

**NATIONAL BOARD FOR TECHNICAL
EDUCATION, KADUNA**

NATIONAL INNOVATION DIPLOMA

IN

TELECOMMUNICATION TECHNOLOGY

CURRICULUM AND COURSE SPECIFICATIONS

2007

**PLOT 'B' BIDA ROAD, P.M.B. 2239,
KADUNA - NIGERIA**

GENERAL INFORMATION

1.0 **PROGRAMME NOMENCLATURE:** NATIONAL DIPLOMA IN TELECOMMUNICATION TECHNOLOGY

2.0 **GOAL AND OBJECTIVES:**

GOAL: To produce technically competent manpower to meet the National requirements in the areas of Telecommunication Technology

OBJECTIVES: A product of NIED in Telecommunication Technology should be able to:

- (i) Assemble, Install and test run telecommunication system.
- (ii) Carryout routine/preventive and corrective maintenance on telecommunication system.
- (iii) Select and use appropriate instruments to carryout simple tests and measurements on telecommunication system under various operating conditions.
- (iv) Operate telecommunication systems and installations with appropriate software whenever the need arises.
- (v) Troubleshoot and repair faulty telecommunication systems with basic diagnostic tools and equipments.
- (vi) Carryout supervision of installation projects on telecommunication systems.
- (vii) Start small and medium scale enterprises that would provide ICT solutions.
- (viii) Assist in the management and administration of telecommunication networks for optimum utilization.
- (ix) Design and build simple telecommunication systems.

3.0 ENTRY REQUIREMENTS FOR NATIONAL INNOVATION DIPLOMA IN TELECOMMUNICATION TECHNOLOGY

The general entry requirements for the NIED program are:

- a. Five credits in Mathematics, Physics, English and, any other two subjects from the following: Technical Drawing, Basic Electricity, Further Mathematics and Agricultural Science.or
- b .National Vocational Certificate (NVC) in any of the approved related trades or craft., or
- c. The National Technical Certificate (NTC) with credit passes in the five relevant subjects., or
- d. Matured candidates with degree or equivalent in any other discipline.

4.0 CURRICULUM

4.1 The curriculum of NID in Telecommunication Technology programme consist of four main components. These are:-

- I. General courses**
- II. Foundation courses**
- III. Professional/Core courses**
- IV. Supervised Industrial Attachment.**

4.2 **General Studies** component shall include courses in CommunicationSkills And Entrepreneurship

4.3 **Foundation Courses** include courses in Mathematics,TechnicalDrawing,Information and Communication Technology

4.4 **Professional Courses** are courses, which give the student the theory and practical skills needed to practice in the field at the technical/technologists level.

4.5 **Student Industrial Attachment** shall be taken during the long vacation following the end of the second semester of the first year.

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TELECOMMUNICATION COURSES

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TET 114 Digital Communications

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CURRICULUM TABLE FOR NID IN TELECOMMUNICATION TECHNOLOGY

YEAR ONE

1ST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE-REQUISITE
CSK 501	Basics of Communication	2	0	0	2	2	
MTH 221	Trigonometry and Analytical Geometry	2	1	0	3	3	
COM 101	Introduction to Computing	1	0	2	3	3	
TET 111	Electronics	2	0	3	5	5	
TET 112	Telecommunication Fundamentals	2	0	3	4	4	
TET 113	Workshop Practice	0	0	2	2	2	
TET 114	Digital Communications	1	0	3	4	4	
TOTAL		10	1	13		23	

2ND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE-REQUISITE
MTH 112	Logic and linear Algebra	3	1	0	4	4	
COM 133	Introduction to Computer Programming	1	0	2	3	3	
TET 121	Measurement and Instrumentation	1	0	3	4	4	
TET 122	Wave Propagation	2	0	0	2	2	
TET123	Telephony and Switching Systems	2	0	2	4	4	
TET124	Digital Circuits and Systems	2	0	2	4	4	
TET 125	Antenna types and Satellite Communications	1	0	2	3	3	
TET 126	Television Transmission and Reception	1	0	2	4	4	
TOTAL		13	1	13		28	

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**YEAR TWO
3RD SEMESTER**

COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE-REQUISITE
EDP 201	Introduction to Entrepreneurship	1	0	2	3	3	
CSK 502	Project Reports	1	0	0	1	1	
MTH 232	Calculus	2	1	0	3	3	
MEC 102	Technical Drawing	1	0	3	4	4	
TET 231	Data Communications and Networking	2	0	3	5	5	
TET 232	Mobile Communication Systems	2	0	2	4	4	
TET 233	Fibre Optic Communications	2	0	3	5	5	
TET 234	Telecommunication Maintenance and Repairs	2	0	3	5	5	
TOTAL		13	1	16		30	

4TH SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE-REQUISITE
MTH 272	Number System and Boolean Algebra	2	1	0	2	2	
EDP 201	Practice of Entrepreneurship	0	1	2	3	3	
COM 201	Introduction to Computer Aided Design and Drafting	2	0	2	4	4	
TET 241	Tele-traffic Engineering	2	0	2	4	4	
TET 242	Network Planning and Management	2	0	3	5	5	
TET 243	Final Year Project	0	0	4	4	4	
TOTAL		7		13		22	

GENERAL STUDIES COURSES

TECHNICAL DRAWING

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Programme: NID in Telecommunication Technology
Course: Technical Drawing
Code: MEC 102
Duration: Hours/Week:4hrs Theory:1 Practical:3
Unit: 4Units
Goal: This course is designed so as to enable the learner understand the concept of Technical drawing

General Objectives: At the end of the course the learner will be able to:

- 1.0 Know different drawing instruments, equipment and Materials used in technical drawing.**
- 2.0 Know graphical communication.**
- 3.0 Know the construction of simple geometrical figures and shapes.**
- 4.0 Know single orthographic projects**
- 5.0 Understand the intersections of regular solids**

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PROGRAMME: NATIONAL INNOVATIVE DIPLOMA IN TELECOMMUNICATION TECHNOLOGY						
COURSE: TECHNICAL DRAWING		COURSE CODE: MEC 102		CONTACT HOURS:4Hrs		
GOAL: Understanding The Concept of Technical Drawing						
Course Specification: Theoretical Content				Practical Content		
General Objective 1.0: Know different drawing instruments, equipment and materials used in technical drawing.				- General Objective:		
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
1	<p>1.1 Outline the uses of the various drawing instruments, equipment and materials.</p> <p>1.2 State the precautions necessary to preserve items 1.1 above.</p>	<p>• Present the students all drawing instruments:</p> <p>a. Drawing set</p> <p>b. T-Square</p> <p>c. Drawing board</p> <p>d. Set squares</p> <p>e. Types of pencils (H to B)</p> <p>Explain the uses of all of the above.</p>	<p>- Black board ruler (1m)</p> <p>- Tee-Square</p> <p>- compass</p> <p>- protector</p> <p>- Adjustable set-square</p> <p>- 60 set square</p> <p>- 45 set square</p> <p>- French curve set</p> <p>- Templates</p> <p>- Duster</p> <p>- Chalk</p> <p>- Complete drawing table</p>	<p>1.1 Identify the different types of drawing instruments, equipment and materials.</p> <p>1.2 Use each of the items outline in 1.1 above.</p> <p>1.3 Maintain the various instruments and equipment</p>	<p>Demonstrate the uses of various drawing instruments, equipment and materials</p>	<p>- Black board ruler (1m)</p> <p>- Tee-Square</p> <p>- compass</p> <p>- protector</p> <p>- Adjustable set-square</p> <p>- 60 set square</p> <p>- 45 set square</p> <p>- French curve set</p> <p>- Templates</p> <p>- Duster</p> <p>- Chalk</p> <p>- Complete drawing table</p>
General Objective 2.0: Know Graphical Communication				General Objective:		
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources

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2 - 3	2.1 Explain graphics and the different types of graphic present in graphical production.	<ul style="list-style-type: none"> • Ask the students to illustrate in a drawing the various types of lines based on BS 308 1972 Part 2. and assess. • Ask the students to set drawing area on A1 paper with a title block and the boarder lines and assess. • Ask students to illustrate technical lettering in capital and small letters, using, free hand and using letter stencils and assess. • Ask students to identify the various standard sheets Ao -A4 and assess • Ask students to draw conventional signs and symbols and assess. 	<ul style="list-style-type: none"> - Black board ruler (1m) - Tee-Square -compass - protector - Adjustable set-square - 60 set square - 45 set square - French curve set - Templates - Duster - Chalk - Complete drawing table ruler (1m) compass 	<p>2.1 Illustrate the various convention present in graphical production of construction lines, finished lines, hidden and overhead details, projections, centre lines, break lines, dimensioning of plane, elevation and sections of objects.</p> <p>2.2 Present drawings on drawing sheets with the following (a) Margins (b) Title block etc.</p> <p>2.3 State the various standards of drawing sheets.</p> <p>2.4 Print letters and figures of various forms and characters.</p> <p>2.5 Illustrate conventional signs, symbols and appropriate lettering characters.</p>	Assist student to construct various convention as outline in 2.1	
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General Objective: 3.0 The construct of simple geometrical figures and shapes.						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
General Objective 4.0: Know the construction of simple geometrical figures and shapes.						
Week	Specific Learning Outcome	Teacher Activities	Resources	Specific Learning Outcome	Teacher Activities	Resources
4-6				4.1 Carry out simple geometrical constructions on circles e.g. (a) diameter of a of a circle of a given circumference. (b) the circumference to a circle of a given diameter (c) a circle to pass through 3 points (d) a circle to pass through 2 points and touch a given line (e) a circle to touch given smaller circle and a given line (f) tangents to circles at various points (g) an arc of radius tangent to two lines at an angle to less than	<ul style="list-style-type: none"> • Ask students to explain the various properties of a circle and assess.. • Ask students to differentiate the different methods of constructing ellipses and assess. Ask students to construct an ellipse using the various methods and assess. • Ask students to explain the various draughting techniques and assess. • Ask students to construct plane and diagonal scales and assess. 	<ul style="list-style-type: none"> - Black board ruler (1m) - Tee-Square - compass protector - Adjustable set-square - 60 set square - 45 set square - French curve set - Templates - Duster - Chalk - Complete drawing table - Black board ruler (1m) - Black board Tee-Square - Black board compass - Blackboard protector - Adjustable

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				<p>and more than 90.</p> <p>(h) an area externally tangent to two circles</p> <p>(i) inscribing and circumscribing circles</p> <p>4.2 Define an ellipse</p> <p>4.3 Construct ellipse Using</p> <p>(a) trammel method</p> <p>(b) concentric circle method.</p> <p>4.4 Explain the following draughting techniques</p> <p>(a) Projection method</p> <p>(b) Measurement method</p> <p>(c) Transposition method.</p> <p>1.5 Construct plane scales and diagonal scales, using appropriate instruments.</p>		<p>set-square</p> <p>- 60 set square</p> <p>- 45 set square</p>
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General Objective 5.0: Draw Isometric and Oblique Projections.						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
7-9	5.1 Explain isometric and oblique projections.	Discuss isometric and oblique projections		5.1 Draw a square in isometric and oblique forms.	<ul style="list-style-type: none"> Ask students to differentiate between Isometric 	<ul style="list-style-type: none"> - Black board ruler (1m) - Black board

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				<p>5.2 Draw a circle in Isometric and oblique Forms.</p> <p>5.3 Draw an ellipse in Isometric and oblique forms.</p> <p>5.4 Draw a polygon with a minimum of eight sides in Isometric and oblique forms.</p> <p>5.5 Draw dimension holes circles, arcs and angles correctly on isometric and obliques</p> <p>5.6 Use appropriate convention symbols and abbreviations.</p>	<p>and oblique projections and assess.</p> <ul style="list-style-type: none"> • Ask students to construct a square and circle in isometric and oblique projections and assess. • Ask students to draw a polygon in isometric and oblique projections and assess. • Ask students to construct and dimension holes circles, arcs and angles in isometric and oblique projection and label with appropriate conventional symbols and abbreviations and assess. 	<p>Tee-Square</p> <ul style="list-style-type: none"> - Black board compass - Blackboard protector - Adjustable set-square - 60 set square - 45 set square - French curve set - Templates - Duster - Chalk - Complete drawing table
General Objective 6.0: Know single orthographic projections.						
Week	Specific Learning Objectives	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
10 -	6.1 Explain the principle of	• Ask students to	- Black board ruler	6.1 Illustrate the principle	.	- Black board

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12	<p>orthographic projection.</p> <p>6.2 Explain why the first and third angles are used instead of the second and fourth</p>	<p>differentiate between first and third angle orthographic projection and assess.</p> <ul style="list-style-type: none"> • Ask students to explain the vertical and horizontal planes in orthographic projection and assess. 	<p>(1m)</p> <ul style="list-style-type: none"> - Black board Tee-Square - Black board compass - Blackboard protector - Adjustable set-square - 60 set square - 45 set square - French curve set - Templates - Duster - Chalk - Complete drawing table 	<p>planes of projection</p> <p>(a) Vertical plane (b) Horizontal plane</p> <p>6.2 Project views of three-dimensional objects on to the basic planes of projection in both first and third angle to obtain</p> <p>(a) the front view or elevation (b) the top view or plan.</p>	<ul style="list-style-type: none"> • Ask students to construct orthographic projections of simple objects in first and third angle orthographic projections and assess. 	<p>ruler (1m)</p> <ul style="list-style-type: none"> - Black board Tee-Square - Black board compass - Blackboard protector - Adjustable set-square - 60 set square - 45 set square - French curve set - Templates - Duster - Chalk - Complete drawing table
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General Objective: 7.0 Understand the intersections of regular solids.						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
13 - 15	71.1 Explain interpretation or intersections of solids.	<ul style="list-style-type: none"> • Ask students to give examples of intersection of solids 	<ul style="list-style-type: none"> - Black board ruler (1m) - Black board Tee-Square - Black board compass - Blackboard protector - Adjustable set-square - 60 set square - 45 set square - French curve set - Templates - Duster - Chalk - Complete drawing table 	7.1 Draw the lines of intersections of the following regular solids and planes in both first and third angles. <ol style="list-style-type: none"> a. Two square-prisms meeting at right angles. b. Two dissimilar square prisms meeting at an angle. c. Two dissimilar square prisms meeting to an angle d. A hexagonal prism meeting a square prism at right angles. e. Two dissimilar cylinders meeting at an angle. f. Two dissimilar cylinders meeting at right angle, their centres not being in the same vertical plane. 	<ul style="list-style-type: none"> • Ask students to construct: <ol style="list-style-type: none"> a. Two square-prisms meeting at right angles b. Two dissimilar square prisms meeting at " c. Two dissimilar square prisms meeting 60 d. An hexagonal prism meeting a square prism e. Two dissimilar cylinders meeting at an angle f. Two dismal cylinders meeting at right angle, then centres at long in the same vertical place. 	
<p>Assessment: The practical class will be awarded 40% of the total score. The continuous assessments, test and quizzes will take 20% of the total score, while the remaining 40% will be for the end of the semester examination score.</p>						

COMPUTER SCIENCE COURSES

Programme:	NID in Telecommunication Technology
Course:	Introduction to Computing
Code:	COM 101
Duration:	Hours/Week:3hrs Theory:1 Practical:2
Unit:	3Units
Goal:	This course is designed so as to enable the learner understand Computer, operating Systems and its applications.
General Objectives:	At the end of this course the leaner should be able to:
	1.0 Understand the basic components of the computer and how it has evolved over the years.
	2.0 Understand the importance and application and application of operating system
	3.0 Understand the operation of windows operating system and application packages.
	4.0 Understand the management and software package.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: INTRODUCTION TO COMPUTING			Course Code: COM 101		Contact Hours: 3Hrs	
GOAL: Understanding Computer, operating systems and its applications						
Course Specification: Theoretical Contents				Practical Content:		
WEEK	General Objective 1.0: Understand the basic components of the computer and how it has evolved over the year.			General Objective:		
	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-4	<p>1.1 Explain the history of computer development.</p> <p>1.2 State the uses of computer and the impact of PC on computer technology.</p> <p>1.3 Differentiate between hardware and software.</p> <p>1.4 Explain the input-process- output algorithm with the following in mind: 1. Central Processor</p>	<ul style="list-style-type: none"> • Relate the present idea of computer to other equipments and items that assess man to perform tasks faster. • Trace the historical evolution of computers. • Assess the impact of computers to every day living. 	<p>-Maximum of 4 students to a computer system.</p> <p>-Maximum of 4 computers to a printer except when a network is in use.</p> <p>-Paper and computer accessories.</p> <p>-Magic Board</p> <p>-Multimedia projector system</p>	Demonstrate how Data is managed by various parts in the system.	Show the students through the various parts of the computer a how data is managed by the various parts in the system.	Computer Systems

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	2. Input Mechanism 3. Output Mechanism					
	General Objective 2.0: Understand the importance and application of operating system.			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5-6	<p>2.1 List the application of the following:</p> <ul style="list-style-type: none"> i. RAM ii. ROM iii. Fixed discs iv. Removable v. MS Office vi Lotus Smart Suite vii. MS Encarta <p>2.2 Explain the concept of an operating system.</p> <ul style="list-style-type: none"> i. PC-DOS/MS DOS ii. Windows iii. Linux iv. Unix 	<ul style="list-style-type: none"> • Explain the need for data storage. • Dismantle a computer system and show the students the RAM card, the Hard disk and the processors. 	<ul style="list-style-type: none"> • Maximum of 4 students to a computer system. • Maximum of 4 computers to a printer except when a network is in use. • Paper and computer accessories. • Magic board multimedia projector system 			

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	General Objective 3.0: Understand the operation of windows operating system and application packages.			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7-9	<p>3.1 Describe the steps for opening and closing windows.</p> <p>3.2 Describe the application of program manager.</p> <p>3.3 State the uses and application of the various windows bars.</p>	<ul style="list-style-type: none"> • Discuss the advantage of windows operating system. • Explain the windows menu and tools. Each student must be given an opportunity to start a computer, open/close the window operating system, and view the windows environment. • Explain the process of creating a file, manipulating the file and describe how to use the print manager. <p>Explain the various packages that makes up MS office.</p>	<ul style="list-style-type: none"> - Maximum of 4 students to a computer system. - Maximum of 4 computers to a printer except when a network is in use. - Paper and computer accessories. - Magic Board - Multimedia projector system 	<ul style="list-style-type: none"> • Demonstrate the steps for opening and closing windows. • Use the various windows bars. • Create files, folders and manipulate them. • Perform printing operation using print manager. • Access computers correctly through windows operating system. • Move from one window to another and how to operate them concurrently. 	<p>Give opportunity to each student to boot a computer, carry out a task on window operating system and shut down the computer.</p> <p>Assists students to load MS Office</p> <p>Explain the various packages that makes up MS office.</p> <p>Load MS Encarta and discuss its uses.</p>	<ul style="list-style-type: none"> • Maximum of 4 students to a computer system. • Maximum of 4 computers to a printer except when a network is in use. • Paper and computer accessories. • Magic Board • Multimedia projector system.

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				(emboldening font size, vitalizing, etc) iii. Creating and saving text files iv. Importing objects v. Spelling and grammar checking vi. Creating and manipulating tables, text boxes equations. vii. Printing and file export.	<ul style="list-style-type: none"> • Ask students to type a short document and save it. • Ask student to edit a document and carry out a spell check. • Demonstrate the use of tables. 	4 computers to a printer except when a network is in use. <ul style="list-style-type: none"> • Paper and computer accessories. • Magic board • Multimedia projector system
<p>Assessments: Coursework 10%; Course test 10%; Practical 40%; Examination 40%.</p>						

Programme:	NID in Telecommunications Technology
Course:	Introduction to Computer Programming
Code:	COM 133
Duration:	Hours/Week:3hrs Theory:1 Practical:2
Unit:	3Units
Goal:	This course is designed so as to enable the students write a basic program using at least one Programming language.
General Objectives:	At the end of this course the students should be able to:
1.0	Understand the features of a good programme.
2.0	Understand the concept of Algorithms and flow charting
3.0	Understand the principles of designing algorithms for common programming problem.
4.0	Understand general modular programme design principles
5.0	Understand the procedure in solving programming problems
6.0	Understand the concept of debugging and maintaining programme.
7.0	Understand good programming practices
8.0	Understand the concept of object oriented programming

PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
Course: Introduction to Computer Programming			Course Code: COM 133		Contact Hour:3Hrs	
GOAL: To be able to write a basic program using at least one programming language						
COURSE SPECIFICATION: Theoretical Content				Practical Content		
General Objective : Understand features of a good program				General Objective:		
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Define a program 1.2 Explain features of good program (Accuracy, maintenance, efficiency, reliability, etc).	<ul style="list-style-type: none"> • Explain program with concrete illustration. • Explain in details the various features of a good program. 	PC loaded with appropriate software and connected to OHP.	View some programming languages in computer	Assist student to view some programming languages in computer	PC loaded with appropriate software in a networked laboratory
General Objective 2: Understand the concept of Algorithms and flowcharting				General Objective:		
Week	Specific Learning Outcomes	Teachers Activities	Resources	Specific Learning Outcomes	Teachers Activities	Resources
2-4	2.1 Define algorithm on a general basis. 2.2 Explain features of an algorithms 2.3 Describe the methods of algorithm representation of English language,	<ul style="list-style-type: none"> • Describe the concept of algorithm with its features. • Give concrete examples of algorithms. 	PC loaded with appropriate software and connected to OHP.	Draw flow charts for simple programming problems. Draw flow charts to implement some simple programming tasks	Assist students in drawing flow charts for simple programming problems.	PC loaded with appropriate software in a networked laboratory

	<p>flowchart, pseudocode, decision table, data flow diagram (DFO) etc.</p> <p>2.4 Describe main ANSI flowcharts as describe algorithms.</p>	<ul style="list-style-type: none"> Teach the various methods of oppressing algorithm with examples. 				
General Objective 3.0: Understand the principles of designing algorithms for common programming problem.						
5-6	<p>3.1 Explain the design of algorithm for problem involving:</p> <p>i) Strictly sequence control structure</p> <p>ii) Selected control structure</p> <p>iii) Iteration control structure</p>	<p>Show the Structure and how to develop simple programming problem involving each of basic control structure.</p> <p>Give class Exercise, assignments to strict to practice on.</p> <p>Correcting the algorithm developed by the students.</p>	<p>PC loaded with appropriate software and connected to OHP.</p>	<p>Write simple programs using different control structure</p>	<p>Assist students in writing simple programs using different control structure</p>	<p>PC loaded with appropriate software in a networked laboratory</p>
General Objective 4.0: Understand General modular programme design principles.						
7-8	<p>4.1 Explain modular programming concept.</p> <p>4.2 Explain top-down design technique.</p> <p>4.3 Explain program design</p>	<p>Discuss the concept and advantages of modular programming</p>	<p>PC loaded with appropriate software and connected to OHP.</p>	<p>Design a program using top-down technique</p> <p>Demonstrate each</p>	<p>Assist students to design a program using top-down technique</p>	<p>PC loaded with appropriate software networked laboratory</p>

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	with program structure charts, hierarchical and network, hierarchical.	Discuss with illustrations programs e.g. payroll, student records, etc. Top-down design principles.		of the 4.1-4.3 above.		
General Objective 5.0: Understand the procedure in solving a programming problems				General Objective:		
9	5.1 Identify problems and confirm it solvable. 5.2 Explain how to code the algorithm using a suitable programming language	-Discuss the Stages involved developing a program. -Demonstrate the stages above with real life program possible.	<ul style="list-style-type: none"> • PC loaded with appropriate software and connected to OHP. 	5.1 Demonstrate how to code a simple algorithm using any suitable language. 5.2 Design algorithm for the chosen method of solution with flowcharts or pseudocodes. 5.3 Test run programmes on the computer.	Assist students in coding a simple algorithm using any suitable language.	PC loaded with appropriate software networked laboratory
General Objective 6.0: Understand the various levels of programming languages						
10	6.1 Explain machine language, low-level language and high level languages 6.2 Give examples of the languages stated above. 6.3 Distinguish the features of languages in 6.1.	Discuss the features of machine language, low level language, and high level language. High light the	PC loaded with appropriate software and connected to OHP.	Code a very simple high level language and translate it to assembly language.	Assist students to code a very simple high level language and translate it to assembly language.	PC loaded with appropriate software networked laboratory

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	6.4 Distinguish between system commands and program statements.	advantages and disadvantage of high level programming layout				
General Objective 7.0 Understand the concept of debugging and maintaining program				General Objective:		
11	7.1 Define debugging. 7.2 Explain syntax, run-time and logical errors. 7.3 Explain program maintenance. 7.4 Distinguish between debugging and maintaining a program.	Discuss various methods of debugging, aids. High light classes. Differentiate between debugging and maintenance. Discuss sources of bugs in program	PC loaded with appropriate software and connected to OHP.	Identify sources of bugs in a program Identify techniques of locating bugs in a program create a simple bug in a simple program and correct it	Assist student to create a simple bug in a simple program and correct it	PC loaded with appropriate software networked laboratory
General Objective 8.0: To understand good programming practices				General Objective:		
12	8.1 Explain structured approach to both flowcharting and program development. 8.2 Explain program documents technique HIPS, data flow diagram, pseudo-cal. 8.3 Explain graphic user interface, GUI. 8.4 Define interactive processing.	Discuss structured approach to flowcharting and programming.	PC loaded with appropriate software and connected to OHP.	Write a simple structured program	Assist to students write a simple structured program	PC loaded with appropriate software networked laboratory
General Objective 9.0: Understand the concept of object oriented programming.						
13	9.1 Describe the concept of OO	Explain object	PC loaded with	Identify	Assist students to	PC loaded with

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	<p>programming. 9.2 Describe the features of OO programming. 9.3 Describe the concept of properties, events, objects and classes.</p>	<p>oriented (OO) program. State the features of OOP Explain the concept of properties Illustrate the obstacles to internet growth in Nigeria. Discuss methods, events, objects and classes. Mention various objects oriented programming languages State The advantages of OOP</p>	<p>appropriate software such as VB.NET and connected to OHP.</p>	<p>properties, events, objects and class in a running OOP</p>	<p>identify properties, events, objects and class in a running OOP</p>	<p>appropriate software such as VB.NET in a networked laboratory</p>
<p>Assessment: Coursework 10%; Course test 10%; Practical 40%; Examination 40%</p>						

Programme:	NID in Telecommunications Technology
Course:	Introduction to Computer aided design and drafting
Code:	COM 201
Duration:	Hours/Week:4hrs Theory:2 Practical:2
Unit:	4Units
Goal:	This course is designed to enable the students acquire Skills in design and drafting
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand the use of computer in the design and drafting process.
	2.0 Know how to construct simple geometric shapes
	3.0 Understand the difference edit boxes.
	4.0 Understand how to use edit commands.
	5.0 Know how to create layers
	6.0 Understand how to create linear and aligned dimensions

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Introduction to Computer Aided Design And Drafting			Course Code: COM 201		Contact Hours: 4Hrs	
GOAL: To enable students acquire skills in design and drafting.						
COURSE SPECIFICATION: Theoretical Contents				Practical Content:		
General Objective 1.0: Understand the use of computer in the design and drafting process.				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1 - 3	<p>1.1 State the advantages and disadvantages of computer in the design process.</p> <p>1.2 Explain the links between CAD and CAM.</p> <p>1.3 Explain the principles of operation capabilities and system requirements of AutoCAD.</p> <p>1.4 Explain the functions of the above.</p> <p>1.6 List the different coordinate systems.</p>	<ul style="list-style-type: none"> • Explain advantages and disadvantages computer in the design process. • Explain the link between CAD and CAM. • Show students the main parts of the screen of Auto CAD 14 Explain the function of the above. • Ask the students to explain and use the different input methods. • Ask students to explain differences 	<p>Complete Computer Sets.</p> <p>1 Computer to 2 Students</p> <p>1 Large Format Printer or Plotters in a Network</p> <p>1 Digitiser to 2 students.</p> <p>Manuals, Recommended Textbooks.</p> <p>Complete Computer Sets</p> <p>1 Computer to 2 Students</p> <p>1 Large Format Printer or Plotters in a Network</p> <p>1 Digitiser to 2</p>	<p>1.1 Install auto CAD Software correctly.</p> <p>1.2 Identify the main parts of the screen of Auto CAD 14 or later version.</p> <p>1.3 Demonstrate the uses of HELP Menu in solving problems when using the package.</p> <p>1.4 Use the OSNAP facility to select options.</p> <p>1.5 Use layer control to change the layers in a drawing.</p> <p>1.6 Use Cartesian and Polar coordinates to</p>	<p>Provide the students with AutoCAD CDROM for the installation.</p>	<p>Complete Computer Sets, 1 Computer to 2 Students, 1 Large Printer or Plotters in a Network, 1 Digitizer to 2 Students.</p>

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		<p>between Cartesian and polar coordinates systems.</p> <ul style="list-style-type: none"> • Ask students to demonstrate the above options on the computer screen. • Ask students to construct lines at set lengths and angles using above coordinate systems. • Ask students to use snap points to construct lines. • Ask students to explain the use of snap points and ortho-commands. • Assess the students. 	students.	<p>draw lines.</p> <p>1.7 Prepare and change the size of the drawing field.</p> <p>1.8 Use different input methods; keyboards, mouse, digitisers, and scanners</p> <p>1.9 Show how to save drawings on demand and also how to set up the auto-save features.</p>		
General Objective 2.0: Understand how to construct simple geometric shapes.				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4	2.1 Describe how to hatch the shapes drawn and change	<ul style="list-style-type: none"> • Ask the students to hatch the 	Complete Computer Sets	2.1 Produce a simple drawing.	Ask the students to	Complete computer sets,

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	<p>the hatch pattern and scale.</p> <p>2.2 Explain how to draw circles, ellipse and arcs to given dimensions.</p> <p>2.3 Explain how to construct polygons and squares to given dimensions.</p>	<p>shapes draw.</p> <ul style="list-style-type: none"> • Ask the students to change the hatch pattern and scale. • Ask the students to draw circles, ellipse and arc to given dimensions. 	<p>1 Computer to 2 Students</p> <p>1 Large Format Printer or Plotters in a Network</p> <p>1 Digitiser to 2 students.</p>	<p>2.2 Produce a simple drawing – Drawing 1.</p>	<p>construct polygons and squares to a given dimensions.</p>	<p>1 computer to 2 students,</p> <p>1 large format printer or plotters in a network,</p> <p>1 Digitiser to 2 students.</p>
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General Objective 3.0: Understand the different edit boxes.				General Objective		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	<p>3.1 State the different edit boxes.</p> <p>3.2 Explain how to select the shapes using edit boxes.</p> <p>3.3 Explain how to use the offset command.</p>	<ul style="list-style-type: none"> • Ask students to explain the different edit boxes. • Ask students to explain their attributes. 	<p>Complete Computer Sets</p> <p>1 Computer to 2 Students</p> <p>1 Large Format Printer or Plotters in a Network</p> <p>1 Digitiser to 2 students.</p>	<p>Use array command to draw both polar and rectangular arrays.</p>	<ul style="list-style-type: none"> • Ask students to draw both polar and rectangular arrays using array command. • Ask 	

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					students to draw using the offset command.	
General Objective 4.0: Understand how to use edit commands.			General Objective:			
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6	4.1 Explain how to use edit commands.	Describe how to use edit commands	Complete Computer Sets 1 Computer to 2 Students 1 Large Format Printer or Plotters in a Network 1 Digitiser to 2 students.	- Demonstrate how to move objects accurately; using both snap commands and coordinates. - Demonstrate how to copy objects from one position to another accurately using snap and coordinate entry. Demonstrate how to erase object. - Demonstrate how to trip objects. - Demonstrate the ability to move	Demonstrate the installation of MD Word. Identify the different features of the software. Ask students to type a short document and save it. Ask student to edit a document and carry out a spell check. Demonstrate the use of	

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				<p>objects accurately; using both snap commands and coordinates.</p> <p>-Demonstrate how to copy objects from one position to another accurately using snap and coordinate entry.</p> <p>-Demonstrate how to erase object.</p> <p>-Demonstrate how to fillet and chamfer angles.</p>	tables.	
General Objective 5.0: know how to create layers				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7-8	5.1 Explain the use of layers and how they help in construction	<ul style="list-style-type: none"> • Ask students to create layers. • Ask students to change colour of layers. • Ask students to change the line type of a layer. • Ask students 	<p>Complete Computer Sets</p> <p>1 Computer to 2 Students</p> <p>1 Large Format Printer or Plotters in a Network</p> <p>1 Digitiser to 2 students.</p>	<p>- Demonstrate how to create layers.</p> <p>- Demonstrate how to change colour of layers.</p> <p>- Demonstrate how to change the line types of a layer.</p> <p>- Demonstrate how to move objects from one</p>	<p>5.1 Ask students to create layers.</p> <p>5.2 Ask students to change colour of layers.</p> <p>5.3 Ask students to change the line type of a layer.</p> <p>5.4 Ask students to</p>	<p>Complete Computer Sets</p> <p>1 Computer to 2 Students</p> <p>1 Large Format Printer or Plotters in a Network</p> <p>1 Digitiser to 2 students.</p>

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		<p>to move objects from one layer to another.</p> <ul style="list-style-type: none"> • Ask students to switch layers on and off. • Ask students to use layers to construct drawings. 		<p>layer to another.</p> <p>- Demonstrate how to switch layers on and off.</p>	<p>move objects from one layer to another.</p> <p>5.5 Ask students to switch layers on and off.</p> <p>5.6 Ask students to use layers to construct drawings.</p>	
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General Objective 6.0: Understand how to create linear and aligned dimensions.				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9-11	<p>6.1 Explain how to create linear and aligned dimensions.</p> <p>6.2 Describe how to create angular dimensions.</p> <p>6.3 Describe how to add tolerances to dimension.</p> <p>6.4 Describe how to create leader lines.</p> <p>6.5 Explain how to add single line and multiple line texts to drawings.</p> <p>6.6 Describe how to edit dimensions and text.</p>	<p>Explain the need for linear and aligned dimensions</p>	<p>Sets of Personal Computers Recommended textbooks Manuals etc.</p>	<p>6.1 Demonstrate how to add to tolerances to dimension.</p> <p>6.2 Demonstrate how to create leader lines.</p> <p>6.3 Demonstrate how to add single line and multiple line texts to drawings.</p> <p>6.4 Demonstrate how to edit dimensions and text.</p>	<p>Assist student in carryout tasks as stated in (6.1-6.4)</p>	<p>Complete computer sets, 1 computer to 2 students, 1 large format printer or plotters in a network, 1 Digitiser to 2 students.</p>

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WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
				6.5 Create the title block for a drawing. 6.6 Write letters and numbers on drawings. 6.7 Draw circles and to erase parts lines or circles. Produce a simple drawing with correct details in terms of title block etc. 6.8 Select parts of a drawing to perform further task. 6.9 Move, copy and rotate drawing parts. 6.10 Produce a full	<ul style="list-style-type: none"> • Ask each student to carry out a drawing that is specific to his/her department. 	Complete Computer Sets 1 Computer to 2 Students 1 Large Format Printer or Plotters in a Network 1 Digitiser to 2 students.

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				<p>drawing with title blocks from a real engineered object.</p> <p>6.11 Show all the views.</p> <p>6.12 Produce a fully dimensioned drawing of a component appropriate to the engineering specification of the department.</p>		
Assessment: Coursework 10%; Course test 10%; Practical 40%; Examination 40%.						

MATHEMATICS COURSES

TELECOMMUNICATION COURSES

Programme:	NID in Telecommunication Technology
Course:	Electronics
Code:	COM 111
Duration:	Hours/Week:5hrs Theory:2 Practical:3
Unit:	5Units
Goal:	This course is designed to enable the students understand Electrical/Electronics components and their applications
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand the operations, characteristics of diodes, transistor, field effect transistors and thyristors.
	2.0 Understand and apply the operating characteristics of Semi.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: ELECTRONICS			COURSE CODE: TET 111		CONTACT HOURS: 5 HRS	
GOAL: Understanding Electrical/Electronics components and their applications.						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
General Objective: Understand the operations, characteristics of diodes, transistor, field effect transistors and thyristors				General Objective:		
WEEK	Specific Learning Objective:	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-2	<p>1.1 Outline energy levels in materials and the electron as a carrier of electricity Or charge.</p> <p>1.2 Explain valence and conduction bands and Fermi energy levels.</p> <p>1.3 Distinguish between conductors, semiconductors, and insulators, using Fermi-Energy level concept.</p> <p>1.4 Explain intrinsic and Extrinsic semiconductors.</p> <p>1.5 Explain carriers in semi-Conductors.</p> <p>1.6 Define majority and Minority carriers.</p> <p>1.7 Outline the effect of</p>	<ul style="list-style-type: none"> • Explain that the material in this module must be kept at a simple level related to bonding, agitation due to temperature and the movement of free electrons constituting current flow. • Explain polarity, conventional current flow and direction of charge flow. • Analyze the constituents of semiconductors, concepts and operation. 	<ul style="list-style-type: none"> - Chalkboard - Chalk - Textbooks - Lecture notes - Chats - Writing materials. 			

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	temperature on the conductivity of semi-conductors and Conductors.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3-4	<p>1.8 Identify the circuit symbols for PN junction diode.</p> <p>1.9 Explain with the aid of suitable sketches the forward and reverse and zener characteristics of the PN junction diode.</p> <p>1.10 Explain zener diode characteristics.</p> <p>1.11 Identify the circuit symbols for zener diode.</p> <p>I. General semi conductor</p> <p>II. diode.</p> <p>III. Light emitting diode</p> <p>IV. Variable capacitance diode (varactor)</p> <p>V. iv) Tunnel diode</p> <p>VII. v) Zener diode</p>	<ul style="list-style-type: none"> • Draw the cct symbols to represent : <ol style="list-style-type: none"> I. PN junction diode. II. Zener diode. III. Tunnel diode. IV. Scholtky V. Diac VI. Varactor • Explain their theoretical concepts and derive equations for operations. • Use these formulas to solve problems. 	<ul style="list-style-type: none"> - Chalkboard - Chalk - Textbooks - Lecture notes - Chats - writing materials. 	<ul style="list-style-type: none"> • Conduct experiments on PN junction diode to determine characteristics using silicon or germanium type. • Experiment on the forward and reverse characteristics of a Zener diode application. • Construct and operate rectifier ccts to produce DC voltages. 	<ul style="list-style-type: none"> • Teacher should give instructions that will assist the students to successfully carryout experiments to determine PN junction characteristics in various semi conductors. • Design rectifier ccts for Half and Full wave rectification to exemplify diode application. 	<p>PN junction diodes, ammeter, voltmeter, Zener diode and cables, practical manuals, practical logbooks, electronic laboratory.</p>

	<p>VIII. vi) Bi-directional zener a. diode</p> <p>IX. (Breakdown diode)</p> <p>X. vii) Backward diode</p> <p>XI. viii) Bi-directional diode</p> <p>XII. (Diac)</p> <p>XIII. ix) Scholtky diode</p> <p>XIV. x) Photo diode</p> <p>2.5 Explain the zener effect phenomenon Explain the applications of zener diode (clipping, clamping, stabilization etc.)</p>					
General Objective: 2.0 Understanding the Operating Characteristics Of Semi-Conductor Device				General Objective: Applying the operating Characteristics of semi conductor device		
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning objective	Teachers Activities	Learning Resources
5-6	<p>2.1 Explain the structure and operation of a bipolar transistor (NPN and PNP).</p> <p>2.2 Explain the biasing arrangements of NPN and PNP bipolar transistors.</p> <p>2.3 Explain the circuit configurations of NPN</p>	<ul style="list-style-type: none"> Discuss the applications of bipolar junction transistors. Explain relevant equations specific to the various applications. 	<ul style="list-style-type: none"> Chalkboard Chalk Textbooks Lecture notes Chats writing materials. 	<p>Determine the static characteristics of NPN transistors in:</p> <p>I. Common Collector (CC) configuration.</p> <p>II. Common Base (CB) configuration.</p> <p>III. Common Emitter (CE) configuration.</p>	<ul style="list-style-type: none"> Instruct students on how to design and implement transistor amplifier ccts in many modes. 	<p>PNP and NPN transistors, ammeter, voltmeter, cable, practical manuals, practical logbooks, electronic laboratory.</p>

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	<p>and PNP bipolar transistors:</p> <ol style="list-style-type: none"> a. the common base configuration b. the common collector configuration c. the common emitter configuration. <p>2.4 Describe the input and output resistances, current and voltage gains from</p>	<ul style="list-style-type: none"> • Solve problems using these equations in various amplifier ccts. 		<ul style="list-style-type: none"> • Design and construct basic amplifier ccts. • Sketch the static characteristic curves of NPN and PNP bipolar transistors for 2.3 (above 	<ul style="list-style-type: none"> • Carryout measurements to determine the gains of the amplifier ccts. 	
Week	Specific Learning outcome:	Teachers Activities	Resources	Specific Learning outcome	Teachers Activities	Learning Resources
7	<p>2.5 Explain basic structures of the thyristor.</p> <p>2.6 Explain the working principles of the thyristor.</p> <p>2.7 List sample applications of the thyristor.</p> <p>2.8 State the advantages of the thyristor switch over other types of electro-mechanical switches e.g. relay.</p>	<p>Use appropriate circuit diagrams to discuss the applications and operational principle of thyristor.</p>	<ul style="list-style-type: none"> - writing materials - Textbook - Charts - Data books. 	<p>Perform experiments on the voltage vs. current Characteristics of a thyristor.</p>	<p>Teacher should give instructions that will assist the students to successfully carryout the experiments.</p>	<p>Thyristor, ammeter, voltmeter, cable, practical manuals, practical logbooks, electronic components.</p>

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Week	Specific Learning objective	Teachers Activities	Learning Resources	Specific Learning objective	Teachers Activities	Learning Resources
8-9	<p>2.9 Explain the basic constructional features of FET's (junction gate and insulated gate).</p> <p>2.10 Plot the output and transfer characteristic from data given.</p> <p>2.11 State precautions necessary when using FET's.</p>	<ul style="list-style-type: none"> • Explain different biasing arrangement of FET amplifier ccts: i. Fixed bias ii. Collector-base bias without a coupling capacitor. iii. Potential divider bias. • Derive necessary equations for the operation and solve problems. 	<ul style="list-style-type: none"> - Magnetic writing board - Field effect transistors -Textbooks - Amplifier circuit. 	<ul style="list-style-type: none"> • Design FET base amplifier circuits and analyse them accordingly. • Identify F ETs and ascertain their workability. • Describe mutual conductance and drain resistance for the device. <p>Obtain voltage gain, input and output resistance from output characteristic curves.</p>	<p>Assist the students to bias the FET transistor for different amplifier ccts operation.</p>	<p>FETs Electronic components. Oscilloscope Meters Function generators.</p>
Week	Specific Learning objective:	Teachers Activities	Learning Resources	Specific Learning objective	Teachers Activities	Learning Resources
		<ul style="list-style-type: none"> • Explain these concepts: i. Biasing ii. Gain iii. Equivalent ccts. • Derive equations relating to operations. 	<ul style="list-style-type: none"> - Chalk - Chalkboard - Writing materials etc. 	<ul style="list-style-type: none"> • Identify the major differences in performance between FETS and Bipolar transistors. • Construct stabilized amplifier ccts. 	<p>Demonstrate different amplifier designs using FETs and Bipolar transistors.</p>	<p>Transistors: FETs and Bipolars. Scope Components. Multimeters.</p>

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				<ul style="list-style-type: none"> • Perform DC. biasing, voltage/current/power gain of an amplifier stage for bipolar transistors and field effect devices • Analyze the AC equivalent circuit of a transistor in each configuration. • Calculate the voltage gain, current and power gain of the stage. 		
Week	Specific Learning Objective:	Teachers Activities	Learning Resource	Specific Learning objective	Teachers Activities	Learning Resources
10-11	2.12 Explain the principle and methods of Inter-stage coupling: <ul style="list-style-type: none"> i. resistance-capacitance ii. Direct coupling iii. Transformer Coupling 	<ul style="list-style-type: none"> • Discuss the purpose of transformer coupled amplifiers. Basic operation and equation for its functionality. • Illustrate with diagrams the methods of inter stage coupling in 7.2. 	<ul style="list-style-type: none"> - Magnetic writing board - Recommended textbooks - Writing materials 	<ul style="list-style-type: none"> • Demonstrate the performance of an amplifier using different coupling methods. • Determine the gain / frequency response of the above transistor amplifier cct. • Determine the overall 	<ul style="list-style-type: none"> • Assist students to setup the labs for cascading • Conduct the practicals with the students. 	Electronic Laboratory, Power Supply Units, Amplifier Modules, Oscilloscopes, Signal Generator, Practical Manuals, Practical Notebooks etc.

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		<ul style="list-style-type: none"> • Give assignments to students and assess them. 		<p>gain in a cascaded amplifier.</p> <ul style="list-style-type: none"> • Analyze the operation and design of transformer coupled amplifiers. 		
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Week	Specific Learning Objective:	Teacher's Notes	Learning Resources	General Objective:		
				Specific Learning objective	Teachers Activities	Learning Resources
	<p>2.13 Describe the general nature of positive and negative feedback in systems.</p> <p>2.14 Explain the general expression for gain of a basic feedback Amplifier cct.</p>	<ul style="list-style-type: none"> • Draw the block diagram of a basic feedback system. • Explain its operation and states their equations for operation. • Instructor should give examples of industrial areas of applications to explain the concepts. 	<ul style="list-style-type: none"> - Chalkboard - Writing materials - Calculators - Recommended textbooks etc 	<ul style="list-style-type: none"> • Design simple feedback amplifiers like OPAMP inverting ccts to demonstrate feedback processes. • Identify feedback ccts and be conversant with their advantages and requirements. • Show that the GAIN of a system is mainly determined by the feedback function and independent of forward gain. 	<ul style="list-style-type: none"> • Assist the students design OPAMP inverting feedback amplifier. • Measure its electrical characteristics. 	<p>Electronic Laboratory, Power Supply Units, Amplifier Modules, Oscilloscopes, Signal Generator, OPAMPs Components Practical Manuals, Practical Notebooks etc.</p>

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				<ul style="list-style-type: none"> Derive necessary equations describing feedback systems. 		
Week	Specific Learning objective	Teachers Activities	Learning Resources	Specific Learning objective	Teachers Activities	Learning Resources
12-13	<p>2.15 Explain the effect of applying negative feedback to an amplifier in relation to:</p> <ol style="list-style-type: none"> I. Gain II. gain stability III. bandwidth IV. distortion V. noise VI. input and output <p>2.16 State the properties of a PID controller and its area of application</p> <p>2.17 Describe the circuit of a simple PID controller as (P)roportional, (I)ntegral, and (D)erivative function generator.</p> <p>2.19 State its</p>	<ul style="list-style-type: none"> Discuss feedback using OPAMP and RC components to explain its operation. Draw feedback output waveforms reference to a given signal input and determine its equations. Explain the concepts of PID. 	<ul style="list-style-type: none"> - Chalkboard - Writing materials, - Calculators - Recommended textbooks. 			

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	widespread use in the Industry.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning objective	Teachers Activities	Learning Resources
14-15	<p>2.20 Explain how oscillators can be produced from an amplifier with positive feedback.</p> <p>2.21 Explain the operation of: i. R- C oscillator ii. L-C oscillator (Hartley & Colpitts Oscillators)</p> <p>2.22 Describe methods of achieving frequency stability of oscillators e.g. piezo -electric crystal.</p> <p>2.23 Explain with the aid of suitable sketches the operation of multivibrators.</p> <p>2.24 Explain simple applications of multivibrators circuits.</p>	<ul style="list-style-type: none"> • Explain the general concept of signal generators or oscillators. • Draw different waveform patterns and explain their generation. • Derive necessary equations for these signals / ccts producing them. 	<ul style="list-style-type: none"> - Chalkboard writing materials - Calculators - Recommended textbooks. 	<ul style="list-style-type: none"> • Design and construct oscillator ccts for sinusoidal and rectangular waveforms. • Determine the factors responsible for frequency determination in oscillators and multivibrators. • Quote formular for oscillator frequencies. • Solve simple problems on multivibrators. 	Assist students to implement the multivibrator ccts and that of the sinusoidal waveform generators.	Electronic Laboratory, Power Supply Units, Amplifier Modules, Oscilloscopes, Components Signal Generator, Practical Manuals, Practical Notebooks etc.
<p>Assessment: The practical class will be awarded 20% of the total score, the continuous assessments, test and quizzes will be 40% of the total score, while the remaining 40% will be for the end of semester examination.</p>						

Programme:	NID in Telecommunication Technology
Course:	Telecommunication Fundamentals
Code:	TET 112
Duration:	Hours/Week:4 hrs Theory:2 Practical:2
Unit:	4Units
Goal:	This course is designed to enable the learner to acquire skills on the Operation of basic telecommunication devices
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand the basic principle of telecommunication fundamentals.
	2.0 Understand the principle of modulation.
	3.0 Understand the concept of logarithm and describe
	4.0 Understand the concept and effect of noise
	5.0 Understand information and bandwidth requirements for telecom systems.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: TELECOMMUNICATION FUNDAMENTALS		COURSE CODE: TET 112		CONTACT HOURS: 4 HRS		
GOAL: Acquire skills on the operation of basic telecommunication devices						
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:		
General Objective:1.0 Understand the Basic Principle of Telecommunication Fundamentals				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-2	Explain the functions and the working principles of block diagrams in (a-e)	<ul style="list-style-type: none"> • Sketch a typical telecommunication system and explain how it works • Explain how a signal is generated from the transducer • List various types of transducers that can be used for telecommunication s • Explain the need for modulation 	<ul style="list-style-type: none"> - Chalkboard - Chalk - Lecture notes - Textbooks 	<ul style="list-style-type: none"> • Draw the block diagram of a simple telecommuni-cation systems showing: <ol style="list-style-type: none"> a. Input transducer b. Transmitter <ol style="list-style-type: none"> i. AM ii. FM iii. TV c. Transmission channels d. Receivers <ol style="list-style-type: none"> i. AM ii. FM iii. TV e. Output transducer • Identify the basic telecommuni 	<ul style="list-style-type: none"> • Show the various stages in AM/SW commercial receiver system. • Identify the major components involved. • Show the various units in a typical TV system. Demonstrate the functions of the stages and identify the major components • Simulate faulty conditions in 	<ul style="list-style-type: none"> • Commercial AM/ SW receiver. • TV receiver Monochrome and Colored. • Electrical components: transistors, ICs, resistors etc • Measuring instruments • Vero boards, soldering iron

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				<p style="text-align: center;">cation system operation.</p> <ul style="list-style-type: none"> • Carryout measurements using basic instruments Frequency meter etc • Handle soldering iron and perform effective soldering. • Carryout circuit design and implementation. 	<p style="text-align: center;">AM and TV units.</p> <ul style="list-style-type: none"> • Demonstrate how to rectify them. • Design a simple AM receiver and transmitter, simulate and record their electrical parameters. 	
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3-4	<p>1.2 Describe the operation of sound transducers;</p> <p style="margin-left: 20px;">a. microphone b. loudspeakers</p> <p>1.3 Describe the principles of operation and uses of the following:</p>	<ul style="list-style-type: none"> • Explain the uses of transducers. • Draw typical diagram showing a, b, c, d, and e. 	<ul style="list-style-type: none"> - Writing and drawing materials - White board - Textbooks - Lecture notes 	<ul style="list-style-type: none"> • Identification and uses of transducers • Identify components as listed in 2.2. 	<ul style="list-style-type: none"> • Teacher should show parts of a transducer. • Demonstration of the use of the components. 	<ul style="list-style-type: none"> • Students to visit Broadcasting studio. • Students to visit Transmitting stations,

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	<ul style="list-style-type: none"> a. carbon microphone b. crystal microphone c. moving iron telephone receiver d. capacitor microphone. 					
	General Objective: 2.0 Understanding the Principles of Modulation			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5-6	2.1 Define Modulation and Demodulation in relation to: <ul style="list-style-type: none"> i. AM system ii. FM system iii. Vestigial technique 2.2 Define a carrier signal 2.3 Explain an intelligent Signal	<ul style="list-style-type: none"> • Explain why the need for signal conversion for effective communication. • Explain different transmission techniques. • Solve theoretical problems related to Mod-Demod processes. 	<ul style="list-style-type: none"> - Writing and drawing materials - White board - chalk - Textbooks 	<ul style="list-style-type: none"> • Monitor and detect signal waveforms in a telecom systems. • Demonstrate AM and FM modulation using two wave forms • Use measuring instruments for calibration. 	<ul style="list-style-type: none"> • Sketches of AM / FM signal • Generate a particular carrier frequency. • Mix the carrier frequency with a sound signal. • Monitor the output waveform. • Demonstrate MOD / DEM using telecoms module. • Use scope to 	<ul style="list-style-type: none"> • Oscilloscope • function – generators • Telecoms module Radio • Radio receiver • Mixer

					monitor signal at various point in a radio system.	
	<p>2.4 Explain the significance of modulation and demodulation in communication systems</p> <p>2.5 Explain amplitude modulation.</p> <p>2.6 Explain the following regarding amplitude modulation:</p> <ol style="list-style-type: none"> side frequencies; side band; modulation envelop; wave band Modulation index. 	<ul style="list-style-type: none"> Discuss the applications of modulation and demodulation to communication Systems give assignments involving amplitude and frequency modulation to students. Draw the block diagram of the following: <ol style="list-style-type: none"> Radio receivers, tuned radio heterodyne receivers 	<ul style="list-style-type: none"> Chalkboard Chalk Writing and Draw materials etc. 	<ul style="list-style-type: none"> Design the signal waveform patterns for AM and FM modulated signals. Design the signal waveform patterns for AM and FM demodulated signals. Identify practical the advantages of FM and AM based systems Design objectively all parameters involved in 1.1 through 1.4. Solve problems involving bandwidths and sidebands 	<ul style="list-style-type: none"> Use radio to tune a particular closer station for both AM and FM reception. Use the oscilloscope to measure waveforms at the IF amplifier stages and at the demodulators. Record the waveform variation. Explain the waveform patterns. 	<ul style="list-style-type: none"> Radio receivers AM and FM systems. Oscilloscope.

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<p>2.7 Explain the working principles of amplitude modulations / demodulation and application areas.</p> <p>2.8 Explain the types and working principles of amplitude demodulators</p> <p>2.9 Explain the working principles of frequency demodulators.</p>	<ul style="list-style-type: none"> • Solve problems • Illustrate theoretical concepts with the aid of diagrams. 	<p>- Black Board - Chalk etc.</p>	<ul style="list-style-type: none"> • Design modulators and test performance for optimum operation. • Compare the parameters of F.M. with A.M and solve problems using equations. 	<ul style="list-style-type: none"> • Assist students to generate a modulated RF signal from a trainer module, design simple modulators eg half wave rectifier to demodulate the Rf waveform. • Instructs students to take various readings and plot curves. 	<p>Telecoms module, Diodes, Capacitors, Resistors, Scope, Multimeters.</p>
<p>2.10 Explain the following terms regarding frequency modulation:</p> <ol style="list-style-type: none"> a. modulation index b. deviation ratio c. frequency deviation d. system deviation e. frequency swing <p>2.11 Explain why F.M. has a</p>	<p>Explain modulation as it relates AM and FM radio systems. Derive equations for their operation and solve related problems.</p>		<p>Operate similar unit especially microwave receivers used in telecoms</p>	<ul style="list-style-type: none"> • Sketch the functional block diagram of a Superhet unit. • Enlist the major components of the basic blocks. <p>2.14 Demonstrate the function</p>	<ul style="list-style-type: none"> • A super heterodyne receiver for AM or SW signal reception. • Oscilloscope.

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	<p>wider bandwidth than A.M.</p> <p>2.12 Explain the use of super heterodyne to suppress image and adjacent channel interferences.</p> <p>2.13 State the functions of a Superhet and its major units.</p>				<p>of individual units.</p> <p>2.15 Use scope to measure signal levels at major</p>	
	<p>2.14 Explain the function of the Automatic Gain Control (A.G.C.)</p> <p>2.15 Explain with the aid of a block diagram the working principles of a super heterodyne receiver.</p> <p>2.16 Explain the following phenomena in super heterodyne receiver:</p> <p>a. adjacent channel interference</p> <p>b. image interference</p>	<p>Explain the purpose of receivers and their types with emphasis on their specific identities.</p>	<p>- Black Board - Chalk etc.</p>			
<p>General Objective :3.0Understanding the concepts of logarithm and decibel</p>				<p>General Objective:</p>		

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WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7-8	3.1 Explain the term 'decibel (dB) 3.2 Explain the reference level for decibel Measurement (dBm)	Explain the fundamental theoretical concepts and solve problems using relevant equations.	White board - Writing materials - Textbooks	<ul style="list-style-type: none"> • Convert frequency values in Hertz to decibels. • Amplify signals to particular amplitudes. • Obtain expressions for <ol style="list-style-type: none"> i. Power ratio form ii. Voltage gain equation. • Apply the expressions above to solve problems in telecommunication. 	<ul style="list-style-type: none"> • Select a particular signal level to amplify. • Measure the amplified output. • Demonstrate the voltage gain, frequency response. • Demonstrate the above parameters in dB as applicable. 	<ul style="list-style-type: none"> • Function generator • Oscilloscope • Amplifier
General Objective :4.0 Understand the concepts and effects of Noise				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9-10	4.1 Explain the meaning of electrical noise. 4.2 Distinguish between External and internal noise in Communication system. 4.3 Discuss the various type of external	Explain the fundamental theoretical concepts and solve problems using relevant equations.	- Writing and drawing materials - White board - Textbooks	<ul style="list-style-type: none"> • Design simple circuit to eliminate certain signal frequencies. • Identify signal frequencies and waveforms. • Demonstrate the ability to filter out any unwanted frequency. 	<ul style="list-style-type: none"> • Demonstrate the occurrence of noise in telecoms systems using radio. • Sketch ways in which noise are generated. • Draw filters and wire a 	<ul style="list-style-type: none"> • Filters • Oscilloscopes • Function generators • Resistors, capacitors. • Radio receiver

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	<p>noise: namely</p> <p>i. Man made noise</p> <p>ii. Atmospheric noise</p> <p>iii. Space noise</p> <p>4.4 Explain the various types of internal noise:</p> <p>i. Thermal/Johnson noise.</p> <p>ii. Shot noise</p> <p>4.5 Define signal to noise ratio and noise figure. Obtain expression for the signal to noise ratio and noise figure (NF)</p> <p>4.6 State ways in which various noises can be eliminated.</p>				<p>simple RC circuit.</p> <ul style="list-style-type: none"> • Demonstrate the operation of a low pass RC filter using the generator and scope. • Use RC cct to obtain a high pass filter. • Demonstrate the cutoff frequencies and state their basis. 	
General Objective :5.0 Understanding Information and Bandwidth Requirements for Telecom Systems				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11-12	<p>5.1 Explain the various information sources for:</p> <p>i. Analog system</p> <p>ii. Digital system</p>	<ul style="list-style-type: none"> • Explain the practical design of Oscillators to satisfy given bandwidth requirements for 	<ul style="list-style-type: none"> - Writing and drawing materials - White board - Textbooks 	<p>1.1 Obtain an expression for the law</p> <p>1.2 Solve problems with the expression in 6.6 above</p>	<p>Design a simple a simple RC phase shift Oscillator.</p>	

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	<p>5.2 Explain how each above is quantified or measured.</p> <p>5.3 Explain the practical implication of bandwidth to telecommunication system</p> <p>5.4 Define a channel.</p> <p>5.5 Explain the relationship between bandwidth and information</p> <p>5.6 State the Hartley's law</p>	<p>telecommunication systems.</p> <ul style="list-style-type: none"> • Explain the causes of congestion in a telecom system. How they can be eliminated or reduce. 				
<p>Assessment: Coursework 20%; Course test 20%; Practical 20%; Examination 40%.</p>						

Programme:	NID in Telecommunication Technology
Course:	Workshop Practice
Code:	TET 113
Duration:	Hours/Week:2hrs Theory:0 Practical:2
Unit:	2Units
Goal:	This course is designed to enable the Students to acquire skills in Workshop practices

General Objectives: At the end of this course the learner should be able to:

- 1.0 Understand wiring and safety regulations.**
- 2.0 Know the use of electrical and electronic engineering tools and equipment.**
- 3.0 Understand the construction and uses of different types of cable and regulation relating the floor uses**
- 4.0 Understand various electrical wiring for system, accessories and the regulations guiding them.**
- 5.0 Understand testing and inspection of inspection of electrical installation for telecommunication systems.**
- 6.0 Know the various jointing and soldering techniques.**

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Workshop Practice			COURSE CODE: TET 113		CONTACT HOURS: 2Hrs	
GOAL: Acquire skills in workshop practices						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
General objective: Understanding wiring and safety regulations.				General objective:		
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
1-3	<p>1.1 List the main causes of hazards in light and heavy currents systems in engineering.</p> <p>1.2 Explain methods of preventing hazards in 1.1 above.</p> <p>1.3 State briefly the scope and purpose of the health and safety at work, Act 1974, the IEE Wiring regulation (15th Edition) the 1937 electricity supply regulation and the 1908 and 1944 factories Act Regulation and Nigerian standards etc.</p> <p>1.4 List the several important considerations concerning general safety of electronic, telecommunication equipments and apparatus.</p> <p>1.5 Explain the necessity for earthing and state the relevant regulation concerning earthing.</p> <p>1.6 Explain the protection of an</p>	<ul style="list-style-type: none"> • Give emphasis on regulatory acts to understand safety regulation requirements. • Questions and Answers. 	<ul style="list-style-type: none"> - Blackboard - Chalk. - Printouts 	<ul style="list-style-type: none"> • Carryout specific safety requirements. • Demonstrate ability to connect safety devices in electrical installations. • Demonstrate ability to protect electrical units accordingly. • Perform safety wiring 	<ul style="list-style-type: none"> • Demonstrate the earthing principle using rod and metal connectors. • Carryout experiment for electrical installation protection using rated fuse, circuit breakers and ELCB 	<ul style="list-style-type: none"> • Earthing rod • Connecting metal • Fuse and Circuit Breakers • Mains power source. • Electrical load. • 15A socket • Hand gloves

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	<p>installation by fuse and ELCB.</p> <p>1.7 Distinguish between solid earthing practice and earth leakage circuit breaker protection.</p> <p>1.8 State a number of problems ET associated with earth leakage circuit.</p> <p>1.9 Describe how the human body can become party of an electric circuit.</p> <p>1.10 Explain how to prevent electric shock.</p> <p>1.11 Describe the method of treating electric shock.</p> <p>1.12 List and use difference types of fire extinguishers.</p> <p>1.13 Explain when each in 1.12 above is applicable.</p>					
General Objective 2.0 Know the use of electrical and electronic engineering tools and equipment						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
4	<p>2.1 List the tools obtainable inside an electrician toolbox</p> <p>2.2 Explain the use of electrical workshop tools.</p>	<ul style="list-style-type: none"> • Explain different types of toolboxes available. 	<ul style="list-style-type: none"> - Blackboard - Chalk. - Printouts 	Use common workshop tools and equipments for the desired effect.	Identify and demonstrate basic functions of components in electrical and	<ul style="list-style-type: none"> • Electronic tool box. • Electrical tool box.

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	2.3 Describe procedure for carrying out routine inspection of hand tools. 2.4 Distinguish between hand and machine tools.	<ul style="list-style-type: none"> Distinguish between Electrical and electronic tools. 			electronics toolboxes.	
General Objective 3.0 Understand the construction and uses of differences types of cables and regulation relating the regulation to their uses						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
5-6	<p>3.1 list the main types of insulating and conducting materials</p> <p>3.2 Distinguish between conductor and insulator.</p> <p>3.3 State the advantage and disadvantage when using P.V.C –<i>insulated metals heated cables</i> <i>Mineral-insulated</i> sheeted cables Armored P.V.C insulated P.V.C sheathed cables Steel and P.V.C Conductors Steel and P.V.C trucking Flexible cable and cord e.t.c</p> <p>3.4 Explain the general IEE regulation relative to cables and their use.</p> <p>3.5 Describe the cables colour coding commonly used in Nigeria.</p>	Describe with aid of sketches, the construction of different types of cables.	- Whiteboard - Drawing and writing materials etc	<ul style="list-style-type: none"> Perform various types of joints using P.V.C and flexible cables. Classify cable types base on resistance and insulation level. 	Demonstrate the measurement of resistances and insulation in cables under load etc.	<ul style="list-style-type: none"> Insulation meters. Resistance meters. Mains source. Loads.

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General Objective :4.0 Understand various electrical wiring for system, accessories and the regulations guiding them.						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
7	<p>4.1 Explain different wiring methods as conduits, ducts, trunking and surface.</p> <p>.4.2 State factors associated with the choice of a particular wiring method.</p> <p>4.3 State the uses of wooden blocks and patresses for electrical wiring.</p>	<ul style="list-style-type: none"> • Explain electrical wiring making reference to a complete home plan. • Remind students of necessary precautions and safety measures. 	<ul style="list-style-type: none"> - Whiteboard - Print outs - Write materials etc 	<ul style="list-style-type: none"> • Install electrical accessories such as plugs, adaptor, ceiling roses, sockets, switches etc • Carry out Wiring of 2 way switches with two intermediate switches to control various lighting points. <ul style="list-style-type: none"> • Carry out wiring of Electric bell, bell indicator and alarm circuits, cooker control unit, consumer control unit. 	<ul style="list-style-type: none"> • Produce a wiring plan comprising of the major AC accessories. • Interconnect the devices according to plan. • Demonstrate the use of conduit, duct and trunking in performing the above tasks. 	<ul style="list-style-type: none"> • Electrical accessories cables, holders, bulbs, roses etc • Conduit pipes. • Clips. • AC mains • Tool box

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				ii.Demonstrate how to distribute power in a consumer premises employing single phase four wire systems.		
General Objective :5.0 Understand the testing and inspection of electrical installations and for telecommunication systems						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
8	<p>5.1 State the basic requirements for testing and inspection of electrical installations.</p> <p>5.2 Draw the electrical diagrams for testing procedures.</p> <p>5.3 List various instruments for carrying out testing and inspection works.</p> <p>5.4 List various instruments for testing and measuring of signal level, frequency and RF power in telecommunication.</p>	<ul style="list-style-type: none"> • Explain procedures involved in testing and acceptance tests. • Draw necessary diagrams for further illustrations. 	<ul style="list-style-type: none"> - Blackboard - Chalk - Writing materials Continuity etc 	<ul style="list-style-type: none"> • Carry out the following test: <ul style="list-style-type: none"> • Verification of polarity test. • Insulation test • Test of ring circuit continuity • Test of effectiveness of earthing 	<ul style="list-style-type: none"> • Read out the electrical parameters from the drawing. • Use measuring instruments to determine the actual parameters. • Compare readings. • Explain the acceptability of discrepancy. 	<ul style="list-style-type: none"> • Wiring with major accessories contained, • Meters: resistance, insulation and power, • Electrical drawing.

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				<ul style="list-style-type: none"> • Locate faults in cables using: <ol style="list-style-type: none"> i. Bridge method ii. Murray loop test. 		
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General Objective 6.0 Know the various jointing and soldering Techniques						
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
9-10	<p>6.1 Explain the following techniques:</p> <ol style="list-style-type: none"> a. jointing technique; b. soldering technique; c. crimping and fastening methods. <p>6.2 Describe the three soldering equipments:</p> <ol style="list-style-type: none"> i. Soldering iron ii. Tinsman soldering iron iii. Pot and ladle <p>6.3 Explain when each of the soldering equipment in 6.2 above is applicable</p> <p>6.4 Explain desoldering procedure and techniques.</p>	<ul style="list-style-type: none"> • Explain necessary procures involved in soldering and de-soldering. • Emphasis should be placed on care to avoid damages. 	<ul style="list-style-type: none"> - Blackboard - Chalk - Prinouts - Writing materials etc 	<ul style="list-style-type: none"> • Perform soldering exercise, using appropriate tools, equipment and material. • Carry out joints of different types of cables using the techniques in 6.1. Carryout circuit analysis, tracing and trouble shooting. 	<ul style="list-style-type: none"> • Design a simple electronic cct eg a timer using IC and transistors separately. • Demonstrate how to wirie the two circuits on board and solder appropriatey • Test and demonstrate the functionality 	<ul style="list-style-type: none"> • Soldering iron • Lead • IC base • Transistors • Jumper wires. • Strip boards. • Razors. • Brush. • Scope • Electronic component s resistors, capacitors etc

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	Assessment: The practical will be awarded 40% of the total score, the continuous assessments, test, quizzes will be 20% of the total score while the remaining 40% will be for the end of the semester Examination score.					

Programme: NID in Telecommunication Technology
Course: Digital Communications
Code: TET 114
Duration: Hours/Week:4hrs Theory:1 Practical:3
Unit: 4Units
Goal: This course is designed to enable the learner to acquire understand digital Communication techniques.

General Objectives: At the end of this course the leaner should be able to:

- 1.0 Know the application of digital system and coding techniques.**
- 2.0 Understand pulse code modulation (PCM) and pulse amplitude modulation (PAM).**
- 3.0 Know digital to analog converters (DAC) and analog to digital converters (ADC)**
- 4.0 Understand digital signal encoding formats.**
- 5.0 Understanding delta modulation and pulse modulation techniques.**

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: DIGITAL COMMUNICATIONS		COURSE CODE: TET 114		CONTACT HOURS: 4 HRS		
GOAL: Understanding Digital Communication Techniques						
COURSE SPECIFICATION: Theoretical Content				Practical Content		
General Objective:1.0 know the application of Digital system and coding techniques.				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Define digital communication. 1.2 State the advantages and disadvantages of Digital transmission 1.3 Explain the real life application of digital communications. 1.4 State the common alphanumeric coding schemes for binary data. 1.5 Explain in detail the following: i. American Standard Code for Information Interchange (ASCII code) ii. Extended Binary Coded Decimal Interchange Code (EBDC) 1.6 Explain the following terms: i. Binary coding ii. Code noise immunity iii. Error probability iv. Bit error rate	<ul style="list-style-type: none"> • Explain basic fundamental concepts in digital communications. • Give assignments on relevant topics. 	- Chalk - whiteboard - Textbooks - Recommended textbooks - Drawing and writing materials.			

	<p>v. Energy per bit vi. Synchronous channel vii. Asynchronous channel viii. protocols</p> <p>1.7 State the Shannon – Hartley theorem and derive its mathematical expression.</p> <p>1.8 Define bit rate and baud rate.</p> <p>1.9 Explain the importance of bandwidth requirement for digital communication</p>					
General Objective :2.0Understanding Pulse code Modulation (PCM) and Pulse Amplitude Modulation (PAM)						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
2-3	<p>2.1 Explain the principles of PCM and its practical applications.</p> <p>2.2 Describe the conversion of analogue signal to digital using the sampling and hold technique.</p> <p>2.3 Explain the concept of Pulse Amplitude Modulation</p> <p>2.4 Explain basic methods of generating PAM: i. Natural sampling ii Flat top sampling</p>	<ul style="list-style-type: none"> • Explain sampling and synchronization. • Explain compounding as it affects in PCM systems. • Discuss the A-law and μ-law of compounding. 	<p>Whiteboard Recommended textbooks, - Drawing and writing materials.</p>	<p>Operate successfully digital based telecommunication equipments.</p>	<p>Assist the students to setup experiments on: i. sampling. ii.PCM</p>	<ul style="list-style-type: none"> • Trainer modules • Scope • Function generators • Analyzers • Multimeters

	<p>2.5 Define the Nyquist rate and sampling frequency.</p> <p>2.6 Explain quantization of signals.</p> <p>2.7 Describe the effect of quantization error and how to correct it.</p> <p>2.8 Define dynamic range and signal to noise ratio.</p> <p>2.9 Obtain the mathematical expression for the dynamic range and signal to noise ratio.</p> <p>2.10 Solve problems using the expression in 2.9. above</p> <p>2.11 Distinguish between linear and nonlinear quantization level</p>					
General Objective 3.0 Know Digital to Analog converters (DAC) and Analog to Digital Converters (ADC)						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4-5	<p>3.1 Explain the functions of Digital to Analog Converters.</p> <p>3.2 State the function of Analog to Digital converters.</p> <p>3.3 Explain how simple 4-bit ramp ADC, successive approximation ADC and dual slope ADC are used</p>	Use appropriate circuit diagrams to illustrate the principles and operation of the common types of Digital to Analog converters	<ul style="list-style-type: none"> - Whiteboard - Recommended textbooks, - Drawing and writing materials. 	<p>Design</p> <ul style="list-style-type: none"> i. Analogue to Digital Converter ii. Digital to Analogue converter iii. Coder-decoder 	<ul style="list-style-type: none"> • Demonstrate the operation of ADC converter • Set up procedure for DAC and test it 	<ul style="list-style-type: none"> • Practical manuals • Telecommunication laboratory • Notebook • Computer system

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	for the signal conversion. 3.4 Discuss encoder and decoder in PCM communication system..	namely: i. Binary weighted resistor ii. R-2R ladder type			functional ity	<ul style="list-style-type: none"> • Scope • Signal generators • Electronic components
General Objective 4.0: Understanding Digital Signal Encoding Formats						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6-7	<p>4.1 Explain these digital signaling encoding formats:</p> <p>i. No-return to zero (NRZ) Return to Zero</p> <p>ii. Return to Zero (NRZ)</p> <p>iii. Phase encoded and delay modulation</p> <p>iv. Multi level binary</p> <p>4.2 Explain the term Code error Detection and Correction</p> <p>4.3 Explain the following methods of Code Error detection and correction:</p> <p>i. Parity</p> <p>ii. Block check character</p> <p>iii. Cyclic Redundancy check</p> <p>iv. Hamming code</p> <p>v. Reed Solomon</p>	<ul style="list-style-type: none"> • Explain digital signaling and encoding formats. • Clarify the usage and importance of the technique. 	<ul style="list-style-type: none"> - Whiteboard - Recommended textbooks - Drawing and writing materials 	<ul style="list-style-type: none"> • Set up digital experimental units with the appropriate modules to demonstrate digital signal encoding. • Carry out digital signal encoding using a computer with electronics workbench Multisim or any other relevant software packages. 	<ul style="list-style-type: none"> • Set up trainer modules to demonstrate the principles of coding and decoding. • Use softwares to implement same. 	<ul style="list-style-type: none"> • Practical manuals • Telecommunication • Notebook • Computer system • Digital system modules.

General Objective 5.0 Understanding Delta Modulation and Pulse Modulation Techniques						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	<p>5.1 State the principles of operation of Delta Modulator, its merits and demerits.</p> <p>5.2 Explain pulse time modulation (PTM)</p> <p>5.3 Explain the following types of pulse time modulation namely: i. Pulse Width Modulation (PWM) ii. Pulse Position Modulation (PPM)</p>	<p>Explain the term Delta modulation.</p>	<p>- Whiteboard - Recommended textbooks - Drawing and writing materials.</p>	<ul style="list-style-type: none"> • Set up a telecommunication trainer with the appropriate modules to analyse the PCM, PAM and PWM waveforms. • Carry out signal analysis using a computer with electronic workbench or relevant software package. 	<p>Use electronic work bench or trainer modules to demonstrate and show the operation of Delta modulators, PTM, PWM, PPM, PAM and PCM.</p>	<ul style="list-style-type: none"> • Practical manuals • Telecommunication • Laboratory • Notebook • Computer system • Trainer modules • Work Bench

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WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9 - 10	<p>5.4 Explain the following digital modulation techniques using appropriate diagrams;</p> <p>i. Frequency Shift Keying (FSK) ii. Phase shift keying (PSK) iii. Binary Phase Shift Keying (BPSK) iv. Quadrature Phase Shift Keying (QPSK) v. Differential phase shift keying (DPHK)</p> <p>5.5 Describe the practical application of each technique in 2.1 above.</p> <p>5.6 Explain the application of Loop backs and Eye - Patterns to monitor the performance of a digital modulation system.</p>	Explain process of digital modulation techniques.	<ul style="list-style-type: none"> - Whiteboard - Recommended textbooks, - Drawing and writing materials 	<ul style="list-style-type: none"> • Set up a telecommunication trainer with the appropriate modules to demonstrate and analyze the FSK and PSK waveforms. • Carry out digital signal modulation using a computer with Electronic workbench or relevant software package. 	Use electronic work bench or trainer modules to demonstrate and the operation of FSK, PSK, BPSK and DPHK	<ul style="list-style-type: none"> • Practical manuals • Telecommunication • Laboratory • Notebook • Computer system • Work Bench • Scope
Assessment: Coursework 10%; Course test 10%; Practical 40%; Examination 40%						

Programme: NID in Telecommunication Technology

Course: Measurement and Instrumentation

Code: TET 121

Duration: Hours/Week:4hrsTheory:1 Practical:3

Unit: 4Units

Goal: This course is designed to acquaint the learner with the operation and application of Measurement/measuring instruments.

General Objectives: At the end of this course the learner should be able to:

- 1.0 Have the basic knowledge and skill measurement and measuring instruments.
- 2.0 Know different types of error in measurement.
- 3.0 Know the features, functions and uses of moving coil instruments.
- 4.0 Understanding the operational principle of digital instruments.
- 5.0 Understanding the working principles of measuring instruments.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Measurement and Instrumentation			COURSE CODE: TET 121		CONTACT HOURS: 4 Hrs	
GOAL: Acquaint students with the operation and application of measurement/measuring instruments						
COURSE SPECIFICATION: Theoretical Content			Practical Content:			
General Objective 1.0: Understand the basic knowledge and skill in measurement and measuring instruments			General Objective:			
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
1 – 2	<p>1.1 State the uses of the following types of measuring Instruments used in Telecommunication:</p> <ol style="list-style-type: none"> i. Digital Analyzers ii. Spectrum Analyzers iii. Voltmeter iv. Ammeter v. Oscilloscope (C.R.O.) vi. Wheatstone bridge vii. Power meter viii. Digital Voltmeter ix. Frequency Counters x. Capacitance meter xi. Inductance bridge xii. Impedance meter <p>1.2 State when each of the above is used.</p>	Discuss the principles of operation of the items in section 1.1	- Chalkboard - Textbooks - Measuring instruments	<ul style="list-style-type: none"> • Demonstrate the use of voltmeter in the measurement of ac and dc voltage • Carry out measurement of ac and dc currents in a simple circuit using ammeters • Use the appropriate instruments to carryout a particular task. 	<ul style="list-style-type: none"> • Ask students to verify ohm's law. • Design simple RC filters for Low and High pass respectively. • Use varying RF input signals at their terminals • Ask students to measure corresponding output frequencies. • Plot graphs of F_{out} versus F_{in} 	<ul style="list-style-type: none"> • E.m.f sources • Variable and fixed resistances • Cables • Voltmeter • Ammeter • Practical manual • Logbook • Instrumentation and measurement laboratory.

General Objective 2.0: Understand different types of error in measurement.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Define the following types of errors: i. Random ii. Systematic iii. Static 2.2 Give practical examples of the errors stated in 2.1 above.	Explain error types in 2.1 with practical examples	- Chalkboard -Recommended textbooks, -Lectures notes.			
General Objective 3.0 Know the features, functions and uses of moving coil instruments.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4	3.1 Sketch the permanent magnet moving coil instrument. 3.2 Explain the operation of moving coil instrument. 3.3 Describe how the moving Coil Instrument can be used as i.. Ammeter and ii. Voltmeter. 3.4 Describe how a multiplier and Shunt resistor can be used to increase the range of Voltmeter and Ammeter respectively.	Illustrate the operating principle with diagram(s).	- Chalkboard -Recommended textbooks - Lecturer notes - Calculators -writing materials.	<ul style="list-style-type: none"> • Calibrate and measure with moving coil instruments. • Calibrate and measure with moving. iron instrument 	The teacher should demonstrate the process of calibration with the students.	<ul style="list-style-type: none"> • Moving coil instrument • Moving iron instrument • Drawing sets • Practical manual • Logbook • Instrumentation and measurement laboratory.

	3.5 Calculate the values of the multiplier and shunt resistor.					
General Objective 4.0 Understanding the operational principle of digital instruments.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	4.1 Draw a block diagram of the following digital meters: i. Digital Voltmeter ii. Frequency Counter 4.2 Explain the operation of the instruments in 4.1 above.	Mention all the essential features of digital instruments.	- Chalkboard - Writing materials, - Lecturer notes - Recommended textbooks.	Carry out measurement of resistances, voltages, currents, and capacitance using multimeter	Ask the students to demonstrate the workability of all mentioned devices in 4.1 below.	- Electronic meters. - scope
General Objective 5.0 Know the operation of bridge circuits.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6 – 7	5.1 List various types of bridge circuit a. Wheat Stone b. Capacitance c. Inductance. 5.2 State the industrial applications of the bridges listed in 5.1 above.	Explain the operation and applications of bridge circuits	- Chalkboard - Writing materials - Lecture notes - Recommended textbooks.	<ul style="list-style-type: none"> Determine the resistance using a Wheatstone bridge. Use bridge circuits to measure different load types. 	Ask students to connect the bridge circuit	<ul style="list-style-type: none"> Wheatstone bridge and other bridge Circuits Inductors Resistors and capacitors Oscillators Practical manual Logbook Instrumentation and measurement

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						laboratory.
General Objective 6.0 Understanding the working principles of measuring instruments						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	6.1 Distinguish between ohmmeter and megger 6.2 Describe the layout and operation of the instruments in 6.1 above.	Explain with the aid of sketches the operation of ohmmeter and megger.	- Chalkboard - Chalk - Writing materials, -Lecture notes -Recommended textbooks - Drawing materials.	Measure d.c voltage in experiments using moving coil instrument. Measure a.c voltage in experiments using suitable instruments.	Assist students to carryout measurements using Ohmmeter and Megger unit.	<ul style="list-style-type: none"> • A.C and d.c voltmeters • Experimental trainers • Practical manual • Logbook • Instrumentation and measurement laboratory.
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9 – 10	6.3 Draw the block diagram of a CRO. 6.4 Explain the function of each block in 7.1 above. 6.5 Describe with the aid of a diagram a Cathode Ray Tube (CRT) and explain its operation. 6.6 Explain the main	Ask the students to draw and explain the functions of CRO's block diagram.	- Chalkboard - Cathode ray tube - Wattmeter -Recommended textbooks - Drawing and writing materials.	<ul style="list-style-type: none"> • Demonstrate how to display system controls by setting the INTENSITY CONTROL and FOCUS kn • Demonstrate how to display vertical system controls by setting the POSITION control, VERTICAL MODE 	<ul style="list-style-type: none"> • Design a simple cct to test operation of the scope. • Demonstrate the alignment of the scope. • Demonstrate Voltage, frequency, Phase measurements 	<ul style="list-style-type: none"> • CRO • Signal • Generator • d.c/a.c power • Supplies • Probe • Practical manual • Practical

	<p>features of an oscilloscope.</p> <p>6.7 Explain the Calibration of the vertical and horizontal scales of an oscilloscope's screen.</p> <p>6.8 Explain the process of initializing an oscilloscope.</p> <p>6.9 State the applications of single trace and dual trace oscilloscopes.</p>			<p>SWITCH, VOLTS/DIVS switches</p> <ul style="list-style-type: none"> • Demonstrate how to display horizontal system Controls by setting Horizontal mode and SEC/DIC Switch • Carry out trigger system control by setting HOLDOFF control and trigger mode SWITCH • Illustrate with a waveform the measurement of voltage and frequency of a waveform. • Carry out the following measurement on various waveforms or signals using an oscilloscope: Amplitude Time Frequency Phase X-Y Pulse width • Use an oscilloscope to carry out the 	<p>with the scope.</p> <ul style="list-style-type: none"> • Ask students to take measurements during experiments. 	<p>logbook.</p>
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				frequency and voltage measurement of various signals or waveforms		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11	<p>6.10 Distinguish between the spectrum analyzer and oscilloscopes.</p> <p>6.11 Describe the main features of a spectrum analyzer</p> <p>6.12 Explain the applications of spectrum analyzers in Telecommunication systems.</p>	Give students assignment on the theoretical concepts of these equipments.	<ul style="list-style-type: none"> - Textbooks - Operation Manual 	<ul style="list-style-type: none"> • Use a spectrum analyzer to display a signal waveform. • Analyze the various signal components in a given waveform. 	Assist the students to setup an experiment to display and analyze a signal waveform.	<ul style="list-style-type: none"> • Telecoms module • Scope • Analyzers
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
12	<p>6.13 Explain the function of Time domain reflectometer.</p> <p>6.14 Explain the functions of various controls available on TDR</p>	Explain theoretical concepts.	<ul style="list-style-type: none"> - Blackboard - Chalk 	Use the TDR to determine the short circuit and open circuit fault in metallic cables electronic components form he circuit board.	Assist students to setup lab work appropriately to achieve objectives.	<ul style="list-style-type: none"> • Lab • Scope • Components • Multi-meters
<p>Assessment: The practical class will be awarded 40% of the total score. Continuous assessments, test, quizzes will take 20% of the total score, while the remaining 40% will be for the end of the semester examination score.</p>						

Programme:	NID in Telecommunication Technology
Course:	Wave Propagation
Code:	TET 122
Duration:	Hours/Week:2hrs Theory:2 Practical:0
Unit:	2Units
Goal:	This course is designed to enable the learner appreciate electro magnetic waves
General Objectives:	At the end of this course the leaner should be able to:
1.0 Know electro Magnetic Wave Theory	
2.0 Understand the properties of Waves in transmission media	
3.0 Understand ground wave (surface wave) propagation	
4.0 Understand space wave propagation	
5.0 Understand sky wave propagation.	

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Wave Propagation			COURSE CODE: TET 122		CONTACT HOURS: 2Hrs	
GOAL: To appreciate electro magnetic waves						
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:		
General Objective: Know electro magnetic wave theory				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-3	<p>1.1 Explain the principle of electrical to electromagnetic conversion.</p> <p>1.2 Explain the Electromagnetic wave with the aid of a diagram.</p> <p>1.3 Explain spectrum with the aid of a diagram</p> <p>1.4 Explain the polarization of electromagnetic wave</p> <p>1.5 Define the characteristics of waves in free space.</p> <p>1.6 List the frequency range allocated to each of the bands in the electromagnetic spectrum and their uses.</p> <p>1.7 Discuss the following</p>	Use teaching aid to explain the propagation of electro magnetic wave spectrum, it characteristics and frequency	<ul style="list-style-type: none"> - Chalkboard - Chalk - Writing materials -Lecture notes -Recommended textbooks - Drawing materials. 			

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	i. critical frequency ii. maximum useable frequency iii. optimum working frequency					
General Objective 2.0 Understand the Properties of Waves in Transmission media						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4-5	2.1 Explain reflection of Electromagnetic waves on different surfaces. 2.2 Analyse the effect of different reflecting surfaces on the electromagnetic waves. 2.3 Define the coefficient of reflection 2.4 Explain the phenomenon refer to as diffraction. 2.5 Show how electromagnetic signal are diffracted over top and around an obstruction.	Illustrate with the aid of diagrams the effect electromagnetic waves on different surfaces and their characteristics	- Chalkboard - Chalk - Writing materials -Lecture notes -Recommended textbooks - Drawing materials.			
General Objectives 3.0 Understand the ground wave (Surface wave) Propagation						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6-8	3.1 Define the ground wave. 3.2 Explain the polarization of ground wave.	Use available training materials to show the students the applications of ground wave in	- Chalkboard - Chalk - Writing materials -Lecture notes -Recommended			

	<p>3.3 Explain the relationship between the earth impedance and attenuation of ground wave.</p> <p>3.4 State the applications of ground wave to practical communication system.</p> <p>3.5 State the frequency range employed for ground wave propagation.</p>	telecommunication systems.	textbooks - Drawing materials.			
General Objectives 4.0 Understand Space wave Propagation						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9-11	<p>4.1 Define space wave.</p> <p>4.2 State the application of direct wave</p> <p>4.2 Explain the effect of diffraction on space wave.</p> <p>4.3 Discuss the reflected wave using a well-labeled diagram.</p> <p>4.4 Explain the reception problems associated with to reflected waves.</p> <p>4.5 Explain the path difference</p>	Teach the students using modern training materials and diagrams space wave and its applications in communication systems,	<p>- Chalkboard</p> <p>- Chalk</p> <p>- Writing materials</p> <p>-Lecture notes</p> <p>-Recommended textbooks</p>			

NID in Telecommunications Technology (Draft)

	between the reflected and directed space waves. 4.6 Explain the phase difference between the reflected and directed space wave					
General Objectives 5.0 Understand Sky wave propagation						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
12-15	5.1 Explain sky wave. 5.2 Explain skipping with aid of diagram 5.3 State the effect of each layer of ionosphere on sky wave namely: D layer E layer F layer 5.4 Explain skip zone 5.5 Explain the fading. 5.6 Explain the use of diversity reception to accommodate severe fading problems: 5.7 Explain troposphere scatter.	Let the students know the effects of sky wave propagation and the effects of ionosphere on communication systems.	- Chalkboard - Chalk - Writing materials -Lecture notes -Recommended textbooks			
Assessment: Continuous assessments test and quizzes will be awarded 40% of the total score. The end of the semester examination will make up for the remaining 60% of the total score.						

NID in Telecommunications Technology (Draft)

Program me:	NID in Telecommunication Technology
Course:	Telephony and Switching System
Code	TET 123
Duration:	Hours/Week:4hrs Theory:2 Practical:2
Unit:	4Units
Goal:	This course is designed to enable the Students to acquire skills in telephone network operation
General Objectives:	At the end of this course the leaner should be able to:
1.0 Understand the public switched Telephone network (PSTM).	
2.0 Understand basic telephone and switching systems.	
3.0 Understand physical media types.	

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Telephony and Switching Systems			COURSE CODE: TET 123		CONTACT HOURS: 4Hrs	
GOAL: To enable students acquire skills in Telephone Network Operation						
COURSE SPECIFICATION: Theoretical Contents				Practical Contents:		
General Objective: Understand the Public Switched Telephone Network (PSTN)				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-2	<p>1.1 Describe analog and digital signals.</p> <p>1.2 Discuss the historical developments in telecommunications.</p> <p>1.3 Identify the organizations governing telecommunications standards and their functions.</p> <p>1.4 Explain PSTN network structure and components</p> <p>1.5 Describe the basic components of a PSTN.</p> <p>1.6 Describe the structure of the Nigerian public switched telephone network (PSTN).</p> <p>17 Explain the different methods of accessing a public network.</p> <p>1.8 Discuss the future of the public switched telephone network</p>	<ul style="list-style-type: none"> • Present an overview of the developments in telecommunications. • Analyse telephone services in Nigeria. • Discuss standardization in telecoms. 	<ul style="list-style-type: none"> - Chalkboard - Chalk - Lecture note - Writing materials 	Design the network structure of the Nigeria telecommunication.	Organise industrial visits to service providers to see an over view network plan and services available.	Visit to operators, Network Plans.

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	(PSTN) in Nigeria.					
General Objectives: 2.0 Understand basic telephony and switching systems						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Distinguish between Analogue and Digital Switching. 2.2 Explain the various types of Signaling in telecommunications networks: i R2 ii MFC iii CAS iv CCS	<ul style="list-style-type: none"> Solve problems Illustrate the working principles with the aid of diagrams. 	Black Board / Chalk Printouts Service Documentation	Demonstrate the steps in enabling signaling formats in switches.	Organise visits to operators to see the processes in signaling formats.	Visits to operators Documentations
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4	2.3 list the different types of trunks and explain trunk signaling. 2.4 Identify the components of analog telecommunications Explain division multiplexing hierarchies	Explain the theoretical concepts.	Black Board / Chalk Documentation	Operate and maintain transmission systems. O&M operation adequately.	Organise visits to see the transmission processes for: i. PDH ii. SDH iii. Analogue	Visit to NITEL Carrier Rooms Documentation
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	2.5 Explain the process of digitizing voice. 2.6 Describe line coding and frame formatting in networks that use T1 and E1 links.	Explain different frequency / bandwidth specifications.	Black board / Chalk Writing materials Documentations	Identify and categorise equipments base on frequency capability.	Arrange for visits to have demonstrations on Radio channels operation and	Visit to NITEL Carrier Rooms Documentation

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	2.7 Explain the different types of signaling used in networks. 2.8 Explain Time Division Multiplexing hierarchies 2.9 Describe the CEPT and US digital transmission hierarchies.			Identify signal flow in a transmission system.	allocations.	
General Objectives 3.0 Understanding Physical media types						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6	3.1 Describe the main physical media types used in transmission. 3.2 List the components for cabling a commercial building 3.3 State the standards for cabling a typical commercial building.	Explain the frequency specification of cable types.	Chalk / Black board etc.	Identify cable types base on frequency.	Assist students to setup lab works to test different cables frequency capacity.	Cables Multimeters Scope Function generators
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7 -10	3.4 Explain the evolution of Switching Systems 3.5 Explain the Role of Switching Systems in Telecommunication Networks 3.6 Explain the operational concepts of Step By Step and Crossbar Exchanges. 3.7 Define Stored Program Control (SPC) concepts. 3.8 Explain ATM Switching 3.9 Explain the Subscriber and Line Interface.	Explain theoretical concepts of telephone exchange operation. Give assignment to read more on topics. Discuss Man Machine Language Interface (MML)	Black board / Chalk Manuals Documentation	Identify the systems in Exchanges. Operate switches. Identify the hardware and software structure of the digital switch.	Arrange visit to operators to learn more switching.	Visit to telecoms Exchanges

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<p>3.10 Analyze the following switching processes: i. Call Detection ii. Numbering Analysis iii. Call Routing iv. Alarms Supervision v. Metering 3.11 Explain the time switches and Space Switches 3.12 Explain processor systems Architecture and functions 3.13 Explain the reliability and fault recovery 3.14 State examples of the present digital switching Systems. 3.15 Distinguish between single-, and multiple-queuing networks, arbitrary-depth blocking networks 3.16 Discuss the new trends in switching namely: i. Photonic Switching ii. IP Switching</p>					
<p>Assessment: Exam40%;Practical 20%;Coursework20%;Test20%.</p>					

Programme: NID in Telecommunication Technology
Course: Digital Circuit and systems
Code: TET 124
Duration: Hours/Week:4hrs Theory:2 Practical:2
Unit: 4Units
Goal: This course is designed to enable the learner understand the concept of digital circuit and system.

General Objectives: At the end of this course the learner should be able to:

- 1.0 Know the concept of data, information presentation, code and number system in digital communication
- 2.0 Understand the different codes used in digital system
- 3.0 Understand the various methods required to simplify combinational logic circuits.
- 4.0 Know the fundamentals of Booleans algebra
- 5.0 Understand logic functions
- 6.0 Understand the features and design of different logic gates.
- 7.0 Know the sequences and data flow controls
- 8.0 Understand the basic principles of bistate elements
- 9.0 Understand the principles of the counters and data transfer registers.
- 10.0 Understand the implementations of adder functions in computers.
- 11.0 Know differences in logic circuits components
- 12.0 Understanding the characteristics of basic digital devices and design Of simple combinational logic circuit.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
	COURSE: Digital Circuit and Systems	Course Code: TET 124			Contact hour: 4 Hrs	
GOAL: Understanding the basic concept of Digital circuit and systems						
COURSE SPECIFICATION: Theoretical				Course Specification: Practical		
General Objective 1.0 Understand the concept of data, information presentation, Code and Number system in Digital				General Objective:		
Week	Specific Learning Objective	Teacher Activities	Resources	Specific Learning Objective	Teacher Activities	Resources
1	1.1 Explain how digital numbers are quantified and defined. 1.2 Explain the base of a number 1.3 Perform arithmetic conversion between numbers in Base 10 and these: i. Base 8 ii. Base 2 v. Base 16 1.4 Outline the significance of weighting data in a numbers systems.	Explain the origin of numbering and bases. Solve problems.	Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.	Carryout number base arithmetic manipulations. Carry out number base arithmetic usi Carry out a reverse conversion of 1.3 above Using calculators.	<ul style="list-style-type: none"> • Perform number base arithmetic conversions using the conditions in 1.3 manually. • Perform similar computations using calculators. 	<ul style="list-style-type: none"> • Scientific calculators • Notebooks.
2	15 Explain why binary number system is used in digital systems. 1.6 state the special relationships between binary, octal and hexadecimals 1.7 Explain the advantages of octal and hexadecimals over the binary data 1.8 Explain the various binary based codes i. BCD codes	Explain theoretical concepts. Solve problems.	Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.	Carry out conversion of lager number systems to decimals and vice –versa		

	<p>ii. Excess –3 codes iii. Grays codes iv. ASCII codes v. Seven –Segments displays codes</p> <p>1.9 Slove problems involving the conversion from one number system to another.</p>					
General Objective 2.0 Understand the different codes used in Digital system						
3	<p>2.1 Explain signs in Binary number Systems.</p> <p>2.2 Explain the differences between the representation of positive and negative numbers</p> <p>2.3 Define N’s complement where N is any number.</p> <p>2.4 Explain the limitations of 1’s complement</p> <p>2.5 Explain 2 complement numbers.</p> <p>2.6 Explain the mantissas and characteristics of a floating point numbers</p> <p>2.7 Solve problems involving various number systems</p>	<p>Explain theoretical concepts.</p> <p>Solve problems.</p>	<p>Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.</p>	<ul style="list-style-type: none"> • Perform Additions, Subtractions, Multiplications and Divisions using number systems • Perform addition and subtraction using 1 complement. • Perform addition and subtraction using 2’s complement numbers. • Identify fixed and floating 	<ul style="list-style-type: none"> • Designed a simple cct to demonstrate the operation of AND, OR, NOT gates. • Verify the operation of one of them base on the truth table. • Ask the students to perform the rest of the exercise. • Record investigations made. 	<ul style="list-style-type: none"> • DC power source • Logic gates AND, OR, NOT • LEDs

				<p>point numbers.</p> <ul style="list-style-type: none"> • Design logic circuits and verify their operation. • Use digital signal formats and levels. • Operate simple digital system equipment. 		
General Objective 3.0 Understanding the various of methods required to simplify combinational Logic circuits						
4	<p>3.1 Explains Venn’s diagram</p> <p>3.2 Use the Venn’s diagram to explain</p> <ol style="list-style-type: none"> Union of set Intersections of sets Universals sets Complements <p>3.3 Apply Venn’s diagrams to simplify Boolean expressions.</p> <p>3.4 Explains the principle of the duality of switching functions.</p> <p>3.6 Explain the complements of functions</p> <p>3.7 Solving problems by finding the complements of various functions using duality methods.</p> <p>3.8 Explain the principles of Karnaugh</p>	<p>Explain theoretical concepts.</p> <p>Give assignments..</p>	<p>Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.</p>			

	<p>map</p> <p>3.9 Draw Karnaugh map for two three and fours variables.</p> <p>3.10 States the advantages of Karnaugh map techniques for simplification of Boolean Algebra</p> <p>3.11 state Booleans Algebras postulations for:</p> <ol style="list-style-type: none"> i. AND ii. OR iii. NOT junctions <p>3.12 Explain how to Implement the circuits of 3. 12 above gates:</p> <ol style="list-style-type: none"> i. AND ii. OR <p>3.13 Explain how to reduce given Boolean equations having many variables to their simplest form.</p> <p>3.15 Explain the importance's of simplification of functions in digital systems.</p>					
General Objective 4.0 Know the fundamentals of Booleans Algebra						
5	<p>4.1 Define inverse operations of Booleans Algebra and the operations design.</p> <p>4.2 state the Booleans postulates the commutative laws, Associative laws, distributive laws, negations laws and De Morgan theorems</p> <p>4.3 Define the truth tables</p> <p>4.4 Define a Karnaugh map (k-map)</p>	<p>Explain the theoretical concept</p> <p>Question and Answer</p>	<p>Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.</p>	<ul style="list-style-type: none"> • Miniaturize complex logic ccts to simple design. • Implements logic circuits base on conditions or Construct a 	<ul style="list-style-type: none"> • Quote all relevant laws stated in 4.1 through 4.6. • Design simple logic circuit to demonstrate their operation. 	<p>Logic gates</p> <p>DC power source</p> <p>LEDs</p>

				<p>truth table for up to 4 variables.</p> <ul style="list-style-type: none"> Form logic expressions from statements of conditions 	<ul style="list-style-type: none"> Ask students to verify and record observations. 	
General Objective 5.0 Understand Logic Functions						
6	<p>5.1 Explain how YES/NO, TRUE/FALSE, ON/OFF can be coded by '1' and '0'</p> <p>5.2 Draw logic gate symbols to represent AND, OR, NOT, NAND and NOR</p> <p>5.3 Explain the operation of AND, OR and NOT using truth table and logic gates.</p> <p>5.4 Solve problems involving basic logic functions.</p>		<p>White Board, Textbooks, recommended textbooks, drawing and writing materials.</p>			
6.0 Understanding the features and design of different logic gates						
Week	Specific Learning Objective	Teacher Activities	Resources	Specific Learning Objective	Teacher Activities	Resources
7	<p>6.1 Explain the principles and operations of combinational logic</p> <p>6.2 Illustrate the actions of gates using truth table</p> <p>6.3 Write down a logical sum of Product equations</p> <p>6.4 Draw the diagrams that implements the equations of using AND, OR, NOT gates</p>	<p>Explain concepts and solve problems.</p>	<p>White Board, Textbooks, drawing and writing materials.</p>	<p>Implements other logic functions using other gates.</p> <p>Perform complex logic circuit designs.</p>	<ul style="list-style-type: none"> Draw basic AND, OR, and NOT gates. Implements these gates' function using NAND and NOR gates. 	<p>Logic gates DC power source LEDs</p>

	<ul style="list-style-type: none"> i. NAND ii. NOR iii. Exclusive –OR iv. Exclusive –NOR functions, <p>6.5 Describe logic circuits using a combinations of logics gates 6.6 Describe the actions of Diodes 6.7 Describe the constructions of the AND or OR gates using diodes</p>				<ul style="list-style-type: none"> • Demonstrate wiring the ccts on board. • verify truth table operation and record observations. 	
General Objectives 7.0 Know the sequences and data flow controls						
8	<p>7.1 Explain error detections. 7.2 Explain the features and attributes of the different logic families. 7.3 Explain the characteristics and circuit parameters of logic families e.g.</p> <ul style="list-style-type: none"> i. Fan-in/fan –out ii. Speed /power factors logic levels iii. Noise immunity iv. Heat dissipations. 	<p>Explain concepts. Give assignments.</p>	<p>Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.</p>			
General Objectives 8.0 Understanding the basic principles of bistable elements						

9	<p>8.1 Define a bistable (flip flop)</p> <p>8.2 Describe the actions of flip flops.</p> <p>8.3 Describe the operations of the following bistable elements.</p> <ol style="list-style-type: none"> i. RS Flip-Flops ii. Clocked RS flips- flops iii. D-flip-flop, T (toggle flips- flops J-K Flip-flops <p>8.4 Explain the functions of presets and clears of the bistable elements.</p> <p>8.5 Describe some specific I.C bistable elements e.g.</p> <ol style="list-style-type: none"> i. SN 7474 ii. SN7476 	<p>Explain concepts.</p> <p>Solve problems.</p>	<p>Chalk, white Board,</p> <p>Textbooks, recommended textbooks, drawing materials and writing materials.</p>	<p>Implement clocking ccts.</p> <p>Implement basic computer memory elements.</p> <p>Design intelligent computer systems.</p>	<p>Sketch ccts of various FFs operation and truth table.</p> <p>Students are to wire the ccts according to designs and verify truth table operations.</p>	<p>FF logic gates</p> <p>DC power source</p> <p>LEDs</p>
General Objectives 9.0 Understanding the principles of the counters and data transfer registers						
10	<p>9.1 Describe the operations of the basic binary ripple counters.</p> <p>9.2 Describe the operations of up down counters.</p> <p>9.3 Describe the operations of the module counters using as examples mod-10, mod 12, and mod –6 counters</p> <p>9.4 Define a shift registers.</p> <p>9.5 Describe the parallel transfers of data through registers.</p> <p>9.6 Describe the serial- parallel transfer operations.</p>	<p>Explain concepts.</p> <p>Solve problems.</p>	<p>Chalk, white Board,</p> <p>Textbooks, recommended textbooks, drawing materials and writing materials.</p>	<p>Implement counters and display circuits.</p> <p>Designed complex TTL circuits using Logic ICs.</p>	<p>Draw counters</p> <p>Designed ccts for their implementation.</p> <p>Students to wire them and verify operation base on TT.</p>	<p>Counter logic gates</p> <p>DC power source</p> <p>LEDs</p> <p>Seven Segment display</p>
General Objectives 10.0 Understand the implementations of Adder functions in computers						
11	<p>10.1 Describe the serial adders</p> <p>10.2 Describe the parallels</p>	<p>Explain concepts.</p>	<p>Chalk, white Board,</p>	<p>Designed and Implement simple</p>	<p>Draw the ccts outlined in 10.1-</p>	<p>Logic gates</p> <p>LEDs</p>

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	10.3 Describe the half –adders 10.4 Describe the full-adders	Solve problems.	Textbooks, recommended textbooks, drawing materials and writing materials.	calculators. Carryout more intelligent systems design and operation.	10.4 Designed ccts for their implementation. Students are to wire the ccts and verify their TT. Verify operation and workability.	DC power source Logic Probe Vero boards Electronic components..
General Objectives 11:0 Know differences in logical circuits components						
12	11.1 Describe differences in logical elements	Explain concepts. Solve problems.	Chalk, white Board, Textbooks, drawing materials and writing materials.	Identify AND, OR NOT, NOR and XOR gates		

General Objectives 12.0 Understanding the characteristic of basic digital devices and Design of simple combinational logic circuits						
13	12.1 Describe the operations of different logic operational elements AND, OR NOT, gates 12.2 Analyze the circuit diagrams that implement various combinational circuits.	Explain concepts. Give assignments Solve problems.	Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.	Implements logic functions using discrete elements. Demonstrate the operations of combinational logic functions	Assist students to form AND and OR gates using discrete components. Design and implement a combinational logic cct.	Practical manuals, Digital system, laboratory, notebook, computer system, Electronic component, Logic probe.
Assessment: Coursework 20%; Course test 20%; Practical 20%; Examination 40%						

Programme:	NID in Telecommunication Technology
Course:	Antenna Types and Satellite Communications
Code:	TET 125
Duration:	Hours/Week:3hrs Theory: 1Practical:2
Unit:	3Units
Goal:	This course is designed to enable the learner understand The operation of antenna and satellite systems.
General Objectives:	At the end of this course the learner should be able to:
1.0	Understand signal radiation, antenna theory and operation
2.0	Understand procedures for Antenna Installations
3.0	Know the component of a satellite system
5.0	Understand different Multiplexing techniques
6.0	Understanding interference and noise
7.0	Understand the basic principle of VSAT technology
8.0	Know the components of VSAT terminal
9.0	Understand commissioning and trouble shooting of VSAT terminal

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Antenna Types and Satellite Communications				Course Code: TET 125		Contact Hour: 3 Hrs
GOAL: Understanding the operation of antennas and satellite systems						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
	General Objective: 1.0 Understanding Signal Radiation Antenna Theory and Operation			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Define an antenna. 1.2 Explain a transmitting and receiving antenna. 1.3 Explain the term antenna reciprocity. 1.4 Explain the polarization of antenna 1.5 Distinguish between vertical and horizontal antenna. 1.6 Explain the concept of signal strength in relation to antenna parameters.	Explain the concepts. Give relevant assignments. Solve problems	Chalk, Board, Textbooks, Pictures Writing materials.			
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
2	1.7 Describe the construction of an half wave dipole antenna 1.8 Explain the following properties in association with dipole antenna: i. Radiation field ii. Induction field iii. Radiation pattern iv. Beam width					

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	v. Antenna gain vi. Radiation resistance vii. Antenna length viii Directivity 1.9 Explain the ground effect on antenna. 1.1 State the relationship between physical and electrical lengths of a dipole antenna. 1.11 Explain the various ways of connecting transmission lines to an antenna. 1.12 Discuss the impedance matching techniques in antenna.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	1.13 State the difference between the half wave and vertical antennas. 1.14 Explain the effects of ground reflection on vertical antenna. 1.15 Explain the application of counter poise in solving grounding problems in vertical antenna. 1.16 Define the term loaded antenna.	Explain antenna types with reference to polarization and associated problems.	Chalk, white Board, Textbooks, Writing materials.			
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4	1.17 Define antenna array. 1.18 Explain the construction of the following antenna array: i. Parasitic array	Derive equations for their operations	White Board, Recommended textbooks, drawing	Operate various antenna types and troubleshoot faults condition	<ul style="list-style-type: none"> • Shows various antenna types. 	<ul style="list-style-type: none"> • Antenna Demonstration equipment by Feedback

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	<ul style="list-style-type: none"> ii. Yagi-uda antenna iii. Driven collinear array iv. Broadside array v. Vertical array vi. Log periodic antenna 		materials and writing materials.	<p>using basic tools.</p> <p>Construct and install a simple Yagi-uda antenna from a set of design parameters.</p>	<ul style="list-style-type: none"> • Demonstrate operations of the antenna types in 4.2 • Students are to record all observations 	<ul style="list-style-type: none"> • Oscilloscope • Spectrum analyzers. • RF generators
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	<p>1.19 Explain the uses of microwave antenna in communication.</p> <p>1.20 Explain the features of the following types of microwave antenna:</p> <ul style="list-style-type: none"> i. Horn antenna ii. Cassegrain feed parabolic antenna Feed horn antenna <p>1.21 Calculate the beam width and power gain of microwave dish.</p>	Explain the bands of microwave frequencies	white Board, Recommended textbooks, drawing and writing materials.	<p>Install a simple parabolic antenna with its feed.</p> <p>Determine the signal strength, bandwidth and gain of the antenna.</p>	<ul style="list-style-type: none"> • Shows various antenna types. • Demonstrate operations of the antenna types in 5.2 • Ask Students to record observations 	<ul style="list-style-type: none"> • Antenna Demonstration Equipment by Feedback • Oscilloscope • Spectrum analyzers. • RF generators
General Objectives 2.0 Understanding Procedures for Antenna Installations.						

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WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6	2.1 State the safety measures in Antenna installation 2.2 Describe the feature of a good site 2.3 Explain grounding and lighting protection for antenna installation 2.4 Explain with aid of diagram the requirements of a base, a mast and good supporting structure 2.5 Discuss the guy wire and its accessories. 2.6 Discuss the laying and termination of lead in wire in antenna installation.	Explain the processes involved in the construction of mast with guy supports.	Chalk/ Board, Textbooks, drawing materials and writing materials.	2.1 Carry out site survey properly. 2.2 Carry out test for grounding and lighting protection 2.3 Construct a good supporting structure for a mast.	Assist the students to compute necessary parameters for a mast construction. Design and construct a mast with guy supports.	<ul style="list-style-type: none"> • Antenna demonstration equipment by Feedback • Oscilloscope • Spectrum analyzers. • RF generators • Mast • Metals • Welding • Concrete
General Objectives 3.0 Understanding Satellite Signal Transfer						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7	3.1 Explain with aid of diagram the principle of operation of communication satellites. 3.2 Describe the Intelsat system. 3.3 Explain the satellite frequency ranges and band designators. 3.4 Explain the term 'geo synchronous orbit'. 3.5 Describe the medium earth	Explain Satellite communication links between ground and space stations. Draw diagrams to show signal flow in a satellite system.	Chalk, white Board, Textbooks, recommended textbooks, drawing materials and writing materials.	Identify basic satellite parts. Configure VSAT systems eg modems and receivers. Carryout satellite alignment using SSOG.	Guide students appropriately and discuss the essence of visit.	Visit to Café and Satellite earth stations.

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	orbit satellites 3.6 Explain the low earth orbit satellites 3.7 Explain the advantages and disadvantages of Satellite communication over other communication system.. 3.8 Explain the applications of satellite communication system.					
General Objectives 4.0 Know the Components of a Satellite system						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	4.1 Explain the following basic components of a satellite: i. Transponder ii. Traveling wave tube iii. Antenna iv. Battery bank v. Solar panels vi. Sensor (earth and sun) vii. Diplexer viii. Pressure tank 4.2 Discuss iridium. 4.3 Describe a satellite earth station 4.4 Explain the difference between Domestic and international earth stations 4.5 Explain the basic feature of satellite earth	Explain theoretical concepts. Give assignments to read further.	white Board, Textbooks, textbooks, materials.			

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	4.6 Explain teledensic 4.7 Explain the space segment of satellites 4.8 Describe the earth segment of satellites.					
General Objectives 5.0 Understanding Different Multiplexing Techniques						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	5.1 Explain the importance of footprint 5.2 Explain the following multiplexing methods that are commonly used in satellite communication system: i. Frequency division multiple access (FDMA) ii. Time division multiple access (TDMA) iii. Code division multiple access (CDMA) 5.3 Explain Scrambling 5.4 Discuss Encryption and conditional access.	Explain multiple digital signals transmission. Explain various digital signals encryption and decryption processes.	white Board, Textbooks, writing materials Lecture notes	Identify basic satellite parts. Configure VSAT systems e.g. modems and receivers. Carryout satellite specific functionalities – TDMA etc.	Ask Students to record all demonstrations carryout.	Visit to Satellite earth station.

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General Objectives 6.0 Understand Interference and Noise						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
10	6.1 Explain Digital Video Broadcasting using satellite communication 6.2 State the sources of inference and noise in satellite communication 6.3 Outline the step involved in the elimination of these interferences and noise. 4.4 Explain the capture and co hannel interferences effects on signals 6.5 Explain fading 6.6 Calculate the Power budgets 6.7 Explain the operation of VSAT satellite system.	Discuss digital broadcasting using satellite system	Chalk, and Board, Textbooks, Recommended textbooks, writing materials.			
General Objectives 7.0 Understanding the basic principle of VSAT Technology						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11	7.1. Explain the historical perspective of VSAT 7.2 Discuss the space segment that support VSAT services. 7.3.Explain the network configuration of VSAT	Discuss the historical advancements in VSAT developments.	Chalk and Board, Textbooks, Recommended textbooks,	7.1 Demonstrate the Installation of VSAT 7.2 carry out Site Survey 7.3 Verify operation of the VSAT receiver.	Instruct and assist students to install the Gilat Satellite system for internet access.	Visit to satellite earth stations and VSAT terminal hubs. Gilat Satellite receiver components.

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			writing materials			
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General Objectives 8.0 Know the Components of VSAT terminal			General Objectives: Demonstrate the installation of a VSAT terminal			
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
12	8.1 Explain the following component of VSAT terminal: i. High power amplifier ii. Solid state power amplifier iii. Low noise amplifier iv. Up converters v. Down converters vi. Modem vii. Network interface unit	Draw a functional block diagram of a VSAT terminal hub and state their functions.	Chalk and Board, Recommended textbooks, writing materials	8.1 Carry out Satellite Link Analyses 8.2 Use equipment for VSAT Link testing 8.3 Verify satellite access 8.4 Carry out Grounding and lightning protection 8.5. Preventative maintenance	Use the installed Gilat system to perform necessary tasks to achieve objectives.	Gilat Satellite receiver components
General Objectives 9.0 Understanding Commissioning and trouble shooting of VSAT terminals						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
13	9.1 Explain the network topology of VSAT system. 9.2 Explain the requirements of VSAT network. 9.3 Relate the importance of Network. Protocol to VSAT network 9.4 Explain the procedure	Discuss the communication of services across a VSAT	Chalk and Board, Recommended textbooks, writing			

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	for VSAT Network troubleshooting		materials			
Assessment: Coursework 20%; Course test 20%; Practical 20%; Examination 40%						

Programme:	NID in Telecommunication Technology
Course:	Television transmission and reception
Code:	TET 126
Duration:	Hours/Week:3hrs Theory:1 Practical:2
Unit:	3Units
Goal:	This course is designed to enable the learner understand the Basic of television
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand television system operation and video information transmission formats.
	2.0 Understand the conversion of electrical signal to visual display in television transmission.
	3.0 Understand the requirements for image capturing and display in colour and satellite television.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Television Transmission and Reception				COURSE CODE: TET 126		CONTACT HOURS: 3HRS
GOAL: To enable students understand the basic of Television.						
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:		
	General Objective: Understanding Television System Operation and Video Information Transmission Formats			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1- 4	<p>1.1 Explain the basic principles of operation of a monochrome (black and white) television transmission system</p> <p>1.2 Explain the basic principles of operation of the cathode ray tube (CRT)</p> <p>1.3 State how a monochrome picture can be regarded as being composed of small picture elements of differing brightness</p> <p>1.4 State the line fields scan required to compose a complete picture on the screen of a cathode ray tube</p>	<ul style="list-style-type: none"> • Draw block diagram of a monochrome and Colored describe how they work - Sketch cathode ray tube • Draw circuits to describe horizontal, vertical and sync circuits 	<ul style="list-style-type: none"> - Chalkboard - Chalk - Lecture note - Writing materials 	<ul style="list-style-type: none"> • Identify TV types and working blocks. • Monitor signal waveforms in telecoms systems. • Carryout troubleshooting in telecoms devices. 	<ul style="list-style-type: none"> • Draw a basic TV receiver block diagram. • Analyze and identify block functions. • Students are asked to produce schematic block diagrams and side explanation notes. • Individual stages be isolated and tested to understand specific functions. • Students are to measure the following parameters: 	<p>TV receiver monochrome or colored</p> <p>Oscilloscope</p> <p>Spectrum analyzers</p> <p>Frequency counters.</p> <p>Telecoms module (TV)</p>

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					SIF, VIF, HOsc and Vosc frequencies.	
General Objectives: 2.0 Understand the Conversion of Electrical Signal to Visual Display in Television Transmission						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5 - 6	2.1 State typical line and field scan periods. 2.2 Explain how a television camera works. 2.3 State how the distribution of charge on a prepared surface produced by a picture can be converted to a sequence of electrical signals by scanning 2.4 State the sequence of electrical signals generated by a camera and how it can be processed in the receiver and converted to a visual display on the screen of a cathode ray tube.	<ul style="list-style-type: none"> • Explain principles with the aid of diagrams. 	<ul style="list-style-type: none"> - Chalkboard - Chalk - Lecture note - Writing materials 			

General Objectives: 3.0 Understand The Requirement For Image Capturing and Display In Coloured And Satellite Television						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7 - 10	<p>3.1 List the requirements of colour television broadcast system</p> <p>3.2 List different types of colour television broadcast systems (PAL, SECAM and NTSC)</p> <p>3.4 Explain gamma correction</p> <p>3.5 Explain chrominance signal</p> <p>3.6 Explain image capture and display in a coloured television</p> <p>3.7 Explain satellite television system.</p> <p>3.8 Describe the principle of receiving signal from a satellite through a dish.</p>	<ul style="list-style-type: none"> Describe the principles Image formation of a scanned field. Describe the three primary colours, chrominance, convergence and the colour resolution. Describe various types of television system show procedure for gamma correction Describe the chrominance system in a colour television using circuits Describe the sequence of scanning a field. 	<ul style="list-style-type: none"> chalkboard Chalk Lecture Notes and Writing materials. Printouts 	<ul style="list-style-type: none"> Identify in TV signals coding and encoding. Operate telecoms system that require encryption and decryption of signals. Handle signal security enforcement. 	Organise visit to a television station.	Visits to TV stations.
Assessment: Coursework 10%; Course test 10%; Practical 20%; Examination 60%						

Programme: NID in Telecommunication Technology
Course: Data Communication and Networking
Code: TET 231
Duration: Hours/Week:5hrs Theory: 2Practical:3
Unit: 5Units
Goal: This course is designed to enable the learner acquire knowledge in data communication and networking.

General Objectives: At the end of this course the learner should be able to:

- 1.0 Understanding data communication
- 2.0 Understand different types of network organization.
- 3.0 Know the various types of media used in data communication network organization.
- 4.0 Know the various types of emerging applications.
- 5.0 Understand communication protocols
- 6.0 Understand network connection

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
	COURSE: DATA COMMUNICATION & NETWORKING	COURSE CODE: TET 231			CONTACT HOURS: 5 HRS	
	GOAL: Acquire Knowledge in Data communication and Networking					
	COURSE SPECIFICATION: Theoretical Content			Practical Content:		
	General Objective 1.0: Understanding Data communication			General Objective:		
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
1	1.1 Define data communication. 1.2 Explain the need for communication between machines. 1.3 State the function of equipment used in data communications. 1.4 Explain the functions of on-line equipment. Interactive processing terminals. 1.5 Explain the functions of indirect equipment. i. Line controller ii. line drivers iii. Data sets (modems, digital services units). iv. Traffic clustering devices: Multiplexers, concentrators. v. Network control, vi. Front end-processors,	<ul style="list-style-type: none"> • Explain the fundamental principles in the areas concerned. • Give assignment for further reading. 	- Manuals Documentation - Black boards - Chalk			

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	vii. Network modes.					
2	<p>1.7 Describe the different types of modulation: Amplitude, frequency and phase.</p> <p>1.8 Explain the principles of multiplexing.</p> <p>1.9 Define multiplexers.</p> <p>1.10 Explain frequency division multiplexing, time division and statistical multiplexing.</p> <p>1.11 Define a concentrator.</p> <p>1.12 Differentiate between multiplexers and concentrators.</p> <p>1.13 Explain the differences between simplex, half duplex and full duplex transmission.</p> <p>1.14 Define synchronous and asynchronous transmissions.</p>	<ul style="list-style-type: none"> • Illustrate with diagrams Calculate the cost effectiveness of multiplexers. • Explain all concern theories. 	<ul style="list-style-type: none"> - Recommended textbooks - Writing materials - Charts - Computer system 	<ul style="list-style-type: none"> • Designed ccts and simulate them to test operation. • Operate sophisticated devices in telecoms. • Operate software base systems and CAD. • Identify different transmission modes 	<ul style="list-style-type: none"> • Use fundamental principles related to modulation and demodulation. • Use E-Bench to design simple Mod-Demod ccts to practicalize concepts. • Ask students to determine parameters associated with FM / AM Mod-Demod processes. 	<ul style="list-style-type: none"> • Circuit electronic • Bench • Computer
3	<p>1.15 Define line organization.</p> <p>1.16 Define point - to - point, multi-point and multi-drop organisations</p> <p>1.18 List the major communication software.</p>	<ul style="list-style-type: none"> • Explain the differences between item 3.1 and 3.2. • Give example in specific areas. 	<p>PC Manuals Documentations</p>			

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	1.19 Define communication software. 1.20 Explain the functions of the various communication software, application programs, performance software teleprocessing software and line control software.					
4	1.21 Define a network. 1.23 Explain evolution of networks. 1.24 Describe the computer technologies modems, multiplexers, computer systems, concentrators etc. 1.25 Discuss the carriers (companies that provide Network facilities e.g. NITEL and other ISPs) 1.26 Explain message transmission.	<ul style="list-style-type: none"> • Teacher should explain evolution of networks to the present Multi user environments • Show students different types of cabling such as twisted pair, coaxial, and optical fiber. 	<ul style="list-style-type: none"> - Pictures - Writing materials - Recommended textbooks - Documentations 	<ul style="list-style-type: none"> • Identify necessary telecoms and electronics systems for multiplexing etc • Operate and carryout specific network functions. 	Organise visit to telecom service providers	Visit Telecoms service providers
General Objective 2.0 Understand different types of Network Organization.						
5	2.1 Explain topological arrangement of: a. Peer to peer b. Client/server 2.2 Explain administrative arrangement: a. Centralized systems (i.e. server based). b. Distributed systems c. Collaborative systems.	<ul style="list-style-type: none"> • Teacher should use computer to demonstrate network organization. • Use diagrams to illustrate the various Network topology. 	<ul style="list-style-type: none"> - Drawing paper - Recommended textbooks - Writing materials - Charts - Computer system. 	<ul style="list-style-type: none"> • Design and implement LAN, WAN networks and their functionalities • Troubleshoot network problems and avoid much 	<ul style="list-style-type: none"> • Design and implement LAN networks using switches, hubs and repeaters. • Design and Implement WAN protocols using 	Cisco or equivalent Packet Tracers.

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	<p>2.3 Explain geographical arrangement:</p> <p>a. Local Area Network (LANs)</p> <p>b. Metropolitan Area network (MANs)</p> <p>c. Wide Area Network (WANs)</p> <p>d. Terrestrial network.</p> <p>2.4 Explain network topologies for LANs:</p> <p>a. Star</p> <p>b. Token ring</p> <p>c. Bus</p> <p>2.5 Explain specific Network Methodologies:</p> <p>a. OSI Model</p> <p>c. SNA - System network architecture</p> <p>d. DNA - Digital network architecture</p> <p>e. ARCNET.</p>			<p>network overheads.</p> <ul style="list-style-type: none"> • Handle hardware and software systems in the data communication systems. • Implement internet access for ISP services. 	<p>Synchronous, ATM, PPP, ISDN.</p> <ul style="list-style-type: none"> • Implement routing protocols for the WAN networks e.g RIP, OSPF, • Students are to simulate the designs and monitor their operations. • Record specific network characteristics. 	
General Objective 3.0 Know the various types of media used in data communications/network.						
WEEK	Specific Learning Objective:	Teachers Activities	Resources			
6	<p>3.1 Explain the various transmission links namely.</p> <p>a. Terrestrial links (Bounded media)</p> <p>b. Coaxial cable</p> <p>c. Twisted pair cable</p> <p>d. Fiber optic cable</p> <p>e. Radio wave</p> <p>f. Satellite microwave</p> <p>g. Infrared.</p>	<p>Teachers should discuss the merits and demerits of transmission links listed in 3.1.</p>	<p>- Drawing paper</p> <p>- Recommended textbooks</p> <p>-Writing materials</p> <p>- Charts</p> <p>-Computer system.</p>			

General Objective 4.0 Know the various types of Emerging Applications.						
7	4.1 Explain the following emerging Applications: a. e-banking, e-commerce, teleconferencing, Tele- diagnosis Technology b. Message transmission c. Tele-Medicine. e. FTP f. VoIP g. Internet virtual classroom technology and e-learning.	Ask the student to explore the Internet by visiting some sites down load desired information e.g. e-learning sites like Shell open university with Holland.	PC with Internet connectivity.			
General Objective 5.0 Understand communication protocols.						
8	5.1 Define a communication protocols. 5.2 State the function of communication protocol 5.3 Explain ISO reference model on internet protocol 5.4 Differentiate between various transmission media (Asynchronous and synchronous). 5.5 Describe some specific transmission protocols: binary synchronous control, synchronous data link control (SDLC) high data	<ul style="list-style-type: none"> • Teacher should explain transition or history of protocols. • Explain bit control protocol. • Explain how protocol works and the level at which they operate. • Show that the level depends on the network itself. • Distinguish between 	<ul style="list-style-type: none"> - Recommended textbooks - Writing materials - Charts - Computer system. 	Implements all aspects of data communication designs.	Assist student to implement data	Packet Tracers

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	<p>link control (HDCL) x 25 etc.</p> <p>5.6 Network protocols</p> <ul style="list-style-type: none"> i. TCP/IP ii. FTP iii. ICMP iv. SMTP v. IPX/SPX 	<p>character-oriented protocols and oriented protocols.</p>				
General Objective 6.0 Understand network connection.						
9	<p>6.1 Explain LAN connectivity</p> <ul style="list-style-type: none"> a. Repeaters b. Bridges c. Ethernet hubs d. Routers <p>6.2 Explain Internetworking devices</p> <ul style="list-style-type: none"> a. Modems b. Multiplexers c. CSU/DSU d. Gateways <p>6.2 Explain Network Adapters</p> <ul style="list-style-type: none"> a. Settings b. Configuration c. Implementation. 	<p>Questions and answers</p>	<ul style="list-style-type: none"> - Recommended textbooks - Writing materials - Charts - Computer system. 			
Assessment: Coursework 10%; Course test 10%; Practical 20%; Examination 60%						

Programme: NID in Telecommunication Technology
Course: Mobile Communication System
Code: TET 232
Duration: Hours/Week:4hrs Theory:2 Practical:2
Unit: 4Units
Goal: This course is designed to enable the learner understand the Concept of cellular/mobile communications

General Objectives: At the end of this course the learner should be able to:

- 1.0 Know the component of GSM system and its operation.
- 2.0 Understand basic GSM network operation.
- 3.0 Understand GSM Switching system
- 4.0 Understand the base station system (BSS)
- 5.0 Understand operation and support services
- 6.0 Understand GSM Security features.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Mobile Communication System			Course Code: TET 232		Contact Hour: 4 Hrs	
GOAL: Understanding the concept of cellular / Mobile communications						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
	General Objective:1.0 Know the component of GSM system and its operation			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Define the concept of Cellular Communications 1.2 Explain the basic operations of radio base station (RBS) 1.3 Discuss the concept of frequency reuses. 1.4 Explain cell splitting	Explain concepts in detail.	- Chalk -White Board -Textbooks -Writing materials.	<ul style="list-style-type: none"> • Identify the functional modules in the GSM network. • Perform basic network tasks and configurations. 	<ul style="list-style-type: none"> • Organise visit and outline specific objectives. • Students are to ask questions on all aspect of general course contents. • Demonstrate specific tasks and commands and general working principles . 	<ul style="list-style-type: none"> • Visit to RBS, MSC of a GSM operator. • Network Software Simulators. • Frequent visit to telecommunication operators.

NID in Telecommunications Technology (Draft)

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
2 - 3	<p>1.5 Explain system operation layout of mobile phone service providers</p> <p>1.6 Explain the operations and dimensions of</p> <ul style="list-style-type: none"> i. Mobile Switching Center (MSC) ii. Call sites iii. Mobile units <p>1.7 Explain the term Call Hand off</p> <p>1.8 Distinguish the following types of analogue mobile phone services:</p> <ul style="list-style-type: none"> i. Narrowband analog mobile phone services (NAMP) ii. Digital advanced mobile phone Service (DAMP) <p>1.9 Explain the properties of radio channel</p> <p>1.10 Explain the parameters of TACS</p> <p>1.11 Describe the mobile network controller of TAC.</p> <p>1.12 Explain the term call management in TACs</p>	<p>Explain the organization and operation of the GSM system.</p>	<ul style="list-style-type: none"> - Whiteboard - Recommended textbooks - Writing materials. 			

NID in Telecommunications Technology (Draft)

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4 – 5	<p>1.13 Explain the following categorization of mobile communication system:</p> <ul style="list-style-type: none"> i. Advanced mobile phone service (AMPS)- First generation ii. Global system for Mobile Communication- Second Generation ii. Third generation (3G) <p>1.14 Explain the concept and evolution of Global system for Mobile communication.</p> <p>1.15 State the merits and demerits of GSM technology.</p> <p>1.16 Explain the GSM specifications in term of :</p> <ul style="list-style-type: none"> i. Frequency band ii. Duplex distance iii. channel separation iv. Modulation v. Transmission rate vi. Access Method vii. Speech coder <p>1.18 Explain the following basic subscriber' GSM services:</p> <ul style="list-style-type: none"> i. Fax mail 	<p>Explain with drawing / pictures the major concepts of new generation networks.</p>	<ul style="list-style-type: none"> - Pictures - Manuals - Documentations - Board and Chalk 			

	<ul style="list-style-type: none"> ii. Short message services iii. Cell broadcast iv. Voice mail v. Telephony vi. Call forwarding vii. Barring of calls viii. Call line identification/restriction ix. Multiparty service etc <p>1.19 Explain the concept of Subscriber Identity Module (SIM)</p> <p>1.20 Explain the operational principle of the GSM subscriber unit or handset</p>					
General Objective 2.0 Understand Basic GSM Network Operation						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6	<p>2.1 State the features of GSM Network</p> <p>2.2 Explain the three major systems in GSM network:</p> <ul style="list-style-type: none"> i. the switching system ii. the base station iii. Operation and support system. 	Discuss systems in GSM network	<ul style="list-style-type: none"> - Board - Chalk - Lecture note - Writing materials 	Carry out practical exercises on operation, maintenance and troubleshooting using GSM trainer units.	Arrange for industrial visits to operators.	<ul style="list-style-type: none"> • Practical manuals • Telecommunication laboratory • Computer system • Industrial visit.

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	<p>2.3 Explain the following functional elements in GSM operations:</p> <ul style="list-style-type: none"> i. Message center (MXE) ii. Mobile Service Node (MSN) iii. Gateway Mobile Services Switching center (GMSC) iv. GSM Internetworking Unit (GIU) v. Intelligent Network (IN) <p>2.4 Describe roaming in the GSM operation.</p> <p>2.5 Explain call set , call routing and charging during roaming</p>					
General Objective 3.0 Understand GSM switching system						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7	<p>3.1 State the function of switching system</p> <p>3.2 Describe the following element of switching system:</p> <ul style="list-style-type: none"> i. . Home Location Register (HLR) ii. Switching Centre (MCS) iii. Visit Location Register (VLR) iv. Authentication Centre (AUC) v. Equipment Identity Register (EIR) 	<p>Explain with drawing / pictures the major concepts of new generation networks</p>	<ul style="list-style-type: none"> - Pictures - Manuals - Board - Chalk 	<p>Carry out practical exercises on operation, maintenance and troubleshooting of the switching system using GSM trainer units.</p>	<p>Organise visits to operators.</p>	<ul style="list-style-type: none"> • Practical manuals • Telecommunication • Laboratory • Notebook • Computer system • Visits.

NID in Telecommunications Technology (Draft)

General Objective 4.0 Understand the Base Station System (BSS)						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	4.1 Explain the operation of the base station system. 4.2 Explain the functions of the following elements in the base station system: i. Base station controllers ii. Base transceiver stations (BTS)	Discuss the operation of a base station	- Board - Chalk - Lecture-note - Writing materials	Carry out practical exercises on operation, maintenance and troubleshooting using GSM trainer units	Organise visits to operators.	<ul style="list-style-type: none"> • Practical manuals • Telecommunication • Laboratory • Notebook • Computer system
General Objective 5.0 Understand Operation and Support services						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	5.1 Discuss the implementation of Operation and maintenance center 5.2 Explain the uses of OSS by network operators in operation and maintenance activities as required in GSM network.	Explain the Principle and operation of the GSM network	- Board - Chalk - Lecture notes - Writing materials			
General Objective 6.0 Understand GSM security Features						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
10	6.1 Explain the security measures in GSM. 6.2 Explain the following	State need for security measures in GSM	- Board - Chalk - Lecture note - Writing materials			

NID in Telecommunications Technology (Draft)

	<p>measures:</p> <ul style="list-style-type: none"> i. Subscriber' identity authentication ii. Subscriber' identity confidentiality iii. Signaling data confidentiality iv. User data confidentiality <p>6.3 Explain the uses of Encryption algorithms in GSM networks.</p> <p>6.4 Explain the following encryption algorithm in:</p> <ul style="list-style-type: none"> i. Authentication algorithm (A3) ii. CIPHERING Algorithm (A5) iii. Key generating algorithm (A8) 					
<p>Assessment: Coursework 10%; Course test 10%; Practical 20%; Examination 60%</p>						

NID in Telecommunications Technology (Draft)

Programme:	NID in Telecommunication Technology
Course:	Fiber Optic communications
Code:	TET 233
Duration:	Hours/Week:5hrs Theory:2 Practical:3
Unit:	5Units
Goal:	This course is designed to enable the learner understand the Concept of Fibre Optic communications
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand the property/nature of light and FOC.
	2.0 Understand Fiber connection and splicing.
	3.0 Understand cabling and construction
	4.0 Understand fibre system testing.

NID in Telecommunications Technology (Draft)

PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Fibre Optic Communications			Course Code: TET 233		Contact Hour: 5 Hrs	
GOAL: Understanding the concepts of fibre optic communication						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
	General Objective:1.0 Understanding the property / Nature of light and FOC			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-2	1.1 Basic principles of Light 1.2 State Snell’s law and its applications. 1.3 Explain the concept of optical fibre communications. 1.4 Explain the principle of propagation of light in various media. 1.5 Discuss the optical spectrum in the electromagnetic spectrum and optical band. 1.6 Explain the types and mode of optic fibre in the following categories: a. Mode i. Single mode ii. Multi mode b. Index i. Graded index ii. Step index	Explain the basic principle of light and lasers for optic fiber operation.	- White Board -Recommended textbooks - Writing materials.	<ul style="list-style-type: none"> • Desmontrate SC and SM connections to a fiber distribution system. • Identify basic signal frame formats from one medium to the other in data communications. 	<ul style="list-style-type: none"> • Assit students to Split fiber cable to reveal internal layers. • Ask students to identify respective fiber layers. • Illustrate splicing to join end points. • Ask students to attach connectors for SM amd MM operations. 	<ul style="list-style-type: none"> • Fiber cable length • Connectors • Toolbox • Network Interface Converters • Frequent industrial visit to telecoms operators.

NID in Telecommunications Technology (Draft)

					<ul style="list-style-type: none"> • Demonstrate the connection of the unit above to an Ethernet to show data transfer. • Use Gigabits PCs to transfer data across the fiber link. 	
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3 – 6	<p>1.7 Explain optic fibre attenuation and the effects of:.</p> <ol style="list-style-type: none"> a. Scattering b. Absorption c. Bends <p>1.8 Explain the following types of dispersion and the techniques for their reduction:</p> <ol style="list-style-type: none"> i. Modal ii. Chromatic iii. Polarisation <p>1.9 Explain the operational principles and characteristics of the following two common light sources in fibre optic communication:</p>	Explain the necessary theoretical concepts.	<ul style="list-style-type: none"> - Chalk - Whiteboard - Textbooks - Writing materials. - Pictures 	Identify optical components appropriately.	Show students various optical components.	<ul style="list-style-type: none"> • Practical manuals • Telecommunication • Laboratory • Notebook • Computer system • Telecoms module • Documentations.

NID in Telecommunications Technology (Draft)

	<ul style="list-style-type: none"> i. Laser diode ii. Light emitting diode <p>1.10 Explain the operational principles of the following detectors employed in FOC:</p> <ul style="list-style-type: none"> (i) Avalanche Photo Diode (ii) PIN Diode <p>1.11 Describe the uses of the following intermediate components in FOC</p> <ul style="list-style-type: none"> i. Isolators ii. Attenuators iii. Branching devices iv. Splitter v. Couplers vi. Multiplexers vii. Optical line amplifier 					
General Objective 2.0 Understand Fiber connection and splicing						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7 -8	<p>2.1 Explain the following fiber joining methods:</p> <ul style="list-style-type: none"> i. Permanent fusion splice ii. Connector iii. Mechanical splices <p>2.2 State the causes of losses in fibre splicing</p> <p>2.3 Explain misalignment in joining of fibre.</p>	<p>Explain the necessary theoretical concept.</p>	<ul style="list-style-type: none"> - Chalk - Whiteboard - Textbooks - Writing materials. 			

NID in Telecommunications Technology (Draft)

	<p>2.4 Explain the following types of misalignment: Angular misalignment Axial misalignment</p> <p>2.5 Explain t how losses could be minimized.</p> <p>2.6 Describe the procedure for fusion splicing by a splicer.</p> <p>2.7 Explain how to carry put mechanical splicing.</p> <p>2.8 Explain the various fibre connectors in markets and their general requirements.</p> <p>2.9 State the Safe working practices during installation.</p> <p>2.10 Outline the Splicing tips for good workmanship.</p>					
General Objective 3.0 Understand Cabling and Construction						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	<p>3.1 Explain the outdoor and interior installation of fibre cable.</p> <p>3.2 Explain the effect of environmental factors on the installation.</p> <p>3.3 State ways to protect cables from external factors.</p>	<p>Explain the following;</p> <p>fiber cable internal structure,</p> <p>Fiber cable</p>	<ul style="list-style-type: none"> - Chalk - White Board - Textbooks - Writing materials. 			

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		length, State limitations for SM MM operations				
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
10	3.3 Define optical networking 3.5 Explain the Synchronous optical network. 3.6. Describe the standard for Synchronous optical networking 3. 7Explain the data rate hierarchy of SONET data rates. 3.8 Describe the fibre optic system in Ethernet LAN 3.9 Explain the operational principle of Fiber distributed data Interface (FDDI)	Explain data flow and fiber communication networks. Explain the operation of data converters for information transfer between fibre and other media	- Chalk - White Board -Recommended textbooks - Drawing and writing materials.			
General Objective 4.0 Understand Fiber System Testing						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11	4.1 Explain the uses of the following measuring instruments: i. Light probe ii. Optical time domain	Explain the operation of instrument use in fiber	- Whiteboard - Textbooks - Writing materials.	• Carry out Continuity and insertion tests	Assist student to perform experiments in order to	• Optical power meter • Optical light source

NID in Telecommunications Technology (Draft)

	reflectometer. iii. Fibre cable analyzer iv. Pulse generator v. radiometer vi. Optical spectral analyzer vii. Fast response oscilloscope 4.2 Explain the measurement of losses, power budget, and rise time in fibre optic system.	test,operation and maintenance		<ul style="list-style-type: none"> • Perform Optical Loss Testing • Use an OTDR in Troubleshooting 	achieve desired objectives.	<ul style="list-style-type: none"> • Optical attenuator • Return loss meter • Fiber cable • Connectors • Converters • LAN networks
<p>Assessment: Practical class 20% of the total score; Course work 20%;Test 20%;while the remaining 40% will be for the end of the semester examination.</p>						

NID in Telecommunications Technology (Draft)

Programme:	NID in Telecommunication Technology
Course:	Telecommunication Maintenance and Repairs
Code:	TET 234
Duration:	Hours/Week: 5hrs Theory: 2 Practical:3
Unit:	5Units
Goal:	This course is designed to enable the learner to acquire skills in maintenance and repairs
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand circuit diagrams.
	2.0 Understand the principle of operations and use of basic electronic measuring instruments in trouble shooting.
	3.0 Understand diagnostic techniques involve in corrective maintenance

NID in Telecommunications Technology (Draft)

PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Telecommunication Maintenance and Repairs			Course Code: TET 234		Contact hour: 5 Hrs	
GOAL: Acquire skills in maintenance and repairs						
COURSE SPECIFICATION: Theoretical				Practical Content:		
General Objective1.0: Understand the circuit diagrams				General Objective:		
Week	Specific Learning Objective	Teacher Activities	Learning Resources	Specific Learning Objective	Teacher Activities	Learning Resources
1 – 3	1.1 Explain the following; <ul style="list-style-type: none"> a.circuit diagrams b.schematic diagrams c.block diagrams d.line diagrams e. flow diagrams f. installation diagrams. of communication systems. 	Provide theoretical explanations and illustrations using diagrams.	<ul style="list-style-type: none"> - Documentations - Pictures - Drawing board / chalk 	<ul style="list-style-type: none"> • Identify the components in a typical communication system. • Draw cct diagrams, flow and installation diagrams efficiently. <ul style="list-style-type: none"> • Produce cct diagrams and clone electronic or telecoms systems. • Manipulate electronic and telecoms equipments. 	<ul style="list-style-type: none"> • Identify the power terminals in the radio and the output terminals. • Show the PCB design and layout format. • Identify the basic units in the radio. • Demonstrate tracing to produce the radio unit cct diagram. • Ask students to produce the unit base on the cct traced. 	<ul style="list-style-type: none"> • Radio • Multimeters • Electronic components • Toolbox

NID in Telecommunications Technology (Draft)

General Objective: 2.0 Understanding the principle of operations and uses of basic electronic measuring instruments in trouble shooting						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4 – 6	<p>2.1 Explain basic trouble shooting techniques in computer -faults diagnosis e.g. fault identifications by eliminations</p> <p>2.2 Explain types of cables, methods of testing and instruments used for testing:</p> <p>i. Twisted pair cables ii. Coaxial cables iii. RS232 Standard communications cables.</p>	<p>Explain the computer booting process.</p> <p>Explain the hard ware architecture of computer systems mention types of data cables in computer/internetworks</p>	<p>- Whiteboard - Lecture notes - Writing materials</p>	<ul style="list-style-type: none"> • Use multimeters and oscilloscope to test the various components on boards /cards such as: <ul style="list-style-type: none"> i. Resistors ii. Diodes iii. Transistors iv. ICs e.tc • Handle toolboxes and use tools well. 	<ul style="list-style-type: none"> • Test electronic components to find out BAD or GOOD. • Test cables for continuity using testers and meters. • Crimp UTP for straight through or Crossover operation. test it operation. • Lecturer should simulate faults and ask students to trace. 	<ul style="list-style-type: none"> • Cables CAT5 UTP • Multimeters • Electronic components • Toolbox • RJ – 45 connectors
General Objective : 3.0 Understand diagnostic techniques involve in corrective maintenance						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7 – 10	3.1 Explain the importance of preventive	Explain what preventive maintenance	<p>- Board - Chalk</p>	<ul style="list-style-type: none"> • Carry out routines for faults clearance 	<ul style="list-style-type: none"> • Assist students to 	<ul style="list-style-type: none"> • Computer parts • Windows vista

NID in Telecommunications Technology (Draft)

	<p>maintenance in telecommunication system.</p> <p>3.2 Explain the need of diagnostic soft-wares.</p> <p>3.3 Explain the use of installations /maintenances manuals in trouble shooting.</p> <p>3.4 Explain the need for equipment inventory in maintenance.</p>	<p>procedures are</p> <p>Explain the need for the right soft/hardware in system trouble shooting & maintenance</p>	<p>- Lecture notes -Writing materials</p>	<ul style="list-style-type: none"> •Use diagnostic software in corrective maintenance •Use anti virus kits in detections, cures and prevention of virus •Interpret the installations /maintenance manuals. •Carry out equipments' inventory of a hardware store. •Carry out the pre-installations check of accessories and equipments 	<p>assemble/clone a PC.</p> <ul style="list-style-type: none"> • Install windows vista OS, office package and Norton anti-virus. • Instruct students to up dates all software as part of corrective maintenance. • Illustrate the interaction B/W hard and software to form a working system 	<ul style="list-style-type: none"> • Norton anti-virus • Office package and tool box
<p>Assessment: Coursework 10%; Course test 10%; Practical 40%; Examination 40%</p>						

NID in Telecommunications Technology (Draft)

Programme:	NID in Telecommunication Technology
Course:	Tele-Traffic Engineering
Code:	TET 241
Duration:	Hours/Week:4hrs Theory:2 Practical:2
Unit:	4Units
Goal:	This course is designed to enable the learner to acquire knowledge in Tele-traffic engineering and its applications in communication systems
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand the fundamental concept of Tele-traffic engineering.
	2.0 Understand congestion theories
	3.0 Understand the basic concepts of traffic observation and measurement

NID in Telecommunications Technology (Draft)

PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE Tele-Traffic Engineering			COURSE CODE: TET 241		CONTACT HOURS: 4 HRS	
GOAL: Acquire knowledge in Tele- Traffic Engineering and its applications in communication systems						
COURSE SPECIFICATION: Theoretical content				Practical Content:		
General Objective 1.0: Understand the fundamental concepts of Tele – traffic Engineering				General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-3	1.1 Define traffic in telecommunication 1.2 Explain trunks. 1.3 Define the Erlang, unit of traffic. 1.4 Derive expression for Grade of Service using Erlang’s table. 1.5 Obtain the Erlang’s lost call formula 1.6 Explain Erlang’s distribution 1.7 Discuss the queuing system	Give detail theoretical explanations.	- Whiteboard - Textbooks - Writing materials.			
General Objective: 2.0 Understand Congestion Theories						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
4-6	2.1 Describe variation of traffic in telecommunication 2.2 Explain the following terms: i. Call congestion	Use teaching aid to explain the theoretical concept	- Whiteboard - Textbooks - Writing materials.			

NID in Telecommunications Technology (Draft)

	<p>ii. Trunk congestion</p> <p>2.3 State the busy hour period.</p> <p>2.4 Explain grade of Service.</p> <p>2.5 Explain the following factors that determine the grade of service:</p> <p>i. Probability of that a call will be lost</p> <p>ii. the probability</p> <p>iii. the proportion of time during which congestion occurs.</p>					
General Objective: 3.0 Understand the Basic Concepts of Traffic observation and Measurement						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7-10	<p>3.1 Explain the concept of traffic management.</p> <p>3.2 Explain the importance of continuous traffic measurements.</p> <p>3.4 Explain Traffic or Call data analysis</p> <p>3.5 Explain the following terms:</p> <p>i. Call completion Rate CCR</p> <p>ii Answer Seizure Ratio ASR</p> <p>3.6 Explain uses of Traffic Data</p> <p>3.7 Explain the delay system in telephony</p>	<p>Give theoretical explanations.</p>	<p>- Chalk</p> <p>- White Board</p> <p>- Textbooks</p> <p>- Drawing and writing materials.</p>	<ul style="list-style-type: none"> • Carry out traffic analysis / management for effective call terminations in telecom switches. • Produce templates for call analysis. 	<p>Organise visits to learn more about traffic analysis in a switch.</p>	<p>Industrial visits to operators.</p>
Assessment: Coursework 10%; Course test 10%; Practical 20%; Examination 60%						

NID in Telecommunications Technology (Draft)

Programme:	NID in Telecommunication Technology
Course:	Network planning and management
Code:	TET 242
Duration:	Hours/Week:5hrs Theory:2 Pra:ctical:3
Unit:	5Units
Goal:	This course is designed to enable the leaner to acquire skills in planning and management of networks.
General Objectives:	At the end of this course the leaner should be able to:
	1.0 Know the basics of network concepts and design.
	2.0 Understand the principles of network administration.
	3.0 Understand network trouble shooting concepts and resources
	4.0 Understand Network hardware components and their operations
	5.0 Understand general network services

NID in Telecommunications Technology (Draft)

PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Network Planning and Management			COURSE CODE: TET 242		CONTACT HOURS: 5 Hrs	
GOAL: Acquire skills in planning and management of networks						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
General Objective1.0: Know the Basics of Network Concepts and Design				General Objective1:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-2	<p>1.1 Classify the different types of networks</p> <p>1.2 Explain the requirements of building networks.</p> <p>1.3 Discuss capacity assessment in Networks</p> <p>1.4 Explain capacity assignment in istributed Network.</p> <p>1.5 Explain concentration and buffering in store and forward Networks</p> <p>1.6 Explain the following terms in detail:</p> <ol style="list-style-type: none"> i. Network Design Algorithms ii. Routing and flow control iii. Random Access Techniques iv Line control procedures v Routing and flow control vi Internetworking models: OSI, DoD vii. Network operating systems: IOS 	<ul style="list-style-type: none"> • Explain basic computer network concepts. • Give assignments on computer network planning and design. 	<ul style="list-style-type: none"> - LAN networks Internet - Documentations - Manuals - Board / Chalk 	<ul style="list-style-type: none"> • Identify network devices according to OSI model. • Design networks and simulate them. • Configure network devices using appropriate IOS. 	<ul style="list-style-type: none"> • Draw the OSI and DoD network models. • Designed simple LAN network with Packet tracers to identify OSI layers implementati on in the network. • Demonstrate Cisco IOS operation with routers in Packet Tracers. Treat boot process in detail. 	<ul style="list-style-type: none"> • Packet • Tracers • NetSims • Computers

NID in Telecommunications Technology (Draft)

General Objective 2.0 Understand the Principles of Network Administration.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3-4	<p>2.1 Explain User and Security administration in relation to</p> <ol style="list-style-type: none"> a. Users b. Group Accounts c. Security Types d. Auditing <p>2.2 Explain Safeguarding Data using:</p> <ol style="list-style-type: none"> a. Backups b. Redundancy c. Uninterruptible power supplies (UPS) d. Firewalls <p>2.3 Explain “Access-List” in access control.</p> <p>2.4 Explain network security measures in OS.</p> <p>2.5 Outline general network administration requirements.</p>	<p>Explain concepts making reference to a particular LAN network in the college.</p>	<ul style="list-style-type: none"> • LAN in the schools • Internet • Documentation • Manuals • Board / Chalk. 	<ul style="list-style-type: none"> • Create accounts and assigned controls. • Enforce security measures in a telecoms / network environment. • Perform security specific tasks using network devices. 	<ul style="list-style-type: none"> • Create user accounts and assigned appropriate user rights. • Demonstrate login using accounts created. • Demonstrate grouping, Global user, Local user rights. 	<ul style="list-style-type: none"> • LAN network • Windows OS • Server OS

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General Objective: 3.0 Understand Network trouble shooting concepts and resources.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5-6	<p>3.1. Explain network trouble shooting guidelines.</p> <p>3.2 Explain the use of the OSI model in network trouble shooting guides.</p> <p>3.3 State the use of the following tools in networks solution: i. PING ii. Traceroute</p> <p>3.4 Explain subnetting for IP network trouble shooting.</p> <p>3.5 Explain the need for the following in networks: i. Gateway ii. Subnet Mask iii. DNS iv. DHCP</p>	<ul style="list-style-type: none"> • Questions and Answers • Give assignments • Explain IP address classifications and network designs. 	<ul style="list-style-type: none"> • LAN in the school • Internet • Documentation • Manuals. 	<p>Identify trouble-shooting resources available on the Net:</p> <p>a. Microsoft download library</p> <p>b. Use microsoft Tech net</p> <p>c. Use microsoft knowledge Base</p> <p>d. Visit vendor support sites</p> <p>e. Visit news groups</p> <p>f. Utilize online services</p>	<ul style="list-style-type: none"> • Design a LAN to demonstrate routing and flow of data. • Create faults to use PING or TRACERT commands to troubleshoot. 	<p>LAN network</p> <p>Packet tracers</p>

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				g. Make use of publications etc. Troubleshoot and rectify network base problems.		
General Objectives 4.0: Understand Network Hardware Components and their Operations.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7-8	<p>4.1 Explain Network Adapters in relation to the following terms:</p> <ul style="list-style-type: none"> i. Function ii. Software Parameters. iii. Problems. iv. Typical solutions. <p>4.2 Explain the operations of the following hardware systems:</p> <ul style="list-style-type: none"> i. Hub ii. Concentrators / Repeaters iii. Bridges iii. Switches iv. Routers. <p>4.3 Analyze typical problems and solutions related to the items in 4.2 above.</p>	<p>Questions and Answers. Explanations on networks scalability.</p>	<ul style="list-style-type: none"> • Recommended textbooks • Writing materials • Charts • Computer system 	<p>Design and control data networks.</p>	<p>Use tracers or Netsims to design LAN and WAN networks using the items in 4.1 and below.</p>	<ul style="list-style-type: none"> • Tracers • Netsims • Computers

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	<p>4.4 Identify the area of applications of the items in 4.2 above.</p> <p>4.5 Explain the interconnection of the items in 4.2 above and specify the types of cabling required.</p> <p>4.6 Explain the necessary protocols required for network formation using the items in 4.2.</p> <p>4.7 List and discuss the network problems experienced using the items in 4.2.</p>					
General Objective: 5.0: Understand general network services						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9-10	<p>5.1 Explain various network resources</p> <p>5.2 List and explain network services applicable to Windows environment.</p> <p>5.3 Describe how network services are enabled in Windows operating systems.</p> <p>5.4 Describe how the following services are enabled and shared in a network:</p>	<ul style="list-style-type: none"> • Explain how systems discover resources in a network environment. • Give assignment on areas of application . • Questions and Answers 	<ul style="list-style-type: none"> • Recommended textbooks • Writing materials • Charts • Computer system 	<ul style="list-style-type: none"> • Perform network specific functions adequately. • Control network devices in data / telecoms environment. 	Design and demonstrate network services in a LAN environment.	<ul style="list-style-type: none"> • Packet Tracers • Netsims

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	<ul style="list-style-type: none"> i. Network printing ii. Network faxing iii. Sharing CD ROMS <p>5.5 Explain the functionality of the following network services work:</p> <ul style="list-style-type: none"> i. Email ii. WWW iii. News iv. Internet Messaging / Chatting v. FTP <p>5.6 Explain how these services in 5.4 are carried on the internet.</p>					
<p>Assessment: Coursework 10%; Course test 10%; Practical 40%; Examination 40%</p>						

Programme:	NID in Telecommunication Technology
Course:	Final Year Projects
Code:	TET 243
Duration:	Hours/Week:4hrs Theory:0 Practical:4
Unit:	4Units
Goal:	This course is designed to enable the learner to write a project report at the end of the Programme.
General Objectives:	At the end of this course the learner should be able to:
	1.0 Understand the practical constructional requirements of the project undertaken.
	2.0 Understand the format for project report writing.

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PROGRAMME: NATIONAL INNOVATION DIPLOMA TELECOMMUNICATION TECHNOLOGY						
COURSE: Final Year Project			COURSE CODE: TET 243		CONTACT HOURS: 4 Hrs	
GOAL: Know how to write a project report						
COURSE SPECIFICATION: Theoretical Content				Practical Content:		
General Objective:				General Objective:1.0 Understand the Practical Constructional Requirements of the project undertaken		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1-4	1.1 Explain the functionality of a schematic diagram given for the project.	<ul style="list-style-type: none"> • Show students how to reduce the project to a schematic diagram. 	<ul style="list-style-type: none"> - Chalk board - Writing Materials 	<ul style="list-style-type: none"> • Identify all the components in a given circuit • Plan the layout for the project on state-by stage basic. • Carry out the project as scheduled in (1-2) • Test the functionality of the completed project • Carryout correction of any detected error/faults 	<ul style="list-style-type: none"> •Teacher should give necessary assistance to students during project supervision. 	<ul style="list-style-type: none"> • Make board circuit diagrams Computer

General Objective: 2.0 Understand the format for project report writing.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5-6	2.1 Explain the purpose of each of the following sections of a project report. a. Cover page b. Title page c. Approval page d. Declaration page e. Table of contents f. Acknowledgements h. List of symbol/summary i. List of symbol/abbreviation j. List of figures k. Body of the project report divided in chapters.	Explain to the students the approved format of writing technical reports. Show samples of project reports in the standard format.	<ul style="list-style-type: none"> • Chalk • Computer PC • Card soft ware • Computer Printer and accessories 			

GUIDELINES FOR ASSESSMENT OF NID TELECOMUNICATION TECHNOLOGY STUDENT PROJECTS

PART A: SUPERVOSOR'S ASSESSMENT

Title of Project	
Name of Student	
Registration Number	
Course	

		Maximum Score	Actual Score
1	Presentation of Report(if conformity with standards)	6	
2	Understanding of the problem(s) and the pursuit of it to achieve the set objectives	7	
3	Report content(Data collection, Test procedures, Design/Construction, results and discussions)	12	
4	Does the report read as an integrated whole? (e.g. Details of work should be put in appendices)	12	
5	Quality of English(Sentence construction, grammar, spelling)	6	
6	Conclusion, Recommendations and summary	7	
	Total	50	

Brief Remark

Name of Reader _____

Signature _____ Date _____

PART B: PANEL'S ASSESSMENT

Title of Project	
Name of Student	
Registration Number	
Course	

		Maximum Score	Actual Score
1	Presentation of Report(if conformity with standards)	10	
2	Report content(Data collection, Test procedures, Design/Construction, results and discussions)	20	
3	Knowledge of theory	10	
4	Conclusion and summary	10	
	Total	50	

Brief Remark

LIST OF MINIMUM RESOURCES FOR NID TELECOMMUNICATION TECHNOLOGY

	LABORATORY	WORKSHOP
	Telecommunication	1) Telecommunication Maintenance and Repairs Workshop
	Digital and Microcomputer	

S/N	ITEMS DESCRIPTION	QUANTITY
TELECOMMUNICATION LABORATORY		
	Basic Electricity kit -----	5
	Wheatstone Bridge -----	5
	Electronic Trainer unit -----	5
	Rheostats (Various range)-----	20
	Earth loop tester -----	5
	Oscilloscopes	
	▪ Single Trace 5MHZ with probe -----	5
	▪ Dual Traces 15 MHZ -----	5
	▪ Channel 100 MHZ-----	5
	▪ Larges screen Display Oscilloscopes -----	5
	Frequency generator -----	5
	Function generator -----	5
	Pulse generators-----	2
	Semi conductor and Electrical and Theo meters fundamentals laboratory kit -----	5
	Telecommunication system trainer-----	5
	Experimental trainer for electronic circuit -----	5
	Transistor amplifier demonstrator -----	5
	Power supply unit 0-60 v/3A-----	5
	Amplifiers -----	5
	Sweep generator -----	5
	Multiage DC Voltmeters-----	5
	Multi range AC voltmeter-----	5
	Multi range AC ammeter -----	5
	Multi DC ammeter-----	5
	Circuit construction deck -----	5
	RLC Bridge -----	5
	Microwaves transmission laboratory kits -----	5
	Transmission line demonstrators -----	5

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Frequency counter -----	5
Transducers (assorted) -----	5 each
RF, AR power meter -----	5 each
CTV pattern generator pal system -----	5
RF wide band generator 100KHZ –100MHZ -----	5
GSM trainer unit-----	2
Satellite Communication trainer unit-----	5
Fiber optic system trainer unit-----	5
Time domain Reflectometer-----	1
Spectrum Analyzer-----	1

DIGITAL SYSTEM AND MICROCOMPUTER LABORATORY

Digital system -----	5
Microcomputer trainer -----	5
Logic probe -----	5
IC Tester -----	5
Logic Tutor-----	2
Microcomputer System (Pentium IV and above, 512 , 40 GB)-----	5
Breadboard -----	30
Power supply -----	5
Logic Analyser-----	5
The logic checker /logic probe -----	5
The wave form or clock generation circuit	
The pull –up circuit	
The –pull down circuit	
The push button switch module	
The inverter circuit and their use in driving LEDs	
The high /low signal display module	
The numerical display modules using 7- segment display	
Binary to 7- segment conversion module	
Semi-conductor switch module	
Digital counter circuit module	
Binary to Decimal Conversion logic module	

Hexadecimal to binary conversion module

The latch module

One pulse generating circuit and power up –one short

Flip-flops and registers

Adder circuits

Subtract or circuits

Combinational logic component facilitate Truth –Table implementation by student using discrete component. AND, OR NAND, NOR E, OR EX, NOR

An assortment of TTL, TT/LS C-MOS P-MOS and ECL, logic IC to facilitate student desing and implementations of Registers, module counter and patent generation.

Structure logic devices An assortment of:

- a) 1-out of 2 multiplexes
- b) 1-out of 4 multiplexes
- c) 1-out of 8 multiplexes
- d) 1-out of 16 multiplexes
- e) 1 –to 2 line decoder /demultiplexes
- f) 2-to 4 line decoder /demultiplexes
- g) 3-to 8 line decode /demultiplexes
- h) 4-to 16 line decoder /demultiplexes

An assortment of erasable and re- programmable read only memories of differences memory storage capacitates

An assortment of field programmable logic arrays (FPLA, S) to facilities use in experiments

An assortment of photo – electric devices, photo-transistor, diace photo tractors, slotted op to- couplers, sources /sensor

Interfaces modules for practical as fallows:

Piezo electric buzzer module

The symbols display module

EPR0M programmer (PC based with adaptor modules)

EPR0M eraser (PC based)

Variables width one-shot pulse module

Temperate sensor module

The Digital comparator module

Analogue comparator module

Digital to analogue converter module

Analogue to digital conversion module

Digital thermometer module

Digital clock module
One- clip microcomputer digital temperature controller
Bare –board (not enclosed) microcomputer trainer kits
Processor (8085, 8086,80186,80286,80386,80486)

TELECOMMUNICATION MAINTENACE AND REPAIRS WORKSHOP

Wire wrap gums-----	5
Wire wraps boards -----	5
Hand tool: cutter. Pliers, wire strippers, assortment screw –drivers, et.c -----	5
An assortment of edge connection -----	5
Soldering stations -----	5
RAM (Chips and module)-----	5
ROM (Chips and module)-----	5
Logic pulser)-----	5
Logic probe -----	5
Logic clips -----	5
Digital voltmeter-----	5
I C insertion tool -----	5
I C extraction tool -----	5
I C socket (assortment) -----	5
Battery charging facilities-----	5
Soldering station-----	5
Soldering irons-----	5
Electronic Technician toolbox-----	5
IC tester-----	5
Transistor Tester-----	5
Digital Multimeter-----	5
Pedestal drill -----	5
Electrician tool kits-----	5
Cable recessing tools-----	5
Earth rods and accessories-----	5

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Various sizes of cables-----	5
Trunking cables and accessories-----	5
Safety belt-----	5
Ladder-----	5
A simulated wall for vertical conduit installation practice-----	5
Transistor Tester-----	5
Megger-----	5
Earth loop tester-----	5

LIST OF BOOKS (NID)

RECOMMENDED LIST OF BOOKS

TELECOMMUNICATION TECHNOLOGY

- 1 Transmission Systems- M.T. Hiss, B. G. Evans
- 2 Telecommunication- Brown & Glazier
- 3 Telecommunication Principles for final students 1 & 2- Knigh
- 4 Electronics & Radio Engineering – Terman
- 5 Electronics Communication System-Kennedy
- 6 Principles of communication System-Taub & Schilling
- 7 Radio & Line TXA & B-D.C. Green
- 8 Principles of Digital Communication G.J. –Marshall
- 9 Signal Processing, Modulation and Noise-Betts.
- 10 Electrical Communication-Meadow.
- 11 Signals, Antenna, Wave Transmission, Noise Modulation –F.R. Connors
- 12 **Communication Systems: Fundamentals and Design Methods** by Nevio Benvenuto, Roberto Corvaja, Tomaso Erseghe, and Nicola Laurenti (**Hardcover** - Dec 26, 2006)
- 13 **Fundamentals of Telecommunication Networks** by Tarek N. Saadawi and Mostafa H. Ammar (**Hardcover** - Sep 15, 1994)
- 14 **Fundamentals of Telecommunications, 2nd Edition** by Roger L. Freeman (**Hardcover** - April 18, 2005)
- 15 **Fundamentals of Telecommunications 1** by Eric Coll (**Spiral-bound** - Jan 2006)
- 16 **Fundamentals of Telecommunications 2** by Eric Coll (**Spiral-bound** - Jan 2006)
- 17 **Essentials of Modern Telecommunications Systems** by Nihal Kularatna and Dileeka Dias (**Hardcover** - May 2004)
- 18 **Telecommunication System Engineering (Wiley Series in Telecommunications and Signal Processing) by Roger L. Freeman (Hardcover - April 19, 1996)**
- 19 **Basics Of Telecommunications by Stephan S. Jones (Paperback - Jun 24, 2004)**
- 20 **Radio Wave Propagation for Telecommunication Applications (Signals and Communication Technology) by H. Sizon and P.de Fornel (Hardcover - Nov 23, 2004)**
- 21 **How Radio Signals Work by Jim Sinclair (Paperback - Feb 1, 1998)**
- 22 **Propagation of Radiowaves (Electromagnetic Waves) by Les W. Barclay (Hardcover - Dec 2002)**
- 23 **Introduction to RF Propagation by John S. Seybold (Hardcover - Sep 20, 2005)**

- 24 Radio Frequency Principles and Applications: The Generation, Propagation, and Reception of Signals and Noise (IEEE Press Series on RF and Microwave Technology) **by Albert A. Smith (Hardcover - Jun 1, 1998)**
- 25 Radio System Design for Telecommunications (Wiley Series in Telecommunications and Signal Processing) **by Roger L. Freeman (Hardcover - April 1997)**
- 26 Baseband Analog Circuits for Software Defined Radio (Analog Circuits and Signal Processing) **by Vito Giannini, Jan Craninckx, and Andrea Baschirotto (Hardcover - Oct 1, 2007)**
- 27 Radio Circuits and Signals **by I. S. Gonorovsky (Hardcover - Nov 1982)**
- 28 Recording Studio Technology, Maintenance, and Repairs : Everything You Need to Properly Care for Your Equipment **by Tom McCartney (Paperback - Sep 11, 2003)**
- 29 Auto Audio/Choosing, Installing & Maintaining Car Stereo Systems: Selection Assembly Installation Maintenance Repair **by Andrew R. Yoder (Paperback - Feb 1995)**
- 30 Electrical Power Equipment Maintenance and Testing (Power Engineering, 4) **by Paul Gill**
- 31 Electronic Servicing and Repairs **by Trevor Linsley (Paperback - Sep 4, 2000)**
- 32 Simple Workshop Devices (Workshop Practice Series) **by Tubal Cain (Paperback - Jul 1998)**
- 33 Testing Computer Telephony Systems and Networks **by Steve Gladstone (Paperback - Feb 1, 1996)**
- 34 Model Engineers' Workshop Projects (Workshop Practice S) **by Harold Hall (Paperback - April 30, 2007)**
- 35 Workshop Processes, Practices and Materials, Third Edition **by Bruce J Black (Paperback - Jun 15, 2004)**
- 36 Communication Systems: Fundamentals and Design Methods **by Nevio Benvenuto, Roberto Corvaja, Tomaso Erseghe, and Nicola Laurenti (Hardcover - Dec 26, 2006)**
- 37 Pulse Code Modulation Systems Design (Artech House Telecommunications Library) **by William N. Waggener (Hardcover - Dec 1998)**
- 38 Digital Communications **by John G. Proakis (Paperback - Dec 1, 2000)**
- 39 Digital Communications: Fundamentals and Applications (2nd Edition) **by Bernard Sklar (Hardcover - Jan 11, 2001)**
- 40 An Introduction to Digital and Analog Communications **by Simon Haykin and Michael Moher (Hardcover - Jan 30, 2006)**
- 41 Modern Digital and Analog Communication Systems (The Oxford Series in Electrical and Computer Engineering) **by B. P. Lathi (Hardcover - Mar 11, 1998)**
- 42 Digital Communications **by Ian A. Glover and Peter M. Grant (Paperback - Dec 2003)**
- 43 Principles Digital Communication System & Computer Networks (Electrical and Computer Engineering Series) **by K V Prasad (Paperback - Feb 2004)**
- 44 Measurement and Instrumentation Principles, Third Edition **by Alan S Morris (Paperback - Mar 27, 2001)**
- 45 Introduction to Instrumentation and Measurements, Second Edition **by Robert B. Northrop (Hardcover - Jun 28, 2005)**
- 46 Instrumentation for Process Measurement and Control, Third Edition **by Norman A. Anderson (Hardcover - Oct 22, 1997)**

- 47 [Instrumentation for Engineering Measurements](#) by **James W. Dally, William F. Riley, and Kenneth G. McConnell** (Hardcover - **Feb 11, 1993**)
- 48 [Electronic Instrumentation and Measurement](#) by **David M. Buchla and McLachlan** (Paperback - **Aug 7, 1996**) – Facsimile
- 49 [Fundamentals of Test Measurement Instrumentation](#) by **Keith R. Cheate** (Paperback - **Mar 24, 2006**)
- 50 [Principles of Electronic Instrumentation and Measurement](#) (Merrill's international series in electrical and electronics technology) by **Howard M. Berlin and Frank C. Getz** (Hardcover - **Jan 1988**)
- 51 [Theory of Electromagnetic Wave Propagation](#) (Dover Books on Physics and Chemistry) by **Charles Herach Papas** (Paperback - **Oct 1988**)
- 52 [Mathematics of Wave Propagation](#) by **Julian L. Davis** (Hardcover - **April 17, 2000**)
- 53 [Wave Propagation: Scattering and Emission in Complex Media](#) by **Ya-Qiu Jin** (Hardcover - **April 30, 2005**)
- 54 [Antennas and Wave Propagation](#) by **A. R. Harish and M. Sachidananda** (Paperback - **Aug 3, 2007**)
- 55 [Wave Propagation and Group Velocity](#) (Pure & Applied Physics) by **Leon Brillouin** (Hardcover - **Jun 1960**)
- 56 [Electromagnetic Wave Propagation, Radiation, and Scattering](#) by **Akira Ishimaru** (Paperback - **Jun 10, 1996**) – Facsimile
- 57 [The Propagation of Radio Waves: The Theory of Radio Waves of Low Power in the Ionosphere and Magnetosphere](#) by **K. G. Budden** (Paperback - **Aug 26, 1988**)
- 58 [Electromagnetic Wave Propagation Through Rain](#) by **Robert K. Crane** (Hardcover - **Feb 8, 1996**)
- 59 [Propagation of Radiowaves](#) (Electromagnetic Waves) by **Les W. Barclay** (Hardcover - **Dec 2002**)
- 60 [Digital Telephony](#) (Wiley Series in Telecommunications and Signal Processing) by **John C. Bellamy** (Hardcover - **Feb 7, 2000**)
- 61 [Telecommunications Protocols](#) by **Travis Russell** (Paperback - **Aug 19, 1999**)
- 62 [Computer Telephony Integration](#) (Artech House Telecommunications Library) by **Rob Walters** (Hardcover - **Jan 1999**)
- 63 [PBX Systems for IP Telephony](#) by **Allan Sulkin** (Paperback - **April 24, 2002**)
- 64 [Digital Switching Systems: System Reliability and Analysis](#) by **Syed Riffat Ali** (Hardcover - **Aug 1, 1997**)
- 65 [Digital Telephony and Network Integration](#) by **Bernard E. Keiser and Eugene Strange** (Hardcover - **Jan 1995**)
- 66 [Telephone Switching Systems](#) by **Richard A. Thompson** (Hardcover - **Jun 2000**)

- 67 Digital Systems Engineering **by William J. Dally and John W. Poulton** (Hardcover - **Jun 28, 1998**)
- 68 Integrated Electronics: Analog and Digital Circuits and Systems (McGraw-Hill electrical and electronic engineering series) **by Jacob Millman and Christos C. Halkias** (Hardcover - **Jun 1972**)
- 69 Schaum's Outline of Introduction to Digital Systems **by James E. Palmer and David Perlman** (Paperback - **Jan 1, 1993**)
- 70 Synthesis of Arithmetic Circuits: FPGA, ASIC and Embedded Systems **by Jean-Pierre Deschamps, Gery J.A. Bioul, and Gustavo D. Sutter** (Hardcover - **Mar 10, 2006**)
- 71 Analysis and Design of Digital Integrated Circuits **by David A. Hodges** (Hardcover - **Jul 18, 2003**)
- 72 Digital Circuits and Systems **by Douglas V. Hall** (Hardcover - **April 1989**)
- 73 Experiments. for Digital Circuits & Systems **by Douglas V. Hall** (Paperback - **Aug 1, 1989**)
- 74 Microwave Radio Links: From Theory to Design (Wiley Series in Telecommunications and Signal Processing) **by Carlos Salema** (Hardcover - **Dec 5, 2002**)
- 75 Advanced Satellite Communications: Potential Markets (Advanced Computing and Telecommunications Series) **by David Roberts, Leroy Schubert, Steven Adamson, and Brian Smith** (Hardcover - **Feb 1995**)
- 76 Antenna Theory: Analysis and Design, 2nd Edition **by Constantine A. Balanis** (Hardcover - **May 29, 1996**)
- 77 Antenna Theory and Design, 2nd Edition **by Warren L. Stutzman and Gary A. Thiele** (Hardcover - **Dec 15, 1997**)
- 78 Satellite Communications Systems: Systems, Techniques and Technology **by Gérard Maral and Michel Bousquet** (Hardcover - **May 2002**)
- 79 Satellite Communications, Fourth Edition (Professional Engineering) **by Dennis Roddy** (Hardcover - **Jan 20, 2006**)
- 80 Antennas and Wave Propagation **by A. R. Harish and M. Sachidananda** (Paperback - **Aug 3, 2007**)
- 81 Satellite Television, Analogue and Digital Reception Techniques **by Herve Benoit** (Paperback - **Jul 2, 1999**)
- 82 Fundamentals of Digital Television Transmission **by Gerald W. Collins** (Hardcover - **Oct 26, 2000**)
- 83 Television Receivers: Digital Video for DTV, Cable, and Satellite **by Jerry Whitaker** (Hardcover - **Jul 27, 2001**)
- 84 Digital Video Broadcasting : The International Standard for Digital Television **by Ulrich Reimers, F. Fechter, D. Jaeger, and C. Johansen** (Hardcover - **Mar 11, 2004**)
- 85 Digital Techniques in Broadcasting Transmission, Second Edition **by Robin Blair** (Paperback - **April 2, 2002**)
- 86 Performance Analysis of Telecommunications and Local Area Networks (The Springer International Series in Engineering and Computer Science) **by Wah Chun Chan** (Hardcover - **Feb 15, 2000**)
- 87 Telecommunications Internetworking: Delivering Services Across the Networks **by P. J. Louis** (Paperback - **Mar 29, 2000**)
- 88 The Cable and Telecommunications Professionals' Reference, Volume 1, Third Edition: PSTN, IP and Cellular Networks, and Mathematical Techniques **by Goff Hill** (Paperback - **Mar 9, 2007**)
- 89 Data Communications and Networking (McGraw-Hill Forouzan Networking) **by Behrouz A. Forouzan** (Hardcover - **Jan 2007**)
- 90 Data Communications Networking **by Behrouz Forouzan** (Paperback - **May 1, 2006**)

- 91 [Networking: A Beginner's Guide, Fourth Edition](#) by **Bruce Hallberg** (Paperback - **Aug 24, 2005**)
- 92 [Guide to Networking Essentials](#) by **Greg Tomsho** (Paperback - **Jun 21, 2006**)
- 93 [Mobile Communications Design Fundamentals \(Wiley Series in Telecommunications and Signal Processing\)](#) by **William C. Y. Lee** (Hardcover - **Jan 1993**)
- 94 [Wireless Information Networks \(Wiley Series in Telecommunications and Signal Processing\)](#) by **Kaveh Pahlavan and Allen H. Levesque** (Hardcover - **Sep 26, 2005**)
- 95 [Introduction to Digital Mobile Communication \(Wiley Series in Telecommunications and Signal Processing\)](#) by **Yoshihiko Akaiwa** (Hardcover - **Jan 15, 1997**)
- 96 [Signal Processing Applications in Cdma Communications \(Artech House Mobile Communications Series\)](#) by **Hui Liu** (Hardcover - **Feb 2000**)
- 97 [Third Generation Wireless Communications, Volume 1: Post Shannon Signal Architectures](#) by **George Calhoun** (Hardcover - **Jan 1, 2003**)
- 98 [CAMEL: Intelligent Networks for the GSM, GPRS and UMTS Network](#) by **Rogier Noldus** (Hardcover - **April 28, 2006**)
- 99 [Optical Telecommunications Networks: Fundamentals and Applications](#) by **Jose Capmany, Daniel Pastor, Beatriz Ortega, and Salvador Sales** (Hardcover - **Dec 2003**)
- 100 [Fundamentals of Fibre Optics in Telecommunication and Sensor Systems](#) by **Bishnu P. Pal** (Hardcover - **April 1993**)
- 101 [Optical Communications \(Wiley Series in Telecommunications and Signal Processing\)](#) by **Robert M. Gagliardi and Sherman Karp** (Hardcover - **Feb 20, 1995**)
- 102 [Fiber-Optic Communication Systems \(Wiley Series in Microwave and Optical Engineering\)](#) by **G. P. Agrawal and Govind P. Agrawal** (Hardcover - **Aug 1997**)
- 103 [Fibre Optic Communication Devices](#) by **Norbert Grote and Herbert Venghaus** (Hardcover - **Feb 23, 2001**)
- 104 [Optical Fibre Devices \(Optics and Optoelectronics Series\)](#) by **J.P Goure and I Verrier** (Paperback - **Dec 15, 2001**)
- 105 [Telecommunications: Equipment Fundamentals and Network Structures](#) by **Vincent Coughlin** (Hardcover - **Sep 1984**)
- 106 [Troubleshooting Communications Facilities: Measurements and Tests on Data and Telecommunications Circuits, Equipment, and Systems](#) by **Bertil C. Lindberg** (Hardcover - **Mar 2, 1990**)
- 107 [The Telecommunications Handbook](#) by **Kornel Terplan and Patricia Morreale** (Hardcover - **Dec 28, 1999**)
- 108 [Electronic Classics: Collecting, Restoring and Repair](#) by **Andrew Emmerson** (Paperback - **Sep 14, 1998**)
- 109 [The Complete PC Upgrade and Maintenance Guide, 16th Edition](#) by **Mark Minasi, Faithe Wempen, and Quentin Docter** (Paperback - **Jul 27, 2005**)
- 110 [Telephone Repair Illustrated](#) by **Stephen J. Bigelow** (Hardcover - **April 1, 1993**)
- 111 [The Fundamental Role of Teletraffic in the Evolution of Telecommunications Networks: Proceedings \(Teletraffic Science and Engineering, Vol 1\)](#) by **Jacques Labetoulle and James W. Roberts** (Hardcover - **April 1, 1994**)
- 112 [Teletraffic Contributions for the Information Age \(Teletraffic Science and Engineering\)](#) by **V. Ramaswami and P.E. Wirth** (Hardcover - **Jun 5, 1997**)

- 113 Voice Teletraffic Systems Engineering (Artech House Telecommunications Library) by **James R. Boucher** (Hardcover - **Sep 1, 1988**)
- 114 Intro to Teletraffic Engineering by **Ramses Mina** (Paperback - **Jun 1985**)
- 115 A Practical Guide to Teletraffic Engineering and Administration by **Robert W. Lawson** (Paperback - **Jun 1983**)
- 116 Fundamentals of Telecommunications Network Management by **Lakshmi G. Raman** (Hardcover - **Mar 10, 1999**)
- 117 Planning Telecommunication Networks by **Thomas G. Robertazzi** (Hardcover - **Dec 1, 1998**)
- 118 Modeling and Analysis of Telecommunications Networks by **Jeremiah F. Hayes and Thimma V. J. Ganesh Babu** (Hardcover - **Feb 23, 2004**)
- 119 Telecommunication Circuit Design by **Patrick D. van der Puije** (Hardcover - **Dec 7, 2001**)

COMPUTER TECHNOLOGY COURSES

1. Title: Advance Microprocessors Architecture
Author: L. Gmmiera & A. Valenzane
Publisher: Addison Wesley

2. Title: Microprocessors Systems 16-bit Approach
Author: W.J. Eccles
Publisher: Addison Wesley

3. Title: Control Applications of Microcomputers
Author: P.M. Mitchel
Publisher: Edward Arnold

4. Title: Microprocessors System Design Technique
Author: R. Barnett
Publisher: Wiley

5. Title: Base Principles and Practices of Microprocessors

Author: D.E. Heffer/G.A. King/D.C. Keith

Publisher: Hodder Stoughton

6. Title: Pulse Digital and Switching Waveforms

Author: Millman and Taub

Publisher: Addison Wesley

ELECTRICAL /ELECTRONICS ENGINEERING

1. Digital Integrated Electronics – Taub & Schilling

2. Introduction to Digital Computer Technology-Mashelsky

3. Microwave Transmission-J.A. Staniforth.

4. Circuit Devices and Systems-Smith

5. Advanced Electrical Engineering-Morton

6. Problems in Electrical Circuit theory-R.G. Meadows

7. Networks Analysis and synthesis –KUO

8. Higher Electrical Engineering-Shepherd, Morton, Spence.

9. Networks-By F.R. Connor

10. Circuit Theory-Vol 1 & 2

11. Electrical Technology –E. Hughes

NID TELECOMUNICATION TECHNOLOGY

Guidelines for textbook writers

The following guidelines are suggestions from the Engineering Committees to the writers of the textbooks for the new curricula. They are intended to supplement the detailed syllabuses which have been produced, and which define the content and level of the courses.

Authors should bear in mind that the curriculum has been designed to give the students a broad understanding of applications in industry and commerce, and this is reflected in the curriculum objectives.

- One book should be produced for each syllabus
- Page size should be A4
- The front size should be 12 point for normal text and 14 point where emphasis is needed
- Line spacing should be set to 1.5 lines
- Headings and subheadings should be emboldened
- Photographs, diagrams and charts should be used extensively throughout the book, and these items must be up-to-date
- In all cases, the material must be related to industry and commerce, using real life examples wherever possible so that the book is not just a theory book. It must help the students to see the subject in the context of the ‘real world’
- The philosophy of the courses is one of an integrated approach to theory and practice, and as such, the books should reflect this by not making an artificial divide between theory and practice.
- Illustrations should be labeled and numbered.
- Examples should be drawn from Nigeria wherever possible, so that the information is set in a country context.
- Each chapter should end with student self-assessment questions (SAG) so that students can check their own master of the subject

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- Accurate instructions should be given for any practical work having first conducted the practical to check that the instructions do indeed work
- The books must have a proper index or table of contents, a list of references and an introduction based on the overall course philosophy and aims of the syllabus.
- Symbols and units must be listed and a unified approach used throughout the book
- In case of queries regarding the contents of the books and the depth of information, the author must contact the relevant curriculum committee via the National Board for Technical Education
- The final draft version of the books should be submitted to Nigerian members of the curriculum working groups for their comments regarding the content in relation to the desired syllabus.

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