3 Explain the process of converting UML diagrams into program code e.g. Java, C++, XML etc. 10.4 Explain the process of converting program code into UML diagrams	Explain System Model Conversion Discuss the importance of Model Conversion Discuss the process of converting UML diagrams into program code e.g. Java, C++, XML and vice versa	White Board. PCs with UML software PC loaded with Presentation package and connected to multimedia Projector Online lecture notes.	Convert sample UML diagrams into program code Convert sample program code into UML diagrams	Demonstrate how to convert sample UML diagrams into program code Demonstrate how to convert sample program code into UML diagrams	What is the importance of system model conversion? Demonstrate how to convert UML diagrams into program code and vice versa?

Recommended Textbooks & References:

1. **Aigbokhan E. E. (2016)** Unified Modelling Language for Object-Oriented Analysis & Design.
2. **Bennett S, Skelton J. & Lunn K. (2001),** Schaum's Outline of UML, McGRAW-HILL International, UK.
3. **Booch G, Rumbaugh J. & Jacobson I. (1998),** The Unified Modeling Language User Guide, Addison-Wesley.

4. **Donald Bell (2003)**, UML basics: An introduction to the Unified Modeling Language Rational Software
5. **Rumbaugh J., Jacobson I., & Booch G. (2005)**, The Unified Modeling Language Reference Manual, Second Edition, Addison-Wesle

Department/ Program: ND Computer Science	**Course Code:**	**COM 214**	**Contact Hours: 5 hours/week**
Subject/Course: Computer Systems Troubleshooting I			**Theoretical: 1 hours/week**
Year: Two Semester: One	**Pre-requisite:**		**Practical: 4 hours /week**

General Objectives:

The course Provides the knowledge and skills to begin to repair Hardware

1. Understand the process of Computer system fault diagnosis.
2. Understand computer system peripheral failures.
3. Understand virus protection utility failure and software diagnostic tools.
4. Understand networks failure symptoms

Department/ Program: ND Computer Science		**Course Code:**	**COM 216**	**Credit Hours: 5 hours/week**
Subject/Course: Computer Systems Troubleshooting				**Theoretical: 1 hours/week**
Year: Two **Semester: One**		**Pre-requisite:**		**Practical: 4 hours /week**
	Theoretical Content			**Practical Content**

General Objective 1: Understand the process of Computer system fault diagnosis

Week/s	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
1 -6	1.1 Explain various components of computer system 1.2 Explain Power on self test. 1.3 Explain Power fault diagnosis.	Describe various components of computer system for example motherboard, RAM, Processor, power supply connections, and other PC components.	PC, Multimedia, Diagnostic package, Presentation Package and	identify procedures for installing/adding a device, including loading/adding/configuring device drivers and required software Complete the fault report form.	Guide students: To complete the fault report form. Specify the POST error Messages Check the	Explain various components Explain different Software diagnostic tests for Hardware

	1.4 Explain different software diagnostic tests for hardware	Explain Power on self test, Power fault diagnosis and how to complete a fault report form. Explain different software diagnostic tests for hardware	Smart/White board	Specify the POST error Messages. Check the motherboard and other PC components power supply.	motherboard and other PC components power supply.	
	1.5 Explain causes of start up failure	Explain: Why the display is on but several beeps heard. Why no beeps were heard, but the POST runs and the system starts up normally with faults.	PC, Multimedia, Diagnostic package, Presentation Package and Smart/White board	Identify and fix different types of fault from hearing the beeps. Identify the type of faults from the error messages. Remedy the fault by taking appropriate hardware/software repair and /or re-instalment.		

	How to take note off the fault message from the screen. Why the power LED is on but nothing else happened. Why the system does not switch on		Recognise POST error message code as an indication of a memory problem. Rectify memory problem by reinsertion or replacement.		
1.6 Explain the cause of hard drive failure	Explain: How to recognise POST error message code as memory failure. Memory failure remedy.	PC, Multimedia, Diagnostic package, Presentation Package and Smart/White board	Identify and fix different types of hard drive faults Use Software diagnostic packages to test and fix hardware.	Guide students to: Identify and fix different types of hard drive faults and use Software diagnostic packages	

1.7 Explain the cause of CD-ROM drive failure.	To explain: How to recognise POST error message code as CD-ROM failure Why data cannot be accessed from the CD-ROM drive. Why the CD-ROM drive is not registered.	PC, Multimedia, Diagnostic package, Presentation Package and Smart/White board	Identify and fix POST error message code as CD-ROM failure, why data cannot be accessed from the CD-ROM drive, why the CD- ROM drive is not registered and etc.	Guide students to fix CD-ROM faults	Explain the cause of CD-ROM drive failure
1.8 Explain the cause of display system failure.	Explain: How to test the monitor connections. How to test monitor power	PC, Multimedia, Diagnostic package, Presentation Package and	Identify and fix: Monitor connection, power, video card etc. Replace video card on motherboard if the video card is embedded in the	Guide students to: Identify and fix: Monitor connection, power, video card etc.	Give synopses of Computer display system failure

	supply. How to test a video card and reseat to check its functionality again. How to replace the video card. How to replace the motherboard if the video card is embedded in the motherboard. Operating Systems(OS) display properties. Display adaptor in device manager	Smart/White board	motherboard. Use Operating Systems(OS) display properties. Display adaptor in device manager	Replace video card on motherboard if the video card is embedded in the motherboard. Use Operating Systems(OS) display properties.	
1.9 List examples of external device	**To explain:**	PC, Multimedia,	**The ability to** :	**To help student to** : Recognise POST	Explain the cause of external

	1.10 Explain the cause of external devices failure	How to recognise POST error message code as external devises failure. To list possible hardware faulty: E.g. flash disk not detected. Scanner failure External DVD not detected. External devises failure remedy.	Diagnostic package, Presentation Package and Smart/White board	Recognise POST error message code as an indication of a external devises problem. Rectify the external devises problem by reinsertion or replacement	error message code as an indication of an external devises problem. Rectify the external devises problem by reinsertion or replacement	devices failure
	1.11 Explain causes of Keyboard/Mouse error	To explain: Why the mouse/keyboard are not recognised in an Operating System (OS) example window, Linus	PC, Multimedia, Diagnostic package, Presentation Package and	Identify and fix: Keyboard errors Mouse errors in different OS	Guide students to: Identify fix: Keyboard errors Mouse errors in different OS	Give common Keyboard and Mouse error messages

		etc. Why the cursor may be difficult to move. Why the cursor movements may be jerky. Why some keys may not function properly.	Smart/White board			
	General Objective 2: Understand computer system peripheral failures.					
7-10	2.1 Explain computer system peripherals 2.2 Explain the cause of serial, parallel and USB port failure.	**To explain:** How to recognise POST error message code as serial, parallel and USB failure. Serial, parallel and USB failure	PC, Multimedia, Diagnostic package, Presentation Package and	**The ability to** : Recognise POST error message code as an indication of a serial, parallel and USB problem. Rectify the serial, parallel and USB problem by	**To help student to** : Recognise POST error message code as an indication of a serial, parallel and USB problem. Rectify the serial,	

		remedy.	Smart/White board	reinsertion or replacement	parallel and USB problem by reinsertion or replacement	
	2.3 Explain the cause of printer's failure.	**To explain:** How to recognise POST error message code as printer's failure. To list possible: Hardware faulty: E.g. connection problems. Power fault Software faulty: E.g. driver installation Conflict Printer's failure remedy.	PC, Multimedia, Diagnostic package, Presentation Package and Smart/White board	**The ability to** : Recognise POST error message code as an indication of a printer's problem. Rectify the printers problem by reinsertion or replacement	**To help student to** : Recognise POST error message code as an indication of a printer's problem. Rectify the printers problem by reinsertion or replacement	

	2.4 Explain the cause of MODEM failure.	**To explain:** How to recognise POST error message code as MODEM failure. MODEM failure remedy.	PC, Multimedia, Diagnostic package, Presentation Package and Smart/White board		**To help student to** : Recognise POST error message code as an indication of a MODEM problem. Rectify the MODEM problem by reinsertion or replacement Investigate a possible hardware faults.	
	General Objective 3: Understand virus protection utility failure and software diagnostic tools					
11-12	3.1 Define Virus 3.2 List examples of Virus 3.3 Explain virus	**To explain:** How to recognise POST error message code as virus protection utility	PC, Multimedia, Diagnostic package,	**The ability to** : Recognise POST error message code as an indication of a virus protection utility problem.	**Guide students to** : Recognise POST error message code as an indication of a virus protection utility problem.	Explain virus protection utility failure

	protection utility failure.	failure. virus protection utility failure remedy.	Presentation Package and Smart/White board	Rectify the virus protection utility problem by reinsertion or replacement	Rectify the virus protection utility problem by reinsertion or replacement	Give examples of Virus
	General Objective 4: Understand networks failure symptoms					
13-15	4.1 Explain Network, and how to setup a network 4.2 Explain the cause of networks failure.	**To explain:** How to recognise POST error message code as networks failure. Networks failure remedy	PC, Multimedia, Diagnostic package, Presentation Package and Smart/White board	**The ability to** : Recognise POST error message code as an indication of a networks problem. Rectify the networks problem by reinsertion or replacement	**To help student to** : Recognise POST error message code as an indication of a networks problem. Rectify the networks problem by reinsertion or replacement	

Programme: Computer Science (National Diploma)	Course Code: COM 215	Contact Hours: 6 hours/week
Course: Computer Application Packages II		Theoretical: 2 hours /week
Year: 2 Semester: I	Pre-requisite: COM 123	Practical: 4 hours /week

Goal: This course is designed to enable the student to acquire a better understanding of standard computer packages.

General Objectives: On completion of this course, the diplomats will be able to:

1. Understand how to use common graphic application packages
2. Understand the process of Desktop Publishing
3. Understand the concepts in Computer Aided Design.
4. Understand Database Management System.

	Theoretical Content			**Practical Content**		
	General Objective 1: Understand common graphics packages					
Week	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
1	1.1 Explain different types of graphic representations e.g. pictures, drawings, charts, animations, etc. 1.2 Explain application areas of graphic packages.	Define Graphic images Explain types of Digital image file: TIFF, JPEG, GIF, PNG, etc. Explain features of: Greeting cards, flyers, posters, Newsletters, Brochures	PC Multimedia projector Graphic application packages	Demonstrate basic understanding of graphic applications.	Identify different graphic Application Packages.	What are the most commonly used graphics packages and what are their functions?
	1.3 Explain the interface and design space of Graphic Packages.	Explain the Menus and Toolbox of a graphic design application.	PC Multimedia	Identify different tools in the toolbox.	Explore the toolbox and other features of	What is the process of creating and saving a

2	1.4 Explain various tools and their functions in graphic application packages. 1.5 Explain how to create a simple graphic design.	Explain the process of creating and saving a design document. Explain how to manipulate Fonts and Images Explain how to use colors	projector Graphic application packages	Design a business card that has text and a logo. Apply color to an object and create an outline.	the interface. Demonstrate how to create and save documents, use fonts, resizing, rotating and moving documents. Guide students to design a business card	design document? What are the basic the basic tools needed to manipulate text and graphic?
	General Objective 2: Understand the process of Desktop Publishing					
	2.1 Explain the design tools used for Desktop Publishing 2.2 Demonstrate the basics of using vector graphics and node	Demonstrate the interfaces of different Desktop Publishing Packages Carryout an overview of	PC Multimedia projector	Demonstrate basic understanding of Desktop Publishing Applications packages.	Guide students in creating a side-fold greeting card.	What are vector graphics? What are the

3	editing for graphics and text	different graphic application packages. Identify the strengths and weaknesses of different Graphic Application Packages.	DTP application packages	Creating a side-fold greeting card for an event Create a standard page poster that includes text and photo.	Guide students in designing a poster that includes text and photo.	key Node editing features?
4-5	2.3 Explain the process of using graphic software to produce a newsletter and a flyer. 2.4 Explain the use of various formatting tools in a graphics package. 2.5 Explain how to format a document into columns, how to use text wrap, and how to create Drop Caps.	Explain layout and formatting of newsletters and flyers	PC Multimedia projector DTP application packages	Create a two-page newsletter Create columns and wrap text around graphics Create drop caps.	Guide students in creating a two-page newsletter with columns, text wrap, and drop caps.	What is the process of designing a Newsletter and what are the design tools needed?

6	2.6 Explain the process of designing brochures and letterheads.	Identify the design tools needed for creating Brochures and Letterheads.	PC Multimedia projector DTP application packages	Create a three-panel brochure for a business enterprise. Create a multiple page brochure for an educational institution. Create a letterhead with logo.	Guide students to design a letterhead. Guide students to create various kinds of brochures.	Explain the process of designing a multiple brochure.
7	2.7 Explain how to add 3D effects to text and objects.	Let students design using samples from templates and clip arts.	PC Multimedia projector DTP application	Create a short slideshow that includes charts, graphs and 3D bitmap effects	Demonstrate how to use Callouts and Connectors for creating chart and the Ellipse tool to draw	What is the process of adding 3D effects to texts and objects.

			packages		pie shapes.	
	General Objective 3: Understand the concept of computer aided design.					
8-9	3.1 Explain the concept of Computer Aided Design (CAD) 3.2. Explain the interface and design space of CAD applications (like AutoCAD, CAD, SmartDraw, etc.) 3.3 Explain layout planning and plotting 3.4 Understand how to create 3D images.	Explain the basics of CAD applications (like AutoCAD, CAD, SmartDraw, etc.) Explain drawing with precision using CAD Applications. . Explain controlling the drawing display.	PC Multimedia Projector CAD Applications (like AutoCAD, CAD, SmartDraw, etc.)	Create a basic design using a CAD applications Set Running Object Snaps Apply Object Snap Overrides Use Polar Tracking to display alignment paths	Guide students to create a design using a CAD application Illustrate how to set Running Object Snaps Illustrate how to override Object Snaps Demonstrate how to use Polar	Explain the concept of Computer Aided Design Explain the functions of basic design tools in a CAD application.

				Use Object Snap Tracking	Tracking Demonstrate how to use Object Snap Tracking	
10	3.5 Explain Blocks and Attributes 3.6 Explain layers	Define Blocks and explain their functions Outline the steps involved in creating attribute definitions. Explain Layer and its significance in CAD.	PC Multimedia Projector CAD Applications (like AutoCAD, CAD, SmartDraw, etc.)	Create a Block Use dynamic blocks in a drawing. Use Blocks with Design Center Use Blocks with Content Explorer	Demonstrate the steps involved in creating Blocks. Illustrate the steps in creating, editing, and deleting attributes. Illustrate the steps for inserting Blocks.	Explain Blocks and Attributes. What are their relevance in design?

				Use attributes to add text to a Block. Create Layer with a Layer Standard	Illustrate how to Work with Dynamic Blocks Guide students to create Layers with Layer Standard	
11-12	3.7 Explain Layouts 3.8 Explain how to setup a Layout	Explain Layouts and their significance to design.	PC Multimedia Projector CAD Applications (like AutoCAD, CAD, SmartDraw, etc.)	Plan a layout and carryout plotting. Create three-dimensional images Create layering, projection types and solid	Demonstrate how to plan a layout and carryout plotting. Illustrate how to Create three-dimensional images Demonstrate how to create layering,	What is a layout? Explain the steps to setup a layout.

				modelling	projection types and solid modelling	
	General Objective 3 (COM 215): Understand database management.					
13	3.1 Explain the functions of a Database Management System (DBMS) e.g. Microsoft Access, MySQL, SQL, etc. 3.2 Explain the features of a DBMS 3.3 Explain the building blocks of a Database..	Explain the tools and menus in a DBMS Define Fields, Records, Tables, Forms and Views Explain different Data Types: Numeric, String, Boolean, Date, etc. Give examples of DBMS operations (update, sorting, etc.)	PC connected to a Projector Relational DBMS	Apply a DBMS to Create, Save, and Retrieve Personnel information	Demonstrate how to Create, Save and Retrieve information from a database.	What is a DBMS? Describe the building blocks of a database.

14	3.4 Explain basic database operations.	Explain Queries, update, sorting, etc.	PC connected to a Projector Relational DBMS	Carry out the following: using the records above: Find and sort data Create queries and forms	Illustrate how to carry out the following database operations: Find and Sort Data Work with Queries and Forms	
15			PC connected to a Projector Relational DBMS	Create personnel report using the records above. Print personnel report.	Demonstrate how to create Reports and Print Reports	

Programme: Computer Science (National Diploma)	Course Code: COM 216	Contact Hours: 3
Course Title: Statistics for Computing II	**Semester: 2**	**Theoretical: 2 hour /week**
Year: 1	**Pre-requisite:**	**Practical: 2 hour /week**

Goal: This course is designed to enable students to acquire a basic knowledge of SPSS Package Tools

General Objectives: On completion of this course the diplomate, should be able to:

1.0 Understand the main facture of SPSS (Statistical Package for Social Science)

2.0 Understand the use of SPSS Graphical User Interface (GUI) effectively

3.0 Understand how to perform descriptive analyses with SPSS and Ms Excel ER

4.0 Understand how to perform common parametric and non-parametric test

5.0 Understand how to perform simple regression and multivariate analyses

	Theoretical Content			**Practical Content**		
	General Objective 1: Understand the main features of SPSS(Statistical Package for Social Science)					
Week	**Specific Learning Outcomes**	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Evaluation
1	1.2 Define SPSS Package 1.3 Identify SPSS general features 1.3 Identify the Importance of SPSS	Explain the main features of SPSS Explain the general aspect, workflow and critical issues Explain Functions, Menus and commands	Books of recorded statistics Internet			Explain SPSS Identify general Features of SPSS Explain Sorting, Transpose in SPSS
2	1.4 Describe File management in SPSS 1.5 Explain data file Storage and Retrieval	Explain file management in SPSS Explain data file Storage and Retrieval Explain the importance of SPSS	Books of recorded statistics Internet			Explain how to store and retrieve files
	General Objective 2¸Understand the Use of SPSS Graphical User Interface (GUI) effectively					

3	2.1 Define Variable, 2.2 Describe Manual Data input 2.3 Explain Automated Data Input and file import	Define Variable and Explain variable view spreadsheet Explain Manual Data Entry Describe how to generate data and Import file using computer system	Textbooks Lecture notes Internet PCs	Demonstrate the concept of Variable Use computer system to generate data	Demonstrate the concept of Variable Illustrate how to generate data online	Describe variable Explain the various methods of data Input
4	2.4 Explain Data Transformation 2.5 Explain syntax files and scripts 2.6 Explain Output Management	Explain Data Transformation Explain Syntax files and scripts Explain output Management	Textbooks PCs	Explain Data Tranformation	Illustrate how to Transform Data	Explain Data Transformation
	General Objective 3: Understand how to perform descriptive analyses with SPSS					

5	3.1 Explain Frequencies 3.2 Explain Descriptive Analysis 3.3 Explain Explore	Explain Frequencies Explain Descriptive Explain Explore	Textbooks Ms. Excel	Categorise various data collected	Explain and supervise student exercises and student work	Explain frequency,Descriptive, Explore
6	3.3 Explain Crosstab 3.4 Explain Charts	Explain Crosstab Explain and discuss Charts	Textbooks Ms. Excel Hard disk, Flash drive, CD, internet etc	Illustrate Crosstab and Chart	Explain crosstab and Chart	Explain Explain Crosstab and Chart
	General Objective 4 : Understand how to perform common parametric and non-parametric test					
7	4.1 Identify and Explain different statistical test: Mean, T_test, One-way ANOVA, Non Parametric test, Normality test	Explain and discuss various types of statistical tests	Textbooks Statistical tables	Identify the various types of statistical table	Demonstrate how to identify the various types of statistical tables	Enumerate the various types of statistical tables
8	4.3 Explain Correlation and Regression: - Linear Correlation and Regression, - Multiple regression (Linear)	Explain Linear Correlation and Regression Explain Multiple regression (Linear)	Statistical tables, PCs, Charts, Ms. Excel	Demonstrate how to construct scattered diagrams, frequency tables and graphs	Demonstrate by examples how to construct scattered diagrams, frequency tables and	Explain how to construct frequency tables and graphs Enumerate the merits and demerits of charts and diagrams

					graphs	
	General Objective 5: Understand how to perform simple regression and multivariate analyses					
9	5.1 Explain Factor Analysis 5.2 Explain Cluster Analysis	Define and Explain Factor Analysis Define and Explain Cluster Analysis	Text books	Analyse data using Factor analysis Analyse data using cluster analysis	Guide students to analyse data using factor analysis	Explain factor and cluster analysis
10-12	5.3 Analyse Data using SPSS	Explain how to analyse data using SPSS	PCs SPSS package	Analyse data using SPSS	Guide students to analyse data using SPSS	Use SPSS to analyse data

Programme: Computer Science (National Diploma)	**Course Code: COM 221**	**Contact Hours: 3**
Course Title: BASIC COMPUTER NETWORKING	**Semester: 2**	**Theoretical: 2 hour /week**
Year: 1	**Pre-requisite:**	**Practical: 2 hour /week**

Goal: This course is designed to equip students with the practical knowledge in computer networking.

General Objectives: On completion of this course the diplomate, should be able to:

1.0 Understand the basic Concepts of Computer Networking

2.0 Know the Hardware Components of Computer Networks and their Functions

3.0 Understand Network Planning and Design

4.0 Know the Different Types of Network Connections

5.0 Understand the Open System Interconnection (ISO) Model and the TCP/IP Model

6.0 Understand IP Address on Networks using IPv4 and IPv6

7.0 Understand Wireless Network Access

PROGRAMME: **ND COMPUTER SCIENCE**						
COURSE: Basic Computer Networking				**COURSE CODE: COM 221**		**CREDIT HOURS: 2**
YEAR: 2	**SEMESTER: 2**	**PRE: REQUISITE**		**Theoretical: 2 hours**	**Practical: 2 Hours**	
Goal: This course is designed to equip students with the practical knowledge in computer networking						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE: 1.0 Understand the basic Concepts of Computer Networking						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Define Computer Network 1.2 State the advantages and disadvantages of a Computer Networks. 1.3 Explain types of Networks: LAN, MAN and WAN 1.4 Explain Perimeter networks, addressing VLANs, Wired and Wireless LAN 1.5 Explain Leased lines, dial-up, ISDN, VPN, T1, T3, E1, E3, DSL, cable modem	Define Computer Network and explain **the concepts of the Internet, Intranet, and Extranet.** Explain Virtual Private Network (VPN), security zones and firewalls Explain the advantages and disadvantages of a Computer Networks. Explain types of Networks: LAN, MAN and WAN	Marker and White Board. PC loaded with Power Point connected to a Multimedia projector Switches Routers Network Simulation Softwares (eg GNS3)	Identify clients and Servers in selected networks Identify wired and wireless networks	Guide students to identify clients and Servers in selected networks Guide students to Identify wired and wireless networks	Networked PCs with clients and servers Practical Manual/ Workbook

	etc, and their characteristics (speed, availability) 1.6 Differentiate between Client and Server Computers 1.7 Differentiate between Wired and Wireless Networks	Discuss perimeter networks; addressing; reserved address ranges for local use (including local loopback ip), VLANs; wired LAN and wireless LAN Discuss Leased lines, dial-up, ISDN, VPN, T1, T3, E1, E3, DSL, cable modem etc, and their characteristics (speed, availability) Explain Client and Server Computers Distinguished between Wired and Wireless Networks				
GENERAL OBJECTIVE: 2.0 Know the Hardware Components of Computer Networks and their Functions						
2-4	2.1 List the hardware components of Computer Network: Router, switches, repeater, Gateway and cables. 2.2 Differentiate between Hub and Switch 2.3 Explain Repeaters and	2.1 Describe different network hardware components: Router, switches, repeater, Gateway and cables. 2.2 Explain functions of components in 2.1 with respect to routing data,	Marker and White Board. PC loaded with Power Point connected to a Multimedia projector	Identify the different network hardware components and their functions	Guide students to Identify the different network hardware components and their functions	LAN cables (Cart 5e), RJ 45, Routers, Switches etc. Practical Manual/ Workbook

	their functions 2.4 Explain bridges and their Functions 2.6 Explain Routers and their functions. 2.7 Describe Network Interface Card (NIC) and functions	traffic, remote connections, switching types and MAC table, understand capabilities of hubs versus switches, virtual switches, Static routing, dynamic routing, routing protocols, (RIP vs. OSPF), NAT, QoS etc.	Switches Routers Network Simulation Softwares (eg GNS3)			
GENERAL OBJECTIVE: 3.0 Understand Network Planning and Design						
5-6	3.1 Define Network Planning and Design 3.2 Outline the importance of network planning 3.3 Outline the steps involved in designing a network 3.4 Explain network topology and access methods	Explain Network Planning and Design Outline the importance of network planning Outline the steps involved in designing a network Discuss network topology, types and access methods	Marker and White Board. PC loaded with Power Point connected to a Multimedia projector Switches Routers Network Simulation Softwares (eg GNS3)	Plan and Design a networks using network diagrams	Guide students to Plan and Design networks using network diagrams.	Networked PCs with simple drawing tools Practical Manual/ Workbook
	General Objective: 4.0 Know the Different Types of Network Connections					
7-9	4.1 Describe Point-to-point,	Discuss Point-to-point,	Marker and	Set up point-to-point	Guide student	Network

	Peer-to-peer, Client/Server based networks 4.2 Explain types of Cable termination and suitable cables for each 4.3 State advantages and Disadvantages of each connection type in 2.1 above 4.4 Explain the types of Servers: print, mails etc. 4.5 Discuss Server reliability, availability and data integrity	Peer-to-peer, Client/Server based networks **Explain c**able types and their characteristics, including media segment length and speed; (fiber optic; twisted pair shielded or unshielded; catxx cabling, wireless; susceptibility to external interference) Explain types of Cable termination and suitable cables for each State advantages and Disadvantages of each connection type Explain the types of Servers: print, mails etc. Discuss Server reliability, availability and data integrity	White Board. PC loaded with Power Point connected to a Multimedia projector Switches Routers Network Simulation Softwares (eg GNS3)	network. Set up peer-to-peer network. Create different types of network cables Create a fibre optics cable Connect devices using RJ45 Cable, fibre optics etc	to set up point-to-point network. Guide student to Set up peer-to-peer network.	Components and Connection devices : LAN cables (Cart 5e), RJ 45, Routers, Switches etc.
	General Objective: 5.0 Understand the Open Systems Interconnection (OSI) Model and TCP/IP Model					
10-	5.1 Define OSI Model.	Explain OSI Model.	Marker and	Identify the layers of	Guide students	Networked

11	5.2. Explain TCP/IP Reference Model 5.3 Differentiate between TCP/IP and OSI Model. 5.4 State the functions of each layer of the OSI Model	Explain the TCP/IP Model Explain the differences between TCP/IP and OSI Model. Explain the functions of each layer of the OSI Model	White Board. PC loaded with Power Point connected to a Multimedia projector Switches Routers Network Simulation Softwares (eg GNS3)	OSI Model	to identify the layers of OSI Model Guide students on how to ping; tracert; pathping; Telnet; IPconfig; etc	PCs with clients and servers Practical Manual/ Workbook
	General Objective: 6.0 Understand IP Addresses on Networks using IPv4 and IPv6					
12-13	6.1 Explain the concept of IP addressing. and types 6.2 Explain the term IPV 4. 6.3 State the classes of IP addresses. 6.4 Explain the range of IP address classes. 6.5 Describe VLSM/ Subnetting IPV4	Discuss the concept of IP addressing. and types Explain the term IPV 4. Explain the classes of IP addresses. Explain the range of IP address classes. Describe VLSM/ SubnettingIPV4	Marker and White Board. PC loaded with Power Point connected to a Multimedia projector Switches Routers	Manually assign a static IP Address on NIC. Develop test procedure and Carryout functionality test Generate test results and compile reports	Guide students to manually assign a static IP address on NIC. Guide students to develop test procedure and Carryout functionality test Guide students	Network Analyser Test and Commissioned Computer.

	6.6 Explain IPV6. 6.7 Explain Network functionality test	Explain IPV6. Explain the importance of IPv6 Explain tunneling protocols; dual ip stack; subnetmask; gateway; ports; packets etc in IPv6	Network Simulation Softwares (eg GNS3)		to generate test results and compile reports .	
	General Objective: 7.0 Understand Wireless Networks Access					
14-15	7.1 Differentiate between Internet and Extranet 7.2 Explain the various types of internet connectivity 7.3 Define Wireless Network and types of Access 7.4 Differentiate between Dial- up, wireless and Broad band Internet access. 7.5 Explain the Advantages of Broad band Over Dial-up and Wireless Access Network 7.6 Explain wireless network	Distinguished between Internet and Extranet Discuss the various types of internet connectivity Discuss Wireless Network and types of Access Distinguished between Dial-up, wireless and Broad band Internet access. Discuss the Advantages of Broad band Over Dial-up and Wireless Access Network	Marker and White Board. PC loaded with Power Point connected to a Multimedia projector Wireless Network Radios Wireless Network Routers	Set up a network with dial-up and broadband internet access Carryout functionality test	Guide students to set up a network with dial-up and broadband internet access Guide students to carryout functionality test	Network Analyser Test and Commissioned Computer.

	standards 7.7 Explain types of Network Security	Explain types of wireless networking standards and their characteristics (802.11A, B, G, N, AC including different Ghz ranges), Explain types of network security (for example, WPA/WEP/802.1X), point-•-to-•point (P2P) wireless, ad hoc networks, wireless bridging etc				
	Assessment Criteria					
	Course work 20%	Course test	Practical 20%	Other (Examination/project/portfolio) % 60%		

	Department/ Programme: COMPUTER SCIENCE (ND)	**Course Code:**	**COM 223**	**Credit Hours: 6 hours/week**
	Department/ Programme: **Computer Science**	**Course Code:**	**COM 223**	**Credit Hours: 5 hours/week**
	Subject/Course: Basic Hardware Maintenance			**Theoretical: hours/week 2**
	GOALS: The course is designed to enable students acquire knowledge of and skills in Basic Hardware Maintenance			
	Year: Two Semester: Two	**Pre-requisite:**	**COM 112**	**Practical: hours /week 3**

General Objectives: On completion of this course the student should be able to

1.0 Understand Basic laboratory practice and safety

2.0 Understand the basic electric theory.

3.0 Understand the function of circuit components.

4.0 Understand basic general measuring equipments

5.0 Understand integrated circuit and terminologies.

6.0 Understand preventative maintenance of hardware components.

7.0 Understand diagnostic techniques involved in corrective maintenance.

8.0 Understand computer installation procedure.

	Course: Basic Hardware Maintenance		**Course Code: COM 223**		**Credit Hours: 5 hours/week**	
					Theoretical: 2 hours/week	
	Year: TWO Semester: TWO		**Pre-requisite: COM112**		**Practical: 3 hours /week**	
	Theoretical Content			**Practical Content**		
Week/s	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
	General Objective 1.0: Understand Basic laboratory practice and safety					
1-2	1.1 Explain the general laboratory safety 1.2 Explain the general laboratory etiquette 1.3 Explain the Electrical safety in computer Lab 1.4 Explain the Safety inspection guide 1.5 Explain the hardware components unsafe conditions 1.6 Explain the precautions	Explain with examples the general laboratory safety Explain the general laboratory etiquette Explain the electrical safety in computer Laboratory Explain the Safety inspection guide Explain the hardware	White board and marker pen PC Loaded with electrical components presentation package Multimedia projector	Write out the pros and cons in laboratory safety Write and show on to inspect the safety guide	Guide the students on the basic laboratory safety Direct the students on to inspect the safety guide.	Describe the general laboratory etiquette Describe the electrical safety in computer Lab

	required when working and maintaining the computer system	components unsafe conditions Explain the precautions required when working and maintaining the computer system				
	General Objective 2.0: Understand Basic Electric Theory.					
3	2.1 Explain the concept of Common electronic/electrical theory 2.2 Explain the current and voltage generation 2.3 Explain voltage regulations and its equipments	Explain concept of Common electronic/electrical theory Like Ohm's law Explain Voltage, Current, sources .	White board and marker pen PC Loaded with an appropriate simulation package such as Electronic work bench presentation package Multimedia projector	Demonstrate Voltage /current source in a circuit, and to test to verify the electric theory .	Guide the students in setting up small circuits to verify the basic electric theory, using either hardware or simulated packages.	State Ohm's law Describe the Voltage, Current, sources

	General Objective 3.0: Understand the function of circuit components.					
4-5	3.1 Explain the different basic electronic components and the functions like Capacitors, Diode, resistors, transistors, switches etc To Understand the function of circuit components	Explain the different basic electronic components and the functions like Capacitors, Diode, resistors, transistors, switches etc Explain their functionalities	White board and marker pen PC Loaded with an appropriate simulation package such as Electronic work bench presentation package Multimedia projector	Demonstrate the characteristics of the different electronic components.	Guide the student in identifying the electronic components	Describe the functions of the following electronic components – capacitors, diode, resistors, transistor

	General Objective 5: Understand basic general measuring equipments					
5-6	5.1 Explain the measuring instruments and their types 5.2 Explain the interfaces of the multimeter 5.3 Explain how to measure the following using analog and digital multimeters – Resistance, Transistor, Capacitor, .	Explain the operation of measuring tools such as, Multimeters, Oscilloscopes. Explain how to use multimeters to measure current voltage, resistance, inductance, capacitance. Explain how an Oscilloscope is used to observe signals, pulses, To explain how diagnostic operations are performed in fault finding .	White board and marker pen Digital and analog multimeter presentation package Multimedia projector Oscilloscope.	The ability to use basic measuring equipments and perform fault diagnostics and maintenance of electrical and electronic circuits.	Guide student in using basic measuring tools to perform fault diagnostics and parameter measurements and perform repairs and maintenance of electrical and electronic circuits.	Describe how to measure Resistance, Transistor, Capacitor
	General Objective 5: Understand integrated circuit and terminologies					

7 - 8	5.1 Define Integrated Circuit (IC) 5.2 Explain the terminologies associated with IC 5.1 Explain the attributes of logic families 5.2 Explain IC pin arrangement	explain the Various terminologies for characterizing logic circuits, such as fan out, fan in , noise margin, Voltage tolerance,….etc. State different attributes of logic families, such as Handling care, voltage tolerance, switching speeds,….etc Explain IC pin arrangement such as dual-in-line DI2, strait line, circular, quad, etc…..	White board. PC. Loaded with an appropriate simulation package such as Electronic work bench. Data sheets of ICs various slides in electronic format to be projected. Multimedia projector	identify different categories of Integrated Circuit and their packaging style	Guide the student to on how to identify different categories of Integrated Circuit	Describe the IC terminology Describe the IC pin arrangement

	General Objective 6: Understand preventative maintenance of hardware components.					
9 -10	6.1 Explain preventive maintenance and its importance on hardware devices 6.2 Explain preventive maintenance to be carried out the various hardware devices 6.3 Explain the hard drive utilities	Explain preventive maintenance and its importance on hardware devices Explain preventive maintenance to be carried out the various hardware devices Explain the hard drive utilities like scandisk, defragmenter, CHECKDISK etc	White board and marker pen presentation package Multimedia projector . Electronic slides showing system components	Carry out preventative maintenance on hardware devices. Demonstrate how to apply the hard drive utilities	Guide student in carrying out preventative maintenance on different devices	Describe the .preventative maintenance on hardware devices Show how to apply hard drive utilities

	General Objective 7: Understand diagnostic techniques involved in corrective maintenance					
11-12	7.1 Explain corrective maintenance and its importance 7.2 Explain how to carry out corrective maintenance 7.3 Explain the diagnostic software that will aid in corrective maintenance	Explain corrective maintenance and its importance Explain how to carry out corrective maintenance Explain the need for diagnostic programs. Eg partition checks, virus detectors, file allocation tables checkers ….etc. Explain how to use diagnostic programs in restoring system functionality.	White board and marker pen presentation package Multimedia projector . Audio Visual programs showing the process.	Perform corrective maintenance on different devices	Guide student in carrying out corrective maintenance on different devices	Describe the procedures of carrying out corrective maintenance
	General Objective 8: Understand computer installation procedure.					
13-15	8.1 Explain basic hardware installations 8.2 Explain site preparation	Explain Site preparation methods	White board and marker pen	Carry out hard drive preparation	Guide student in carrying out hard drive	Describe the hard drive preparation showing

	methods 8.3 Explain Hard drive preparation 8.4 Explain system requirements for installation 8.5 Explain background and procedures needed for system installation To show awareness and understand the background and procedures	Explain hard drive preparation showing partition and formatting Explain system requirements for installation and procedures needed for system installation	presentation package Multimedia projector .	like disk partitioning and formatting Show how different software can be installed.	partitioning and formatting Guide students how software installation	partition and formatting

Programme: Computer Science (National Diploma)	**Course Code: COM 224**	**Contact Hours: 4 hours/week**
Course: Management Information Systems		**Theoretical: 2 hours /week**
Year: 2 Semester: 4	**Pre-requisite: COM101**	**Practical: 2 hours /week**

Goal: This course is designed to enable introduce students to management information systems

General Objectives: On completion of this course the diplomat should be able to:

1. Know different systems.
2. Understand systems theory.
3. Understand the concept of management information.
4. Know the features of management information systems (MIS)
5. Understand the concept of transaction processing.
6. Understand the concept of office automation.
7. Understand the different applications of MIS.
8. Understand the principles of decision making
9. Know the development cycle of an MIS
10. Understand the principles of project management.
11. Understand total systems

	Theoretical Content			**Practical Content**		
	General Objective 1 (COM 224): Know different systems.					
Week	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
	1.1 Understand a system and its characteristics. 1.2 Understand the taxonomy of systems; deterministic, probabilities, static, dynamic etc. 1.3 Understand organization and business education as make up of systems or subsystems	Define a system State the characteristics of a system. Explain the taxonomy of a system: deterministic, probabilistic, static, dynamic etc. Explain organizations, business,	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	A Develop a simple MIS	To assist student in developing a simple MIS	Formation of different systems.

		education, etc as made up of systems or subsystems				
	General Objective 2 (COM 224): Understand systems theory.					

2	2.1 Understand closed and open loop systems. 2.2 Understand feedback control in a system 2.3 Understand a system model 2.4 Understand how to represent a system	Distinguish between closed and open loop systems. Explain feed back control in system. Define a system model List and explain types of models Represent systems as models.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector.	Differentiate between open and closed loop systems and represent systems as models	Guide students in representing various sytems as models	Represent educational , business and public service systems etc as models.
	General Objective 3 (COM 224): Understand the concept of management information.					

3	3.1 Understand management and its functions	Define management and list the functions of management.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Describe a management information process	Guide the students to describe and explain management information process	Describe management and list its functions

4	3.2 Understand information needs at management levels. 3.3 Understand attributes of information	Explain the information needs at the management levels. Explain and give attributes of information	White Board. Charts, PC loaded with Presentation software package and	Create some attributes of information at management level.	Guide the students on how to create attributes of information at the management level	List the attributes of information

			connected to multimedia Projector.			
	General Objective 4 (COM 224): Know the features of management information systems (MIS)					
5	4.1 Understand an information system and it's characteristics. 4.2 Understand a management information system. 4.3 Appreciate the importance of MIS to business organizations. 4.4 Recognise features of information systems	Define information system. Explain the characteristics of an information system. Define management information system. Explain the importance of	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Describe the features of information systems. Discuss the importance of MIS to business and other organisations	Guide the students on how to recognise the features of Information Systems.	Explain the importance of MIS to Educational System

		MIS to business organization.				
		Explain the features of an information system.				
Week/s	**General Objective 5 (COM 224):** Understand the concept of transaction processing.					

6	5.1 Understand the concept of data and information 5.2 Understand data capture 5.3 Understand verification and validation 5.4 Understand data processing stages 5.5 Understand the concept of a database management system (DBMS), including insertion , delete and update operations.	Explain concept of data and information. Explain data processing stages. Explain the concepts of data capture, verification and validation. Explain concepts of a database management system (DBMS) Explain insertion, deletion, and update	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Capture data, verify data and processing data by performing insertion, deletion and updating operations.	Guide the students in processing of data through the insertion, deleting and updating operations.	Capture and Process data by implementing insert, delete and update operation.

		operations.				
Week/s	**General Objective 6 (COM 224):** Understand the concept of office automation.					

7	6.1 Understand office automation and its components, e-mail, voice mail, fax machine, teleconferencing 6.2 Understand telecommuting 6.3 Understand the importance of office automation (OA) to an organization	Define office automation. Explain components of office automation i.e. e-mail, voice-mail fax machine, teleconferencing, Explain telecommuting. Explain the importance of office automation (O.A.) to an organization.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Understand what constitutes office automation Apply office automation to a business or organisational setting.	Guide the students to appreciate the importance of OA.	Needed items for contemporary office automation

Week/s	**General Objective 7 (COM 224):** Understand the different applications of MIS.					
8	7.1 Understand various types of information systems and their objectives. 7.2 Recognise the elements required for any information system 7.3 Understand reports required for any types of information system	List the various types of information system. Explain the objectives of each type of information System. Explain the elements required for any information system.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Mention the various types of Information Systems and their objectives. Outline the nature of reports required for each type of Information System.	Guide the students so that they will be able to recognise the elements required for an Information System.	OHP connected to PC. Networked PC laboratory, with internet access loaded with MIS packages.

		Explain the nature of reports required for each type of information system.				
9	7.4 Understand sources of data for each type of information system 7.5 Understand the information needs, strategic technical and operational advantages of MIS	Identify sources of data for each type of information system. Identify information needs such as strategic, technical and operational. Identify some advantages of MIS	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Describe the kind of data needed for each type of information system Describe the information needs, the strategic technical and operational advantage of the MIS	Guide the students on how to identify the information needs of an MIS	. State the operational advantages of MIS

Week/s	**General Objective 8 (COM 224):** Understand the principles of decision making					
10	8.1 Understand the stages in decision making 8.2 Understand various approaches to decision making 8.3 Undertake application of some decision making techniques	Explain decision making and represent this diagrammatically. Explain the approaches to decision making. Explain a case study on decision making techniques	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Represent decision making diagrammatically Discuss some case studies in decision making	Assist the students in the correct representation of decision making in a diagrammatic form.	Represent decision making diagrammatically. Discuss a case study on decision making.
Week/s	**General Objective 9** Know the development cycle of an MIS					

11	9.1 Understand the need for information system development.	Explain the need for information system development.	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	State the need for information system development	Guide the student to appreciate the need for information system development.	State the need for Information System Development.
12	9.2 Understand the phases and importance in the development cycle of MIS	Identify the phases in the development cycle of MIS State the importance of each phase Describe each of the phases of the	White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Discuss the importance of each of the phases in the development cycle of MIS	Guide the students to appreciate the importance of each of the phases in the development cycle of MIS	Describe and list the importance of each phase of the development cycle of MIS

		development cycle of an MIS.				
Week/s	**General Objective 10 (COM 224):** Understand the principles of project management.					
13	10.1 Understand project management and its objectives. 10.2 Understand some tools used in project management and their application	Define project management Explain the objectives of project management. Identify tools to be used in project management. Apply the tools	A flip chart. White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Describe the tools used in project management	Guide the students to apply the tools identified for project management.	List the tools to be used in project management and state their functions.

Week/s	**General Objective 11 (COM 224):** Understand total systems and Risks associated with MIS.					
15	11.3 Understand the effect of time lag on inputs 11.4 Understand the effect of deviating from standards. 11.5 Understand risks associated with MIS	Explain the effect of time lag on inputs. Explain the effect of deviating from standards. Explained the risks that can be associated with MIS Develop an MIS.	A flip chart. White Board. Charts, PC loaded with Presentation software package and connected to multimedia Projector	Time lag effects on inputs Enumerate the various operational risks arising from flawed MIS	Guide the students to realise the effect of time lag on inputs and deviation from standards. Guide the students to detect management decisions based on ineffective, inaccurate or incomplete MIS	Mention the effects of time lag on inputs and state the possible effects of deviation from standards. Describe a scenario of decisions based on flawed MIS

Programme: (National Diploma) Computer Science	**Course Code: COM 225**	**Contact Hours: 4**
Course: Web Technology	**Semester: 1**	**Theoretical: 2 hours /week**
Year: 1	**Pre-requisite:**	**Practical: 2 hours /week**

Goal: This course is designed to acquaint students with the basic technological tools needed to design web applications

GENERAL OBJECTIVES: On completion of this course the student should be able to:

1.0 Know the fundamental concepts of World Wide Web (WWW).

2.0 Understand Hypertext Mark-up Language HTML

3.0 Understand scripting for HTML.

4.0 Understand Dynamic HTML (DHTML).

5.0 Understand Cascading Style Sheets (CSS).

6.0 Understand dynamic content.

7.0 Know web development tools.

8.0 Understand Multimedia.

9.0 Know Extensible Mark-up Language (XML).

	Theoretical Content			**Practical Content**		
	General Objective 1.0: Know the fundamental concepts of World Wide Web (WWW).					
Week	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1-3 1	1.1 Explain the Internet concept 1.2 Explain Web definition and historical outline 1.3 Explain the anatomy of Web connection and how a Web page works 1.4 Explain how mark-up languages, hypertext and Universal Resource Location (URL) work	Define internet. Define (WWW) and Outline its history Explain the Anatomy of a Web connection .and how a web page works. Explain how mark-up Languages and how hypertext work.	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Know how to browse the Web, Know how to use URL to navigate the Web. Understand how HTML file(written) give rise to a Web page.	Guide the student to: Browse. the net Demonstrate how to use Front End Dev tools.	List and explain the steps involved in browsing the web. Explain the use URL in WWW
	General Objective 2.0: Understand Hypertext mark-up language HTML					
2- 6	2.1 Explain the functions of HTML, planning and writing of an HTML document. 2.2 Show preview and editing of a web page.	Explain functions of HTML, Text formatting, hyperlinks, tables, lists, graphics, images, sound and video support.	Multimedia Projector PC Lab connected to internet.. Code-	Write a simple HTML based document Create a simple web	Guide Students on how to use HTML in carrying out Web based operations	Explain the functions of HTML. Explain how to preview, edit and create links in web pages create a

	2.3 Explain how to Create links to other web pages. 2.4 Explain how Printing of HTML document works. 2.5 Explain how to create ordered/unordered list in HTML document. 2.6 Explain how to customize font and control font selection 2.7 Explain how to Align text in HTML document 2.8 Explain how to insert graphics and specify graphic size, link graphics , insert on image map in HTML document 2.9 Explain how to add background image in HTML document and	Explain how to write a HTML Document, Preview and edit a web page. Explain how to create links to other web pages, print an HTML document, ordered list and unordered list in HTML document. Explain how to align text, insert graphics and specify graphic size and Link graphics in HTML document. Explain how to insert image map, add background image and explore multimedia option in HTML document.	Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	page. Use various HTML tags to enhance the quality and appearance of a web page. Explain how to add graphics and multimedia to HTML Documents Demonstrate how to create a form and use it to control user inputs Illustrate table concepts. and web principles		simple table span rows and columns, Format borders, modify table backgrounds

	how to explore multimedia options 2.10 Understand the use of forms to control input. 2.11 Explain how to create a text entry field and a drop down menu, add radio buttons, checkboxes and a push button connecting forms back end 2.12 Explain how to create and manipulate table and manipulations 2.13 Explain how to create navigational bar and target links.	Explain how to use form controls (text fields, radio buttons, checkbox, etc.) Explain how to connect forms with back end. Explain how to work with tables Explain how to work with hyperlinks				
	General Objective 3.0: Understand scripting for HTML					

7-8	3.1 Explain how to code JavaScript to improve the functionalities of HTML document 3.2 Explain how to code JavaScript variables, functions and closures in HTML document 3.3 Explain how to code operators (arithmetic, relational/comparison, logical, etc.) 3.4 Explain conditional statements in JavaScript	Explain the advantages of using scripting with JavaScript (Flexibility, Simplification immediate response, improved interactivity, reduced server loads) Explain how to code operators Explain how to code and use Boolean expressions in JavaScript in an HTML document	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Explain how to Create and code JavaScript Explain how to design and implement JavaScript event handlers.	Guide students in their practical work on Full Stack Java Scripting	Explain how to perform scripting using JavaScript. Explain how to handle events using Java Scripts Create functions, assign variables, Create conditional scripts
	General Objective 4.0: Understand DHTML.					
9-10	4.1 Explain DHTML, its building blocks, Object models design	Explain dynamic HTML Explain the building blocks of DHTML Explain DHTML	Multimedia Projector PC Lab connected to internet. Code-Lobster,	Explain how to design and implement web page using DHTML.	Guide students in practical works in DHTML.	Explain DHTML & its building block Design D HTML pages

		Pages Describes DHTML object model Describe Browser variability	Code Envy, Crimson Editor, Cloud9 IDE,			Research into code architecture Keep up with DHTML changes
	General Objective 5.0: Understand Cascading Style Sheets (CSS).					
11	5.1 Explain Cascading Style Sheets (CSS) 5.2 Explain how to create inline, embedded style sheet and external style sheets links 5.3 Explain how to code selectors (element, relational, class, etc.) 5.4 Explain how to work with measurements (absolute and relative) 5.5 Explain how to code CSS	Explain CSS Explain how to link CSS to an HTML document (inline, embedded and external links) Explain how to Show and hide page elements Change font size dynamically Control font colour dynamically Explain different types of HTML	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Explain how to Create an embedded style sheets to an HTML documents Explain class Implement and browsers detection Demonstrate how to show and hide page elements Demonstrate how to change font Size and font colour dynamically Demonstrate the Use external style sheet in a document dynamically using Code Lobster, Crimson Editor or Cloud IDE and	Provide Guidance and assistance in student practical work in CSS	Explain what CSS means Create a HTML document and format it using CSS Test the HTML document created above using different browsers and observe the compatibility

	padding, margin, borders, fonts, colours, texts, etc. 5.6 Explain how to use CSS to format HTML tags (elements, form, tables, etc) 5.7 Explain different CSS browser compatibility	formatting using CSS Explain browser compatibility		Code Charge Studios.		
	General Objective 6.0: Understand dynamic content.					
12	6.1 Explain dynamic content 6.2 Explain how to insert and delete dynamic content dynamically 6.3 Explain how to replace graphics dynamically 6.4 Explain how to bind and manipulate data dynamically	Explain dynamic content Explain how to insert and delete dynamic content dynamically Explain dynamic data binding and its manipulation	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate how to Insert, delete, and modify content dynamically Explain how to incorporate advanced content in data	Guide and assist students in creating dynamic contents	Explain dynamic content Demonstrate how to insert and delete dynamic contents in HTML documents
	General Objective 7.0: Know web development tools.					

13	7.1 Explain web development: Test Driven Development (TDD) and Behaviour Driven Development (BDD) Explain the tools for Web development. 7.2 Explain and different types of development tools such as • Text editors (Sublime Text, Atom, etc.) • Chrome developer Tools • JQuery • GitHub • Twitter Bootstrap • Angular JS	Explain how to Position an element absolutely and relatively with developer tools Explain how to size an element Manually on Stack screen elements Explain important Web Development tools	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate how to position an element absolutely, relatively. and Size an element manually. Stack screen elements Add a scroll bar, and create side bar. Incorporate an advanced positioning function	Guide student In practical work in Scripting and Source Control	List and explain tools used in web development Create a side bar and incorporate an advanced positioning function to it Explain important Web Development tools
	General Objective 8.0 Understand Multimedia.					

14	8.1 Explain the use of Multimedia in Web application development Packages .	Explain the operation of Graphic packages such as: Photoshop, Animation Packages, Dreamweaver, Flash,	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate the use of Graphic web application software and to develop a simple web application.	Guide student in practical work using Graphic packages.	Explain the use of Multimedia in Web application development
	General Objective 9.0 Know Extensible Mark-up Language (XML).					
15	9.1 Explain XML 9.2 Explain the operation and application of XML	Explain XML Explain how XML is used and explain the advantages of using XML	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate the use of XML package and apply to a given case	Guide the students how to create XML documents and how to test it	Explain the basic XML features Create an XML document and test how to it works

Programme: (National Diploma) Computer Science	**Course Code: COM 225**	**Contact Hours: 4**
Course: Web Technology	**Semester: 1**	**Theoretical: 2 hours /week**
Year: 1	**Pre-requisite:**	**Practical: 2 hours /week**
Goal: This course is designed to acquaint students with the basic technological tools needed to design web applications		
GENERAL OBJECTIVES: On completion of this course the student should be able to: 1.0 Know the fundamental concepts of World Wide Web (WWW). 2.0 Understand Hypertext Mark-up Language HTML 3.0 Understand scripting for HTML. 4.0 Understand Dynamic HTML (DHTML). 5.0 Understand Cascading Style Sheets (CSS). 6.0 Understand dynamic content. 7.0 Know web development tools. 8.0 Understand Multimedia. 9.0 Know Extensible Mark-up Language (XML).		

	Theoretical Content			**Practical Content**		
	General Objective 1.0: Know the fundamental concepts of World Wide Web (WWW).					
Week	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1	1.1 Explain the Internet concept 1.2 Explain Web definition and historical outline 1.3 Explain the anatomy of Web connection and how a Web page works 1.4 Explain how mark-up languages, hypertext and Universal Resource Location (URL) work	Define internet. Define (WWW) and Outline its history Explain the Anatomy of a Web connection .and how a web page works. Explain how mark-up Languages and how hypertext work.	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Know how to browse the Web, Know how to use URL to navigate the Web. Understand how HTML file(written) give rise to a Web page.	Guide the student to: Browse. the net Demonstrate how to use Front End Dev tools.	List and explain the steps involved in browsing the web. Explain the use URL in WWW
	General Objective 2.0: Understand Hypertext mark-up language HTML					
2-6	2.1 Explain the functions of HTML, planning and writing of an HTML document. 2.2 Show preview and editing of a web page. 2.3 Explain how to Create	Explain functions of HTML, Text formatting, hyperlinks, tables, lists, graphics, images, sound and video support.	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor,	Write a simple HTML based document Create a simple web page.	Guide Students on how to use HTML in carrying out Web based operations	Explain the functions of HTML. Explain how to preview, edit and create links in web pages create a

	links to other web pages. 2.4 Explain how Printing of HTML document works. 2.5 Explain how to create ordered/unordered list in HTML document. 2.6 Explain how to customize font and control font selection 2.7 Explain how to Align text in HTML document 2.8 Explain how to insert graphics and specify graphic size, link graphics , insert on image map in HTML document 2.9 Explain how to add background image in HTML document and how to explore multimedia options 2.10 Understand the use of forms to control input. 2.11 Explain how to create a text entry field and a drop down menu, add radio buttons, checkboxes and a	Explain how to write a HTML Document, Preview and edit a web page. Explain how to create links to other web pages, print an HTML document, ordered list and unordered list in HTML document. Explain how to align text, insert graphics and specify graphic size and Link graphics in HTML document. Explain how to insert image map, add background image and explore multimedia option in HTML document. Explain how to use form controls (text fields, radio buttons, checkbox, etc.)	Cloud9 IDE,	Use various HTML tags to enhance the quality and appearance of a web page. Explain how to add graphics and multimedia to HTML Documents Demonstrate how to create a form and use it to control user inputs Illustrate table concepts. and web principles		simple table span rows and columns, Format borders, modify table backgrounds

	push button connecting forms back end 2.12 Explain how to create and manipulate table and manipulations 2.13 Explain how to create navigational bar and target links.	Explain how to connect forms with back end. Explain how to work with tables Explain how to work with hyperlinks				
	General Objective 3.0: Understand scripting for HTML					
7-8	3.1 Explain how to code JavaScript to improve the functionalities of HTML document 3.2 Explain how to code JavaScript variables, functions and closures in HTML document 3.3 Explain how to code operators (arithmetic, relational/comparison, logical, etc.) 3.4 Explain conditional statements in JavaScript	Explain the advantages of using scripting with JavaScript (Flexibility, Simplification immediate response, improved interactivity, reduced server loads) Explain how to code operators Explain how to code and use Boolean expressions in	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Explain how to Create and code JavaScript Explain how to design and implement JavaScript event handlers.	Guide students in their practical work on Full Stack Java Scripting	Explain how to perform scripting using JavaScript. Explain how to handle events using Java Scripts Create functions, assign variables, Create conditional scripts

		JavaScript in an HTML document				
	General Objective 4.0: Understand DHTML.					
9-10	4.1 Explain DHTML, its building blocks, Object models design	Explain dynamic HTML Explain the building blocks of DHTML Explain DHTML Pages Describes DHTML object model Describe Browser variability	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Explain how to design and implement web page using DHTML.	Guide students in practical works in DHTML.	Explain DHTML & its building block Design D HTML pages Research into code architecture Keep up with DHTML changes
	General Objective 5.0: Understand Cascading Style Sheets (CSS).					

11	5.1 Explain Cascading Style Sheets (CSS) 5.2 Explain how to create inline, embedded style sheet and external style sheets links 5.3 Explain how to code selectors (element, relational, class, etc.) 5.4 Explain how to work with measurements (absolute and relative) 5.5 Explain how to code CSS padding, margin, borders, fonts, colours, texts, etc. 5.6 Explain how to use CSS to format HTML tags (elements, form, tables, etc) 5.7 Explain different CSS browser compatibility	Explain CSS Explain how to link CSS to an HTML document (inline, embedded and external links) Explain how to Show and hide page elements Change font size dynamically Control font colour dynamically Explain different types of HTML formatting using CSS Explain browser compatibility	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Explain how to Create an embedded style sheets to an HTML documents Explain class Implement and browsers detection Demonstrate how to show and hide page elements Demonstrate how to change font Size and font colour dynamically Demonstrate the Use external style sheet in a document dynamically using Code Lobster, Crimson Editor or Cloud IDE and Code Charge Studios.	Provide Guidance and assistance in student practical work in CSS	Explain what CSS means Create a HTML document and format it using CSS Test the HTML document created above using different browsers and observe the compatibility

	General Objective 6.0: Understand dynamic content.					
12	6.1 Explain dynamic content 6.2 Explain how to insert and delete dynamic content dynamically 6.3 Explain how to replace graphics dynamically 6.4 Explain how to bind and manipulate data dynamically	Explain dynamic content Explain how to insert and delete dynamic content dynamically Explain dynamic data binding and its manipulation	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate how to Insert, delete, and modify content dynamically Explain how to incorporate advanced content in data	Guide and assist students in creating dynamic contents	Explain dynamic content Demonstrate how to insert and delete dynamic contents in HTML documents
	General Objective 7.0: Know web development tools.					
13	7.1 Explain web development: Test Driven Development (TDD) and Behaviour Driven Development (BDD) Explain the tools for Web development. 7.2 Explain and different types of development tools such as • Text editors (Sublime Text, Atom, etc.) • Chrome developer Tools • JQuery • GitHub • Twitter Bootstrap • Angular JS	Explain how to Position an element absolutely and relatively with developer tools Explain how to size an element Manually on Stack screen elements Explain important Web Development tools	Multimedia Projector PC Lab connected to internet.. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate how to position an element absolutely, relatively. and Size an element manually. Stack screen elements Add a scroll bar, and create side bar. Incorporate an advanced positioning function	Guide student In practical work in Scripting and Source Control	List and explain tools used in web development Create a side bar and incorporate an advanced positioning function to it Explain important Web Development tools

	General Objective 8.0 Understand Multimedia.					
14	8.1 Explain the use of Multimedia in Web application development Packages .	Explain the operation of Graphic packages such as: Photoshop, Animation Packages, Dreamweaver, Flash,	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate the use of Graphic web application software and to develop a simple web application.	Guide student in practical work using Graphic packages.	Explain the use of Multimedia in Web application development
	General Objective 9.0 Know Extensible Mark-up Language (XML).					
15	9.1 Explain XML 9.2 Explain the operation and application of XML	Explain XML Explain how XML is used and explain the advantages of using XML	Multimedia Projector PC Lab connected to internet. Code-Lobster, Code Envy, Crimson Editor, Cloud9 IDE,	Demonstrate the use of XML package and apply to a given case	Guide the students how to create XML documents and how to test it	Explain the basic XML features Create an XML document and test how to it works

	Department/ Programme: Computer Science (ND)	**Course Code:** **COM 226**		**Credit Hours: 3 Hours/week**
	Subject/Course: File Organisation and Management			**Theoretical: 2ours/week**
	Year: I **Semester: 2**	**Pre-requisite:**	**COM 111**	**Practical: 1hours /week**
GOAL: The students are expected to organize and manage data in file processing program from secondary storage				

General Objectives:

On completion of this course the student should be able to:

1.0 Know simple file organization concept

2.0 Understand the concept of file operations

3.0 Understand the basic storage devices and media

4.0 Understand different file access methods and the buffering techniques.

5.0 Understand file organizational structure and processing.

6.0 Know the process of file updating, protection and security.

	Course: Computer Science (ND)	**Course Code: COM 226**			**Contact Hours : 3 hours/week**	
	File Organisation and management				**Theoretical: 2 hours/week**	
	Year: I Semester: I I	**Pre-requisite: COM 111**			**Practical: 1 hours /week**	
	Theoretical Content			**Practical Content**		
	General Objective 1.0: Know simple file organisation concept					
Week/s	**Specific Learning Outcomes**	**Teacher's activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's activities**	**Evaluation**
1-3	Able to: 1.1 Explain File Organization and Management 1.2 Explain the concept of file organisation in computing 1.3 Explain the concept of record, field, character, byte and bits in relation to a file 1.4 Explain seek, read, write, fetch, insert, delete and update operations 1.5 Explain qualitatively file system performance in terms of fetch, insert, update and reorganization.	To : Define File organisation and Management --Identify a file in computing --Relate record, field, character, byte and bits to a file --Explain blocks of data --Describe seek, read, write, fetch, insert, delete and update	A flip chart, A white board and multimedia projector	To be able to write a simple program that creates and updates records of a file.	To assist students write a simple program that create and updates records of a file	Distinguish between File Organisation and Management

		operations --Explain qualitatively file system performance in terms of fetch, insert, update and re-organization				
	General Objective 2.0: Understand the concept of file operations					
4-6	**Explain:** 2.1 Different methods of file organisation in computer system (heap, binary, file queues, stack etc) 2.2 File design alternatives 2.3 The different file operations; storage, retrieval, add delete, update and maintenance. 2.4 Activity ratio and hit rate. 2.5 Different types of files: Master file, Transaction file, Reference file, etc. 2.6 The concept of master file, transaction file and activity file.	To: --Describe different methods of file organisation in computer system (heap… .....) --Evaluate the file design alternatives . --State illustrative examples of the application of the different design alternatives. --Explain the different file operations; storage, retrieval, add delete, update and maintenance.	A flip chart, A white board, OHP connected to PC loaded with appropriate software. A PC with most input and output devices that can be opened for demonstrat-ion.	To be able to write a simple program for creating and maintaining different file organisation.	To assist students to write a simple program for creating and maintaining different file organisation.	Explain different types of file operations

		--Define posting. --Define activity ratio and hit rate. --Explain different types of files: Master file, Transaction file, Reference file, etc. --Differentiate among old master file, new master file, transaction				
		file and activity file. --Explain the use grand father, father and son analogy.				

	General Objective 3.0: Understand the basic storage devices and media.					
7-8	Be able to know: 3.1 Types of storage devices and media 3.2 The characteristics of magnetic storage media, tape, disk, cartridge, bubble, hard disk, CDROM, DVD, floppy disks, zip disk, tape streamer, flash memory, optical disk.	TO; --Identify types of storage devices and media --Describe the characteristics of magnetic storage media, tape, disk, cartridge, bubble, hard disk, CDROM,DVD, floppy disks, zip disk, tape streamer, flash memory, optical disk. --Describe the nature and characteristics of media listed above --Describe optical storage device.	A flip chart, A white board, OHP connected to PC loaded with appropriat e software. A PC with most input and output devices that can be opened for demonstra t- ion.	To be able to load and retrieve documents to and from different storage media.	To assist students to load and retrieve documents to and from different storage media.	List types of storage devices. .

	General Objective 4: Understand different file access methods and the buffering techniques.					
9-10	Explain: 4.1 Different file access types:- random access, direct access and index sequential	TO: --Describe different file access types:- random access and direct access	A flip chart, and multimedia projector.	To be able to write simple programs involving	To assist students to write simple	
	storage methods. 4.2 Seek time and rotational delay 4.3 The concept of a buffer and its functions 4.4 The calculation of buffer requirement of a file.	storage methods. -- Define seek time and rotational delay --Explain the parameters above in relation to different access methods mentioned above . --Define a buffer -- List the functions of a buffer --Calculate buffer requirement of a file.		Index sequential and random access methods.	programs involving sequential and random access methods.	Compute the seek time and buffer requirement of a file.

	General Objective 5: Understand file organizational structure and processing.					
11-13	Explain: 5.1 File structure and organization 5.2 File processing technique 5.3 Acoustical data structure 5.4 File generation and management 5.5 File sorting and merging.	To: --Explain file structure and organization --Explain acoustical data structure --Describe table and arrays. --Describe lists. --Compare stacks and queues	A flip chart, and multimedia projector.	To be able to write simple program involving 1,2,3 dimensional arrays, stacks and Queues.	To assist students to write simple programs involving 1,2,3 dimension al arrays, stacks and Queues.	Discuss file sorting techniques. Distinguish between file structure and data structure.
		--Decribe plex structures --Describe the techniques of file processing: batch, real-time, online, serial, sequential, indexedsequential, random, etc. --Describe methods of generating files: e.g key to tape, key to disk. --Explain file creation	input and output devices that can be opened for demonstra t- ion.			

		procedures --Describe file sorting and merging.				
	General Objectives 6: Understand file update, Protection and security					
14-15	Explain: 6.1 The concept of file access, file protection (passwords access rights, priority status, cryptography, biometric etc) 6.2 File indexing and index maintenance. 6.3 File status, dumping and archiving.	TO: --Describe file update procedures and file access --Explain file protection (passwords access rights, priority status, cryptography etc) --Explain indexing and	A flip chart, and multimedia projector..	To be able to write a file access protection and security program.	To assist students to write a file access protection and security program.	Explain various file access techniques and protection.

	6.4 The problems relating to file access, protection, Security, archiving and backing up.	index maintenance. --Describe file status --Explain dumping --Explain archiving. --List problems relating to file access, protection, Security, archiving and backing up. --Explain approaches to each problem above.	A flip chart, and multimedia projector..			Explain file security and archiving ..

National Diploma Computer Science
List of minimum equipment for software laboratory

S/N	Description of Item	No Required			
1.	Computer systems	30 all networked			
2	Server	1			
3	Printers	2 (1 coloured and 1 black and white) All networked			
3.	UPS	30			
4.	Over Head Projector	1			
5.	Generator 3.5KVA/ 5 KVA Solar Inverter	1			
6.	Software i) Operating system (Windows, Linux, Unix etc) ii) Visual BASIC iii) Text Editors (eg ATOM, Sublime text etc iv) JAVA Script	1 each			

	v) Network Simulators (NS2, CISCO packet Tracer etc) **vi) ArgoUML** **vii) Magic Draw** **viii) Codelobster** **ix) JAVA (JDK)** **x) Crimson Editor** **xi) C Compiler**				
7.	**Packages** **i) Office Suites** **ii) CorelDraw** **iii) Adobe suite** **iv) Simulation packages** **v) AutoCAD** **vi) SPSS, R etc**	**1 each**			

ND Hardware Workshop list of minimum equipment

S/N	Description of Item	Number of item Required
1.	Digital Multimeter	30
2.	Set of Screw Drivers	30
3.	Soldering iron	30
4.	Oscilloscope	2
5.	Vero/Bread Board	30
6.	Error Diagnostic Package	30
7.	Logic Probe	5
8.	Cleaning Kit	5
9	Lead sucker	30
10	Network tool kits	10
11	Blower	5
12	Circuit Magnifier	30
13	Descrete components (diode, capacitors, resistors etc)	Assorted
14	Faulty Systems	5

LIST OF PARTICIPANT

CURRICULUM REVIEW WORKSHOP FOR NATIONAL DIPLOMA/HIGHER NATIONAL DIPLOMA (ND/HND) COMPUTER SCIENCE AT DELTA STATE POLYTECHNIC, OZORO
21st TO 27th APRIL, 2019

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