

NATIONAL BOARD FOR TECHNICAL EDUCATION

NATIONAL TECHNICAL CERTIFICATE

AND

ADVANCED NATIONAL TECHNICAL CERTIFICATE

DRAFT CURRICULUM AND MODULE SPECIFICATIONS

IN

DRAFT SMANSHIP CRAFT PRACTICE

2008

GENERAL INFORMATION

AIM:

To give training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant.

ENTRY QUALIFICATIONS

CRAFT PROGRAMME

Candidates must not be less than 14 years of age and should have successfully completed three years of junior secondary education or its equivalent. Special consideration may be given to sponsored candidates with lower academic qualifications who hold trade test certificates and are capable of benefiting from the programme.

ADVANCED CRAFT PROGRAMME

Candidates should possess the National Technical Certificate or its equivalent and should have had a minimum of two years post qualification cognate industrial experience.

THE CURRICULUM

The Curriculum of each programme is broadly divided into three components:

- a General Education, which accounts for 30% of the total hours required for the programme
- b Trade Theory, Trade Practice and Related Studies which account for 65% and
- c Supervised Industrial Training/Work Experience, which accounts for about 5% of the total hours required for the programme. This component of the course which may be taken in industry or in college production unit is compulsory for the full-time students

Included in the curriculum, for the guidance of the teacher are the teacher's activity and learning resources required.

Unit Course/Module

A Course/Module is defined as a body of knowledge and skills capable of being utilized on its own or as a foundation or pre-requisite knowledge for more advanced work in the same or other fields of study. Each trade when successfully completed can be used for employment purposes.

BEHAVIOURAL OBJECTIVES

These are educational objectives which identify precisely the type of behaviour a student should exhibit at the end of a course/module or programme. Two types of behavioural objectives have been used in the curriculum. They are:

- a General Objectives
- b Specific learning outcomes

General Objectives are concise but general statements of the behaviour of the students on completion of a unit of work such as understanding the principles and application.

- a Orthographic projection in engineering/technical drawing
- b Loci in Mathematics
- c Basic concepts of politics and government in Political Science
- d Demand and Supply in Economics

Specific Learning outcomes are concise statements of the specific behaviour expressed in units of discrete practical tasks and related knowledge the students should demonstrate as a result of the educational process to ascertain that the general objectives or course/programme have been achieved. They are more discrete and quantitative expressions of the scope of the tasks contained in a teaching unit.

GENERAL EDUCATION IN TECHNICAL COLLEGES

The General Education component of the curriculum aims at providing the trainee with complete secondary education in critical subjects like English Language, Economics, Physics, Chemistry, Biology, Entrepreneurial Studies and Mathematics to enhance the understanding of machines, tools and materials of their trades and their application and as a foundation for post-secondary technical education for the above average trainee. Hence, it is hoped that trainees who successfully complete their trade and general education may be able to compete with their secondary school counterparts for direct entry into the polytechnics or colleges of education (Technical) for ND or NCE courses respectively. The Social Studies component is designed to broaden the trainee's social skills and his understanding his environment.

For purpose of certification, only the first three courses in Mathematics will be required. The remaining modules are optional and are designed for the above average students.

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National Certificate

The NTC and ANTC programmes are run by Technical Colleges accredited by NBTE
NABTEB conducts the final national examination and awards certificates to successful candidate.

Trainees who successfully complete all the courses/modules specified in the curriculum table and passed the national examinations in the trade will be awarded one of the following certificates

S/NO	LEVEL	CERTIFICATE
	Technical Programme	
1	Craft Level	National Technical Certificate
2	Advanced Craft Level	Advanced National Technical Certificate

Guidance Notes for Teachers Teaching the Curriculum

The number of hours stated in the curriculum table may be increased or decreased to suit individual institution's timetable provided the entire course content is properly covered and the goals and objectives of each module are achieved at the end of the term.

The maximum duration of any module in the new scheme is 300 hours. This means that for a term of 15 weeks, the course should be offered for 20 hours a week. This can be scheduled in sessions of 4 hours in a day leaving the remaining hours for general

education. However, (properly organised and if there are adequate resources), most of these courses can be offered in two sessions a day, one in the morning and the other one in the afternoon. In so doing, some of these programmes may be completed in lesser number of years than at present.

Each session of 4 hours include the trade theory and practice. It is left for the teacher to decide where the class should be held, in the workshop or in a lecture room.

INTEGRATED APPROACH IN THE TEACHING OF TRADE.

Theory, Trade Science and Trade Calculation

The traditional approach of teaching trade science and trade calculation as separate and distinct subjects in technical college programmes is not relevant to the new programme as it will amount to a duplication of the teaching of mathematics and the physical science subjects in the course. The basic concepts and principles in mathematics and physical science are the same as in the trade calculation and trade science. In the new scheme therefore, mathematics and the physical science will be taught by qualified persons in these fields and the instructors will apply the principles and concepts in solving trade science and calculation problems in the trade theory classes. To this end, efforts have to be made to ensure that mathematics and science modules required to be able to solve technical problems were taken as pre-requisite to the trade module.

Evaluation of Programme/Module

For the programme to achieve its objectives, any course started at the beginning of a term must terminate at the end of the term.

Instructors should therefore device methods of accurately assessing the trainees to enable them give the student's final grades at the end of the term. A national examination will be taken by all students who have successfully completed their modules. The final award will be based on the aggregate of the scores attained in course work and the national examination.

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CURRICULUM TABLE AND COURSE HOURS/WEEK

Module Code	MODULE	YEAR I						YEAR 2						YEAR 3						TOTAL HOURS		
		Term 1		Term 2		Term 3		<i>Term 1</i>		Term 2		Term3		Term 1		Term 2		Term 3				
		T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P			
CMA 12-15	MATHEMATICS	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	216
CEN 11-17	ENGLISH	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	216
CPH 10-12	PHYSIC	2	-	2	-	2	-	2	1	2	1	2	1	2	1	2	1	2	1	2	1	288
CCH11-12	CHEMISTRY	2	-	2	-	2	-	2	1	2	1	2	1	2	1	2	1	2	1	2	1	288
CEC 11-13	ECONOMICS	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	216
ICT 11-15	COMPUTER	-	-	-	-	-	-	1	2	1	2	1	2	1	2	1	2	-	-	-	-	180
CRD 11-13	TECH.DRAWING	-	3	-	3	-	3	-	3	-	3	-	3	-	2	-	2	-	2	-	2	288
CBM 11	ENTERPRENUESHIP	-	-	-	-	-	-	2	-	2	-	2	-	-	-	-	-	-	-	-	-	72
CAD 11	Free hand sketching	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36

CAD 12	Architectural Drawing 1	-	-	1	2			-	-	-	-	-	-	-	-	-	-	-	-	72
CAD 12	Architectural Drawing 2					1	2													
CAD 13	Delineation							1	2											36
CAD 14	Mechanical Service Draughts man ship									1	2									36
CAD 15	Electrical/Electronics											1	2							36
	TOTAL	20	-	20	8	18	3	23	11	20	10	21	10	19	9	19	9	18	7	3092

CURRICULUM TABLE AND COURSE HOURS/WEEK

PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE

Module Code	MODULE	YEAR I						TOTAL HOURS
		Term 1		Term 2		Term 3		
Module Code	MODULE	T	P	T	P	T	P	TOTAL HOURS
	MATHEMATICS	3	-	3	-	2	-	108
	ENGLISH LANGUAGE	1	-	1	-	1	-	36
	ECONOMIC	2	-	2	-	2	-	72
	ENTERPRENUESHIP	2	-	2	-	2	-	72
	AUTO CAD I	1	2	-	-	-	-	36
	AUTO CAD II	-	-	1	2	-	-	36
21	Advanced Architectural Drawing		3					36
CSD 21	ADVANCED STRUCTURAL DETAILING		-		3		-	36
CSD 23	ENGINEERING SERVICES DRAWINGS AND DETAILING						3	36
	TOTAL	24	14	24	14	22	12	1656

PROGRAMME: National Technical Certificate in Draughtsman ship Craft Practice

MODULE: FREEHAND SKETCHING

COURSE CODE: CAD 11

DURATION: 36 Hours

PRE-REQUISITE: NONE

GOAL: This module is intended to develop in the student the flare for artistic representations.

General Objectives

On completion of this module, the trainee should be able to:

- 1.0 Know the basic materials and tools used in freehand sketching for artistic productions
- 2.0 Understand simple pencil sketching
- 3.0 Understand the principles of shadow casting and shading in sketching
- 4.0 Understand simple pen and ink sketching
- 5.0 Know colours and colour schemes
- 6.0 Understand simple still life and abstract sketching

PROGRAMME: National Technical Certificate in Draughtsman ship			
Module: Freehand Sketching		Course Code: CAD 11	Contact Hours: 60Hrs
Course Specification: Theoretical/Practical Content			
WEEK	General Objective 1.0: Know the basic materials and tools used in freehand sketching for artistic productions		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the trainee should be able to:</p> <p>1.1 Explain the role of art in communication</p> <p>1.2 Explain the relationship between fine art and Architecture.</p> <p>1.3 Enumerate the basic tools used in graphic arts and their functions.</p> <p>1.4 List the various materials used in graphic arts.</p> <p>1.5 Illustrate how the materials in 1.3 above are used for graphical productions.</p> <p>1.6 Maintain the tools enumerated in 1.3 above.</p>	<p>Distinguish between fine art and architecture.</p> <p>Show each tool and explain its function.</p> <p>Enumerate materials used in graphic arts.</p> <p>Use the above materials to produce graphical arts.</p> <p>Show step-by-step how to maintain tools used in graphic arts.</p>	<p>Charts</p> <p>Real Objects</p> <p>Tools</p>

General Objective 2.0: Understand simple pencil sketching		
<p>2.1 State the various grades of pencils and factors affecting their choice for sketching.</p> <p>2.2 Set up a drawing board.</p> <p>2.3 Sketch various planer shapes, e.g. rectangles, circles, triangles, ellipses, etc</p> <p>2.4 Sketch three – dimensional shapes, e.g. cones, Cylinders, prisms, spheres, hyperboloids, paraboloids, polyhedral, geodesic domes, hyperbolic paraboloid, etc using line drawings.</p> <p>2.5 Express the shapes sketched in 2.4 above using pencil tonal effects.</p>	<p>Show various types of pencils</p> <p>Demonstrate how to set up a drawing board</p> <p>Show objects of various shapes e.g. rectangle circles etc.</p> <p>Show objects of three dimensional shapes.</p>	<p>Various periods</p> <p>Drawing Boards</p> <p>Various objects</p>
General Objective 3.0: Understand the principles of shadow casting & shading in sketching		
<p>3.1 Explain the principles of shadow casting.</p> <p>3.2 Enumerate the various tonal effects used in graphical productions.</p> <p>3.3 Illustrate the tonal effects in 3.1 above.</p> <p>3.4 Use the cross-hatching techniques to produce the objects in 2.4 above</p> <p>3.5 Apply pointillism technique to produce the objects in 2.4 above.</p>	<p>Explain tonal effects used in graphical productions.</p>	

General Objective 4.0: Know simple pen and ink sketching		
<p>4.1 State the various types and grades of pens used for sketching and the factors affecting their choice.</p> <p>4.2 Sketch two and three dimensional shapes using pens and ink line methods.</p> <p>4.3 Express the shapes in 4.2 above using the following methods:</p> <p>a. cross – hatching technique</p> <p>b. pointillism technique</p>	<p>Show various grades of pens used for sketching.</p> <p>Demonstrate methods cross – hatching & pointillism techniques.</p>	<p>Various pens</p>
General Objective 5.0: Know colours and colour schemes		
<p>5.1 Explain the structure of light</p> <p>5.2 Describe the principle of visible colour of an in relation to the reflection, refraction, and absorption properties of light.</p> <p>5.3 Identify the various colours in use.</p> <p>5.4 Illustrate the colour wheel.</p> <p>5.5 Illustrate the principles of contrast and harmony in the use of colour.</p> <p>Explain the importance of colours and their symbolism in design.</p> <p>5.6 State the various media for colour productions in graphical works.</p> <p>5.7 Use the colours in 5.7 above on the shapes in 4.2 above, e.g. water colour, poster colour, oil paint, crayons, coloured pencils, colour films etc.</p> <p>5.8 Use the colours in 5.7 above on the shapes in 4.2 above, e.g. water colour, poster colour oil paint. crayons, coloured pencils, coloured films etc.</p> <p>Interpose various colours to attain certain effects using the media in 5.7 above.</p>	<p>Explain various media for colour production in graphical works.</p> <p>Mix various colours to obtain certain effects</p>	<p>Various pens</p> <p>Charts water colour, poster colour crayons charts showing colour wheel</p>

General Objective 6.0: Understand simple still life and abstract sketching		
<p>6.1 Observe given geometrical objects from a given point, e.g. cylinder, cones, cuboids, hemispheres, prisms, paraboloids etc.</p> <p>6.2 Produce line sketches of the observed objects in their given combinations.</p> <p>6.3 Apply tonal effects both monochromatically and multi chromatically to the sketches in 6.2 above showing shades and shadows.</p> <p>6.4 Produce monochromatic and multi-chromatic sketches of given still life objects, e.g. trees, buildings, animals, street scenes, human beings, etc.</p> <p>6.5 Produce from imaginative thinking monochromatic and multi-chromatic sketches, e.g. market place, shopping centre, conference sessions, street scene motor park, luxury park, office complex etc.</p> <p>6.6 Produce monochromatic and multi-chromatic and multi-chromatic abstract design combining various geometrical shapes.</p>	<p>Show various objects from different points e.g. cones, cylinder, cuboidrate.</p> <p>Sketch the objects showing shades & show real objects: trees, buildings, animals etc sketch the real objects.</p>	<p>Various shapes: cylinder, cones e.t.c.</p> <p>Objects such as tree, etc charts.</p>

PROGRAMME: National Technical Certificate in Draughtsman ship Craft Practice

MODULE: ARCHITECTURAL DRAWING 1

DURATION: 36 Hours

PRE-REQUISITE: CTD 11 – TECHNICAL DRAWING

GOAL: This module is intended to give the students the skill to produce well laid out basic Architectural Drawings.

General Objectives

On completion of this module, the students should be able to:

- 1.0 Know the equipment and materials required for architectural draughting.
- 2.0 Know how drawings are reproduced.
- 3.0 Understand how to present drawings and code them.
- 4.0 Know the graphical symbols, conventional signs and lettering styles used for architectural drawings.
- 5.0 Understand the difference between presentation drawings and working drawings.
- 6.0 Understand how to trace given drawings
- 7.0 Know how to redraw given drawings
- 8.0 Know the elements of the Sign.
- 9.0 Understand the general space requirements for different functions in residential buildings.
- 10.0 Know the Historical development relevance, types advantages A the application of the various computers in the design process.
- 11.0 Give the students the basic skills needed to use Corel draw software package to produce drawings.

PROGRAMME: NTC IN DRAUGHTSMANSHIP			
Module: Architectural Drawing 1		Course Code: CAD 12	Contact Hours: 180Hrs
Course Specification:			
WEEK	General Objective 1.0: Know the equipment and materials required for architectural drawing.		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 1.1 Enumerate the tools and equipment used in Architectural Drawing productions. 1.2 List the various materials and graphical aids used in Architectural Drawing. 1.3 Illustrate how the materials in 1.2 above are used for Architectural Drawing productions. 1.4 Maintain the tools and equipment enumerated in 1.1 above.	List various tools and equipment used in Arch. Drawing Demonstrate the used of theses tools and materials. Discuss how to maintain the tools equipment.	Various tools equipment Graphs, Charts
General Objective 2.0: Know how drawings are reproduced.			
	2.1 Enumerate the various equipment used in graphical reproduction, eg printing machine, scanning machine, etc. 2.2 Use the equipment in 2.1 above. 2.3 Maintain the equipment in 2.1 above.	List the equipment used in graphical reproduction. Demonstrated the – use of such equipment show how to maintain the equipment.	Various graphical equipment e.g. printing machine
General Objective 3.0: Understand how to present drawings and code them.			
	3.1 Explain the various systems of coding drawings. 3.2 Illustrate how to layout drawings and present them		

General Objectives 4.0: Know the graphical symbols, conventional signs and lettering styles used for architectural drawings.		
<p>4.1 Illustrate the various types of lines</p> <p>4.2 Explain the principles behind choice of pen points for use in drawing.</p> <p>4.3 Illustrate the graphical symbols and conventional signs used in architectural drawing.</p> <p>4.4 State the specification notes used in annotating drawing.</p> <p>4.5 Illustrate the various styles of lettering used in architectural drawing.</p> <p>4.6 Illustrate personal lettering technique.</p> <p>4.7 Illustrate stencil given drawings.</p>	<p>Draw different types of lines</p> <p>Draw various styles of lettering</p>	<p>Different pens charts Drawing papers</p>
General Objectives 5.0: Illustrate the difference between presentation drawings and working drawings		
<p>5.1 State the two different categories of architectural drawings.</p> <p>5.2 Explain the difference between presentation and working drawings.</p> <p>5.3 State the purposes of the two categories of drawings.</p>	<p>Show different architectural drawings.</p> <p>Enumerate purpose of two categories of drawing s.</p>	<p>Charts pictures</p>
General Objectives 6.0: Understand how to trace given drawings.		
<p>6.1 Choose pens and pen points for tracing a given drawing.</p> <p>6.2 Explain the underlining principles in tracing.</p> <p>6.3 Retrace in ink a given set of working drawings using the appropriate drawings.</p> <p>6.4 Stencil the retraced set of drawings.</p>	<p>Explain the right device of pens and pen points.</p> <p>Show how to retrace a given set of working draining.</p>	<p>Tracing paper pens</p>

General Objective 7.0: Know how to redraw given drawings.			
	<p>7.1 Choose the appropriate grade of pencil for drawing Choose the appropriate scales for drawing.</p> <p>7.2 Draft the plan of a given design using a given set of drawings as a guide.</p> <p>7.3 Project the elevations and sections.</p> <p>7.4 Draft the doors and windows schedules, Finishing</p> <p>7.5 Drawings, Sanitary Drawings, and Site Plan.</p> <p>7.6 Trace in ink the drawings drafted in 7.3, 7.4 and 7.5 above.</p> <p>7.7 Stencil and annotate the traced drawings.</p> <p>7.8 Code the finished drawings in the conventional orders.</p>	<p>Explain the device of appropriate grade of pencil and scales for drawing.</p> <p>Draw plan, device and sections.</p> <p>Show sanitary drawing and site plan.</p>	<p>Types of pencils</p> <p>Charts</p>
General Objective 8.0: Know the elements of Design.			
	<p>On completion of this module, the trainee should be able to:</p> <p>8.1 Explain the composition of forms, rhythm, balance, texture.</p> <p>8.2 Use colour and contrast, scale and dimension.</p> <p>8.3 Apply proportion as an element of design.</p>	<p>Demonstrate on how to use colour and contrast, scale * & dimension.</p>	<p>Various colour Charts</p>
General Objective 9.0: Understand the general space requirements for different functions in residential building.			

9.1 Work out the spaces needed for human movement.	Show how the spaces could be worked out. -Demonstrate the arrangement of furniture.	Charts Plan of a given building
9.2 Arrange furniture, fixtures, equipment of common usage in a residential building.		
9.3 Design kitchen, toilet, living room, etc as a unit.		

PROGRAMME: NTC IN DRAUGHTSMANSHIP			
Module: Architectural Drawing 1		Course Code: CAD 15	Contact Hours: 120Hrs
Course Specification:			
WEEK 1 & 2	General Objective 10.0: Know the Historical development relevance, types advantages A the application of the various computers in the design process.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 10.1 Understand the History, development, relevance, types advantages of the application of various computer softwares e.g. Apple, MS-Dos, AutoCAD, Archicad, power point, power draw, corel draw etc. 10.2 Applications of the various softwares in 1.1 above briefly.	Gives historical Development, types, advantages various soft waves listed in 1.1	<ul style="list-style-type: none"> - Computer system - Magic board - Corel draw packages
	General Objective 11.0: Give the students the basic skills needed to use Corel draw software package to produce drawings.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the should be able to: 11.1 Understand the principles operations, capabilities and system requirements for cord draw package. 11.2 Know how to draw a simple building or	Explain Corel draw screen loading & Quilting Demonstrate and perform shaping and Zooming, use of	

	<p>machine using the Corel draw from greetings title to shutdown</p>	<p>Demonstrate and perform shaping and zooming, use of furring tools. Demonstrate and perform object arrangement, sketching, scaling, mirroring, rotating, skewing etc. Demonstrate sang and printing Old awing in Corel draw.</p>	<p>- do -</p>
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PROGRAMME: National Technical Certificate in Draughtsman ship Craft Practice

MODULE: ARCHITECTURAL DRAWING 11

DURATION: 36 Hours

PRE-REQUISITE: CAD 13

GOAL: The module is intended to give the students the ability to produce complete set of working drawings in the architect's sketch design with minimum assistance.

General Objectives

On the completion of this module, the should be able to:

- 1.0 Know the procedure for development and programming for full-scale drawing.
- 2.0 Analyze human activities and circulation for a simple design.
- 3.0 Understand the heraldry of the various spaces in residential buildings.
- 4.0 Understand the principle of modular coordination.
- 5.0 Know schedules
- 6.0 Know the operating Building laws, Bye-Laws and Regulations.
- 7.0 Know the Conventions & symbols of Services Elements in Building.
- 8.0 Know the Importance of service Drawings
- 9.0 Understand basic pipe and duct draughting.
- 10.0 Understand the production of electrical fittings and installations in building drawings.
- 11.0 Understand Telecommunication Symbols.

PROGRAMME: NTC IN DRAUGHTSMAN SHIP			
Module: ARCHITECTURAL DRAWING 11		Course Code: CAD 13	Contact Hours:36hr
Course Specification:			
WEEK 1 & 2	General Objective 1.0: Know the procedure for development and programming for full scale drawing.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the should be able to: 1.1 Read and interpret a given preliminary sketch design. 1.2 Determine all the various types of working drawing necessary. 1.3 Choose size of drawing sheets. 1.4 Select overall dimensions. 1.5 Identify significant details. 1.6 Prepare complete set of working drawings. 1.7 Correlate details on working drawings.	Read a given prelim sketch design. Enumerate various types of working drawings. Prepare complete set of working drawings.	Charts Various sheets
General Objective 2.0: Analyze human activities and circulation for a simple design.			
	On completion of this module, the should be able to: 2.1 Identify the functions that take place in a simple building such as snack bar, a 2- bedroom bungalow, kiosk, convenience shops. 2.2 Explain the relationships between the different functions in the simple buildings enumerated in 1.1 above 2.3 Enumerate the sequence of events in the building.	Illustrate those functions that take place in a simple building. Show step-by-step the sequence of events in the building.	Plan for a 2 – bedroom bungalow

General Objective 3.0: Understand the heraldry of the various spaces in residential buildings.			
3.1	State the hierarchical order of the various spaces In a residential building.	Discuss factors affecting the arrangement of these spaces.	
3.2	Explain the factors affecting the arrangement of these spaces and the determination of their sizes.		
General Objective 4.0: Understand the principle of modular coordination.			
4.1	Define modular coordination.	Discuss basic methods of modular coordination. Demonstrate use of modular coordination. Demonstrate use of modular dincusioning. Apply modular drafting technique for a given design.	Charts
4.2	Explain the basic methods of modular coordination.		
4.3	Describe modular draughting methods and convention.		
4.4	Illustrate the use of modular dimensioning in the assembly of component units in architectural drawing.		
4.5	Prepare architectural drawings applying modular draughting techniques for a given design. Prepare modular details.		
4.6	Provide references and notations to all drawings. State the range of tolerances for on-site layout of Coordinates.		
General Objective 5.0: Know the concept of schedules			
5.1	Explain what schedules are.	Describe schedules list various types of schedules.	
5.2	Enumerate the various types of schedules.		
5.3	Prepare the necessary schedules for the project handled in 4.4 above.		

	General Objective 6.0: Know the operating building laws, bye-laws and regulations.		
	6.1 Explain building laws, bye-laws and regulations. 6.2 State the laws and regulations applicable in your area. 6.3 Describe the procedure for obtaining planning approval in your area.	Discuss building laws, eye-laws.	
Course Specification:			
WEEK	General Objective 7.0: Know the Conventions & symbols of Services Elements in Building.		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 7.1 Defining Services drawings 7.2 Identify types of services drawings eg electrical, plumbing, water. 7.3 State the importance of services drawings amount working drawings. 7.4 Prepare services layout drawings for plumbing, electrical & water lines.	Explain services drawing. List types of services drawings, eg. Electrical, plumbing etc. Sketch services layout drawings.	Diagrams - do -
General Objective 8.0: Know the Importance of service Drawings.			
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the should be able to: 8.1 Describe various types of pipe fittings 8.2 Draw the water supply system for a given 8.3 Draw the drainage and waste disposal system for building drainages.	Enumerate types of pipe fittings. Illustrate by drawing the drainage & waste disposal systems.	- do -

General Objective 9.0: Understand basic pipe and duct drafting			
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>9.1 Describe the various types of pipe/ducts 1.5 concrete.</p> <p>9.2 Explain the use of pipes in building work e.g. water, gas, sewage</p> <p>9.3 Illustrate the various symbols and convention used in pipe draughting.</p> <p>9.4 State the factors affecting choice of pipes for different purposes e.g. Gas, water & sewage pipes etc.</p> <p>9.5 State the factors affecting choice of pipes for different purposes.</p> <p>9.6 State the functions of valves in a piping network.</p> <p>9.7 State the functions of values in a piping network</p> <p>9.8 Illustrate the various types of valves.</p> <p>9.9 Explain the factors affecting choice of valves.</p> <p>9.10 Draw a typical flow diagram for a given piping.</p> <p>9.11 Explain the functions of instrumentation</p>	<p>List various types of pipe/ducts</p> <p>Discuss use of pipes in building work e.g. water, Gas. Sewage.</p> <p>Sketch various symbols and convention, used in pipe righting.</p> <p>List factors affecting choice of pipe.</p>	<p>Diagrams</p> <p>Charts</p>

	General Objective 10.0: Understand the production of electrical fittings and installations in building drawings.		
	<p>Specific Learning Outcome:</p> <p>On completion of this module, the should be able to:</p> <p>10.1 Describe the various ways of heating & cooling system.</p> <p>4.1 Explain the principle of air conditioner.</p> <p>4.2 Describe the various types of air conditioning systems in buildings</p> <p>10.2 Enumerate the advantages and disadvantages of each type.</p> <p>10.3 Illustrate the installation techniques of each type.</p> <p>10.4 State the guiding factors in the design of central air condition system.</p> <p>10.5 Prepare installation drawings of a given design of a central air-conditioning system.</p>	<p>Teacher Activities:</p> <p>Explain heating & cooling systems.</p> <p>Mention types of air-conditioner.</p> <p>List advantages and disadvantages of each type.</p> <p>Mention factors in the design of central a.c. system.</p>	<p>Resources:</p> <p>Drawing Instruments Diagrams</p>

General Objective 11.0: Understand Telecommunication Symbols.			
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the students should be able to:</p> <p>11.1 Illustrate the symbols and conventions electrical Installation drawings.</p> <p>11.2 Produce single line diagram for the electrical system of a given simple bungalow.</p> <p>11.3 Draw the switching circuit and branch circuit details.</p> <p>11.4 Draw the rising mains and the distribution and service panel.</p>	<p>Draw symbols and connections in electrical Installation drawings.</p>	<p>Diagrams</p>
	<p>11.5 Draw the electrical heating and cooling systems buildings.</p> <p>11.6 Draw the electrical plan of a given simple building.</p> <p>11.7 Prepare electricity distribution drawings.</p> <p>11.8 Prepare electricity transmission drawings.</p> <p>11.9 Detail various electrical components.</p> <p>11.10 Prepare lighting conductor services drawings.</p> <p>11.11 Prepare fire protection services drawings.</p>	<p>Illustrate electricity distribution and transmission drawings.</p>	<p>Diagrams Charts Drawing Instructor.</p>

PROGRAMME: National Technical Certificate in Draughtsman ship Craft Practice

MODULE: DELINEATION

DURATION: 36 HOURS

PRE-REQUISITE: CAD 11

GOAL: This module is intended to give the students the ability to present projects in two and three dimensions monochromatically.

General Objectives

On completion of this module, the students should be able to:

- 1.0 Understand three dimensional drawings of a simple building design.
- 2.0 Understand the principle of light and shade.
- 3.0 Understand monochromatic drawings in two and three dimensions with shades and shadows, introducing life elements.
- 4.0 Know the various equipment and materials required in photography.
- 5.0 Understand the basic principles in photography.
- 6.0 Know the various cameras used in architectural photography.
- 7.0 Know how to produce good photographic prints.

8.0 Know how to present various projects with the aid of photography.

PROGRAMME: NTC IN DRAUGHTSMAN SHIP			
Module: DELINEATION		Course Code: CAD 14	Contact Hours: 180 Hrs
Course Specification:			
WEEK	General Objective 1.0:	Understand three dimensional drawings of a simple building design.	
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the students should be able to:	Explain types of projection.	Charts
	1.1 Determine the position of view for isometric and axonometric projections for a given simple building.	Draw Isometric & axonometric projections.	Plan of a bungalow
	1.2 Project isometrically and axonometrically the chosen view for the given design.	List types of perspective views.	
	1.3 Enumerate the various types of perspectives.		
	1.4 Determine the position of view for the various types of perspective.		
	1.5 Project a one-point perspective of the given bungalow from the chosen view.		
	1.6 Project a bird's eye view of the given bungalow from the chosen view.		
	1.7 Project a two-point approach perspective of the given bungalow.		

General Objective 2.0: Know the principle of light and shade.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <p>2.1 Explain the principle of light trasmittance on solid objects.</p> <p>2.2 Relate the principle of light transmittance to shade and shadow effects.</p> <p>2.3 Illustrate the various graphical techniques used in shading and shadow casting.</p> <p>2.4 Illustrate the difference in effects on plane and curved surfaces.</p> <p>2.5 Illustrate the principles of shading and shadow casting.</p> <p>2.6 Shade and cast shadow on given simple two-dimensional and theme-dimensional set of drawings.</p> <p>2.7 Use artificial aids to portray required graphic effects, e.g. letratones, latrasets, furnish plates, etc.</p>	<p>Describe the principle of light transmittance on solid object.</p> <p>Differentiate plane and arrived surface.</p> <p>Explain principles of shading and shadow casting</p>	<p>Plane and curved objects</p>

	General Objective 3.0 Understand monochromatic drawings in two and three dimensions with shades and shadows, introducing life elements.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>3.1 Render plan and sections showing furnishings, traffic flow, trees, human beings and other life elements.</p> <p>3.2 Render site plans casting shades and shadows.</p> <p>3.3 Draw elevations choosing appropriate points of pens for the various planes.</p> <p>3.4 Cast shades and shadows on the elevations introducing life elements such as cars, trees, human figures, animals, sky scenes, etc.</p> <p>3.5 Cast shades and shadows on the projected isometric, axonometric and perspective drawings projected in 1.1 to 1.7 above.</p> <p>3.6 Introduce life and landscape elements monochromatically</p>	<p>Draw plan & section to show furnishings, traffic flow – tree sets.</p> <p>Show how shades and shadows are cast in site plans.</p> <p>Use appropriate points of pens to draw-elevations.</p>	<p>Various objects, pens.</p> <p>Charts.</p>
WEEK	General Objective 4.0: Know the various equipment and materials required in photography.		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>4.1 Define photography.</p> <p>4.2 Enumerate the various equipment used in photography.</p> <p>4.3 Describe how these equipment functions.</p> <p>4.4 maintain the equipment in 1.3 above.</p> <p>4.5 Enumerate the various materials used in photography, their functions & care.</p>	<p>Explain what photography is.</p> <p>List various types of equipment used in photography.</p> <p>List materials used in photography.</p>	<p>Cameras</p> <p>Charts</p>

General Objective 5.0: Understand the basic principles in photography.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <p>5.1 Explain light transmission in relation to photography.</p> <p>5.2 Describe the influence of light on photo-sensitive materials.</p> <p>5.3 lustrate the principle of reflection, refraction and absorption of light by various materials.</p> <p>5.4 Explain colour reflection, refraction and absorption.</p> <p>State how the principle of light transmittance is used in a pin –hole camera.</p>	<p>Discuss influence of light on photo sensitive materials</p> <p>Describe reflection, refraction and absorption.</p>	<p>Prisms Charts</p>
General Objective 6.0: Know the various cameras used in architectural photography.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the students should be able to:</p> <p>Enumerate the various types of cameras and their relative properties.</p> <p>6.1 Identify the parts of the cameras in 3.1 above.</p> <p>6.2 State the functions of the parts identified in 3.2 above</p> <p>6.3 Describe the operational procedure of each type of camera.</p> <p>6.4 Enumerate the various types and specifications of films used for the various cameras and factors affecting their choice for use.</p> <p>6.5 Choose film for a given single reflex camera.</p> <p>6.6 Load the film in the camera</p> <p>6.7 Focus various still life objects from chosen view</p>	<p>List different types of cameras.</p> <p>Illustrate with diagrams the functions of the parts of camera.</p> <p>Focus and snap various still objects.</p>	<p>Camera of various types.</p> <p>Video cameras,</p> <p>Films still</p> <p>Objects, eg tables, tree etc.</p>

	<p>points.</p> <p>6.8 Snap the object in 3.8 above.</p> <p>6.9 Snap moving objects from a chosen view point.</p>		
General Objective 7.0: Know how to produce good photography prints.			
	<p>Specific Learning Outcome:</p> <p>On completion of this module, the students should be able to:</p> <p>7.1 Describe the procedures for developing a film.</p> <p>7.2 List the various items used in film development.</p> <p>7.3 State the precautions to be taken in film developments.</p> <p>7.4 Develop the films snapped in 3.9 and 3.10 above.</p> <p>7.5 Enumerate the various items used in photographic printing.</p> <p>7.6 State the required precautions in photographic printing.</p> <p>7.7 State the different types of prints, e.g. contact prints enlargements, etc.</p> <p>7.8 Print black and white photographs.</p>	<p>Teacher Activities:</p> <p>Show ho to develop a film</p> <p>List materials for printing films snapped.</p> <p>Differentiate types prints, eg. Contact prints enlargement, e.t.c.</p> <p>Explain black & white photographs.</p>	<p>Resources:</p> <p>Film.</p> <p>Chemicals used for development</p> <p>Printing materials.</p>
General Objective8.0: Know how to present various projects with the aid of photography.			
	<p>Specific Learning Outcome:</p> <p>On completion of this module, the students should be able to:</p> <p>8.1 Interpret and juxtapose photographic images in Printing to achieve certain desired effects.</p> <p>8.2 Present various models photographically.</p> <p>8.3 Use photographs as an aid in perspective drawing.</p> <p>8.4 Describe how various project reports are presented using photographs.</p> <p>8.5 Present photographic folio.</p>	<p>Teacher Activities:</p> <p>Explain various models of photographic.</p> <p>Illustrate photographic folio.</p>	<p>Resources:</p> <p>-do-</p>

PROGRAMME: National Technical Certificate in Draughtsman ship Craft Practice

MODULE: Mechanical Service Draughtsman ship

COURSE CODE: CAD 15

DURATION: 36 HOURS

PRE-REQUISITE: 13 – Engineering Drawing

GOAL: This module is intended to give the students the ability to produce good services drawings.

General Objectives

On completion of this module, the students should be able to:

- 1.0 Know the importance of services drawings.
- 2.0 Know plumbing and waste disposal drawings
- 3.0 Understand basic pipe and duct draughting.
- 4.0 Know drawings for air-conditioning, heating and ventilation systems for buildings.
- 5.0 Know the production of duct drawings for elevators and escalators,
- 6.0 Understand Reinforced concrete structural detailing.
- 7.0 Understand the arrangement and detail drawing of steel structure.

PROGRAMME: NTC IN DRAUGHTSMAN SHIP			
Module: DELINEATION		Course Code: CAD 15	Contact Hours:36 Hrs
Course Specification:			
WEEK	General Objective 1.0: Know the importance of services drawings		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>1.1 Define services drawings.</p> <p>1.2 Illustrate the signs, symbols and conventions of services drawing</p> <p>1.3 Enumerate the various types of services drawings. e.g. plumbing, electrical, telecom, etc.</p> <p>1.4 State the importance of services drawings amongst working drawings.</p> <p>1.5 Prepare services layout drawings for a given simple project.</p>	<p>Draw signs, symbols and convention of services drawing.</p> <p>List various types of services drawings, eg. Plumbing, electrical etc.</p>	<p>Charts</p>
General Objective 2.0: 0 Know plumbing and waste disposal drawings			
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>2.1 Describe the various types of plumbing works in buildings.</p> <p>2.2 Illustrate a typical plumbing network in a given two-bedroom bungalow.</p> <p>2.3 Illustrate the various types of drainage and sewage systems.</p> <p>2.4 Draw the water supply system for a given simple project with annotations and specification notes.</p> <p>2.5 Draw the drainage and waste disposal system for the project in 2.4 above.</p> <p>2.6 Draw the drainage and waste disposal system for the project in 2.4 above.</p> <p>2.7 Prepare the sewage disposal drawings for the project in 2.4 above.</p>	<p>Discuss the types of plumbing works in buildings.</p> <p>Draw various types of drainage, sewage system & waster disposal.</p>	<p>Charts Building plan Drawing Instruments</p>

General Objective 3.0 Understand basic pipe and duct draughting.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <p>3.1 Describe the various types of pipes and ducts.</p> <p>3.2 Enumerate with examples the various terms used in pipe draughting.</p> <p>3.3 Explain the uses of pipes in building works. e.g. conduit water, sewage.</p> <p>3.4 Illustrate the various symbols and conventions used in pipe draughting.</p> <p>3.5 State the factors affecting choice of pipes for different purposes, e.g., gas piping, water pipe, sewage pipe etc.</p> <p>3.6 Draw the various types of piping works enumerated in 3.5 above for a given building project.</p> <p>3.7 State the functions of valves in a piping network.</p> <p>3.8 Illustrate the various types of valves.</p> <p>3.9 Explain the factors affecting the choice of valves.</p> <p>3.10 Illustrate the various types of piping controls and fittings stating their functions.</p> <p>3.11 Draw a typical flow diagram for a given piping reticulation with instrumentation system e.g. in the oil industry.</p> <p>3.12 Explain the functions of instrumentation system.</p>	<p>Show various types of pipes and ducts.</p> <p>Describe use of conduct water, sewage etc.</p> <p>Draw various symbols and conventions used in pipe draughting.</p> <p>Describe types and functions of valves.</p> <p>Illustrate a flow diagram for a given piping reticulation.</p>	<p>Charts</p> <p>Various kinds of pipes.</p> <p>Pictures.</p>

General Objective 4.0: Know drawings for air-conditioning, heating and ventilation systems for buildings.			
Specific Learning Outcome:		Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <p>4.1 Describe the various ways of heating and cooling houses.</p> <p>4.2 Explain the principle of air conditioning.</p> <p>4.3 Describe the various types of air-conditioning systems in buildings.</p> <p>4.4 Enumerate the advantage and disadvantages of each type.</p> <p>4.5 Illustrate the installation techniques in 4.3 of each type.</p> <p>4.6 State the guiding factors in the design of a central air-conditioning system.</p> <p>4.7 Prepare installation drawings of a given design of a central air-conditioning system.</p> <p>4.8 State the factors affecting the sizes of ducts for central air-conditioning system.</p> <p>4.9 Describe the various types of artificial ventilators and how they function, e.g. fans, extractors, etc.</p> <p>4.10 Illustrate the installation techniques of such type.</p> <p>4.11 Prepare installation drawings for the various types.</p> <p>4.12 Describe the various types of heating systems in buildings.</p> <p>4.13 Prepare installation drawing s for the various heating systems and state their merits and demerits.</p>		<p>Discuss air-conditioning and types in building. Show techniques of installation.</p> <p>Show installation drawings of a given design of central air-condition system.</p> <p>Explain artificial ventilators and their functions.</p> <p>Explain types of heating systems.</p>	<p>Charts</p>

General Objective 5.0: Know the production of duct drawings for elevators and escalators		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <p>5.1 State the differences between elevators and escalators with their attendant advantage and disadvantages.</p> <p>5.2 Describe the various types of elevators.</p> <p>5.3 State the factors affecting the choice of each type and their space requirements.</p> <p>5.4 Draw the various types of elevators and their duct provisions.</p> <p>5.5 Explain how the duct sizes for elevators are determined.</p> <p>5.6 Describe the requirements for installing an escalator.</p> <p>5.7 Draw an escalator with the duct provisions.</p> <p>5.8 Explain how the duct sizes for escalators are determined.</p>	<p>Differentiate between elevators & escalators.</p> <p>Illustrate types of elevators.</p> <p>Explain how to install escalators.</p> <p>Illustrate types of escalators.</p>	<p>Charts</p>

WEEK 1 & 2	General Objective 6.0: Understand Reinforced concrete structural detailing.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the students should be able to:</p> <ul style="list-style-type: none"> 4.1 Draw the various symbols, signs and conventions used in structural detailing. 4.2 Draw a typical reinforced concrete structural frame plan with notation. 4.3 Draw reinforced concrete structural frame building on sectional elevations. 4.4 Draw with full reinforced concrete details of structural elements, viz: foundation (independent bases, piles, strip footing, raft) columns, beams, slabs, (one-way, two ways, flat slabs, solid slabs, pre-cast slabs, hollow –tile slabs, garage floors, etc) cantilever, lintels, stairs, walls (panel walls, plain and reinforced concrete walls basement retaining walls). 4.5 Prepare detailed bending scheduling of bars in reinforcement of structural members. 4.6 Undertake detailing of reinforced concrete structural buildings. 6.7 Draw a typical reinforced concrete structure and frame plan with notation. 	<p>Demonstrate with sketches the concept and typical concrete structure and frame plan with notations. Draw pictorial drawings of various types, of reinforced concrete structures. Put dimension lines in given drawing and observe all the rules. Put dimension lines in given drawing and observe all the rules</p>	<p>Chalkboard Transparent projectors. Drawing Instruments.</p> <p>-do-</p> <p>-do -</p>

General Objective: 7.0 Understand the arrangement and detail drawings of steel structures.			
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>7.1 Prepare typical title blocks of drawings.</p> <p>7.2 State recommended scale for site plans, general Arrangement, marking plans, detail drawing and enlarged details.</p> <p>7.3 Explain the various drawing sizes in use: sketches, details, general arrangement in detailing.</p> <p>7.4 State the information contained in the material list.</p> <p>7.5 Describe details recommended for lines, sections And dimension</p> <p>7.6 Show representation of rolled as formed steel sections for universal beam, universal column, joint, channel, angle, Tee rectangular, hollow section, circular hollow stanchions.</p> <p>7.7 Draw grids and marking plans in two storey Buildings For the following members: stanchions, trusses, crane grinders, purlins, sheeting rails, bracing, gable stanchions, beams etc.</p> <p>7.8 State specification for types strength, diameter, tolerance for bolts.</p>	<p>Draw and show typical conventional plan/sections in dictating various forms. Such as Universal beams, edumn, hollow sections etc. Draw/sketch metric representation of to various sections of structural/joints.</p> <p>Demonstrate with sketches various techniques. Showing structural members.</p> <p>Draw typical symbols representations of joints using bolts, rivets and welding.</p>	<p>Use of chalkboard, Drawing Instrument. Transparent papers and projectors.</p>

	<p>7.9 Show representation for bolts and holes in plan and elevation on steelwork drawings.</p> <p>7.10 Define terms for butt and fillet welds and rivets and indicate them on drawings using symbols with different abbreviations.</p> <p>7.11 Prepare detail drawings for beams, Perkins, sheeting rails, plate girders, stanchions, bases, trusses and lattice girders for different sections.</p> <p>7.12 Prepare stresses and layout sheet of typical roof trusses.</p>	<p>- do -</p>	<p>Chalkboard Drawing papers drawing Instruments</p>
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PROGRAMME: National Technical Certificate in Draughtsman ship Craft Practice

MODULE: ELECTRICAL/ELECTRONIC DRAUGHTSMANSHIP

COURSE CODE: CED 11 DRAUGHTSMANSHIP

DURATION: 36 HOURS

PRE-REQUISITE: CAD 11 – Technical Drawing

GOAL: The module is intended to provide the trainee with basic knowledge and skill in draughting of electrical and electronic components and diagrams.

General Objectives

On completion of this module, the students should be able to:

- 1.0 Know the electrical and electronic graphic symbols in common use.
- 2.0 Know the block diagram representations of electrical and electronic circuits.
- 3.0 Know the schematic and wiring diagrams of electrical and electronic circuits.
- 4.0 Know the draughting of electrical/electronic connecting diagrams.
- 5.0 Understand the production of electrical installation drawings
- 6.0 Know how to produce telecommunication drawings.
- 7.0 Know the block diagram representations of electrical and electronic circuit
- 8.0 Know the schematic and wiring diagrams of electrical and electronic circuit
- 9.0 Know the draughting of electrical/electronic connecting diagrams.
- 10.0 Know the drafting of electrical/electronic connecting diagram.

PROGRAMME: NTC IN ARCHITECTURAL DESIGN			
Module: ELECTRICAL/ELECTRONIC DRAUGHTSMANSHIP		Course Code:	Contact Hours:
Course Specification:			
WEEK	General Objective 1.0: Know the electrical and electronic graphic symbols in common use.		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>1.1 Identify electrical and electronic graphic symbols in common use.</p> <p>1.2 Sketch by freehand the components in 1.1 above.</p> <p>1.3 Draw the electrical/electronic symbols identified in 1.1 above using appropriate draughtsman ship equipment and materials.</p>	<p>Illustrate electrical & electronic graphic symbols in common use.</p> <p>Draw the above using draughtsman ship equipment & materials.</p>	<p>Draughtsman ship equipment & materials.</p>
General Objective 2.0: Know the block diagram representations of electrical and electronic circuits.			
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the should be able to:</p> <p>2.1 State the methods of block diagram representations.</p> <p>2.2 Explain the merits of each method in 2.1</p> <p>2.3 Explain the methods of labeling block diagrams.</p> <p>2.4 State the merit and demerit of block diagram representations.</p> <p>2.5 Draft artwork for printed circuit boards.</p> <p>2.6 Draft logic diagrams</p>	<p>Draw block diagram Label a block diagram.</p> <p>Draft artwork for printed circuit boards.</p>	<p>Diagrams Charts Printed circuit boards.</p>

General Objective 3.0: Know the schematic and wiring diagrams of electrical and electronic circuits.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the students should be able to:</p> <p>3.1 Explain the term “schematic diagram”.</p> <p>3.2 State the merits and demerits of schematic diagrams.</p> <p>3.3 Draft various schematic diagrams e.g. transistor circuits, electrical panel, etc.</p> <p>3.4 Explain the term “wiring diagram”.</p> <p>3.5 State the merits and demerits of wiring diagrams.</p> <p>3.6 Draft various wiring and circuit diagrams.</p> <p>3.7 State the relevant I.E.E. regulations relating to the various diagrams in 3.6 above.</p>	<p>Illustrate the schematic diagram.</p> <p>Draft schematic diagrams.</p> <p>E.g. transfer circuits, electrical panel etc.</p>	<p>Circuit boards</p> <p>Diagrams</p>

General Objective 4.0: Know the draughtinbg of electrical/electronic connecting diagrams.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the students should be able to:</p> <p>4.1 Explain the term connection diagram.</p> <p>4.2 State the merits and demerits of connection diagrams.</p> <p>4.3 State the various types of connection diagrams.</p> <p>4.4 Explain the uses of the various types of connection diagrams in 4.3 above.</p> <p>4.5 State the merits and demerits of connection diagrams.</p> <p>4.6 Explain the term “point-to-point diagrams”</p> <p>4.7 Draft point-to-point diagrams.</p> <p>4.8 Explain the term “highway diagrams”</p> <p>4.9 Draft baseline diagram.</p> <p>4.10 Explain the term “baseline diagram”</p> <p>4.11 Draft highway diagrams.</p> <p>4.12 Define lineless diagram.</p> <p>4.13 Draft lineless diagram.</p> <p>4.14 Draft various electrical and electronic designs or circuits using connection diagrams.</p>	<p>List types of connection diagrams.</p> <p>Describe point –to- pint and highway diagrams.</p> <p>Draft each of the above.</p>	<p>Diagram charts</p> <p>Drafting Instruments</p>

General Objective 5.0: Understand the production electrical installation drawings.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <p>5.1 Describe the various types of electrical drawings e.g. block diagram, circuit diagram, schematic diagram, etc.</p> <p>5.2 Illustrate the symbols and conventions used in electrical installation drawings.</p> <p>5.3 Enumerate the various types of electrical loads resistive load, inductive load, capacitive load etc.</p> <p>5.4 Produce single line diagram for the electrical system of a given simple bungalow.</p> <p>5.5 Draw the switching circuit and branch circuit details.</p> <p>5.6 Draw the rising mains and the distribution and service panels.</p> <p>5.7 Draw the electrical heating and cooling systems in buildings.</p> <p>5.8 Illustrate and draw different types of lighting fixtures in Buildings</p> <p>5.9 Draw the electrical plan of a given simple building.</p> <p>5.10 Prepare electricity distribution drawings.</p> <p>5.11 Prepare electricity transmission drawings.</p> <p>5.12 Detail various electrical components.</p> <p>5.13 Prepare lighting conductor services drawings.</p> <p>5.14 Prepare fire protection services drawings.</p>	<p>Differentiate between block diagram circuit diagrams, schematic diagram. e.t.c</p> <p>Show symbols and conventions used in electrical installation drawings.</p> <p>Illustrate single line diagram, switching circuit and branch circuit.</p>	<p>Diagrams</p> <p>- do-</p> <p>- do -</p>

	General Objective 6.0: Know how to produce telecommunication drawings.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the should be able to: 6.1 Describe the various systems of telecommunication services to buildings. 6.2 Draw the telephone wiring system for a given building project. 6.3 Draw the audio-visual wiring system for a given building project. 6.4 Draw the security and fire-alarm system for a given building project.	Explain various systems of telecom services to buildings. Illustrate telephone, fire - alarm system.	Diagrams
	Module: STRUCTURAL DETAILING	Course Code:	Contact Hours:
	Course Specification:		
WEEK	General Objective 7.0: Know the block diagram representations of electrical and electronic circuit.		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the should be able to: 7.1 Sketch by hand the component in electrical and electronic graphic symbols. 7.2 Draw the electrical/electronic symbols Identified in Electrical/Electronic Graphic symbols.	Draw electrical and electronics symbols.	Diagrams

General Objective 8.0: 0 Know the schematic and inuring diagrams of electrical and electronic circuit			
Specific Learning Outcome:		Teacher Activities:	Resources:
On completion of this module, the should be able to:		- do -	- do -
8.1	State the methods of block diagram representation.		
8.2	Explain the merits of each method in block diagrams		
8.3	Explain the method of labeling block diagram		
8.4	State the merit and demerit of block diagram		
General Objective 9.0: Know how to produce good photographic prints.			
Specific Learning Outcome:		Teacher Activities:	Resources:
On completion of this module, the should be able to:		- do -	- do -
9.1	Explain the term “schematic diagram”		
9.2	State the merits and demerits of schematic diagrams.		
9.3	Drat various schematic diagrams e.g. Transit or circuit, Electrical Panel etc.		
9.4	Explain the term “Wiring Diagram”		

General Objective 10.0: Know the drafting of electrical/electronic connecting diagram.		
Specific Learning Outcome:	Teacher Activities:	Resources:
<p>On completion of this module, the should be able to:</p> <ul style="list-style-type: none"> 10.0 Explain the term connection diagram 10.1 State the merits and demerits of connecting diagrams. 10.2 State the various types of connection diagram. 10.3 Explain the uses of various types of connection diagram 10.4 State the demerits and merits of connection diagram. 10.5 Explain the term point o point diagrams. 10.6 Draft point-to-point diagram 10.7 Explain the term “baseline diagrams” 10.8 Draft baseline diagram. 10.9 Explain the term “highway diagrams” 10.10 Draft highway diagrams. 10.11 Define lineless diagram. 10.12 Draft lineless diagram. 10.13 Draft various electrical and electronic designs or circuits using connection diagrams 		

ADVANCED NATIONAL TECHNICAL CERTIFICATE

PROGRAMME: Advanced National Technical Certificate in Draughtsman ship Craft Practice

MODULE: CAD 21 ADVANCED ARCHITECTURAL DRAWING

DURATION: 36 Hours

PRE-REQUISITE:

GOAL: This course is intended to provide students with in-depth knowledge in advanced architectural drawing.

General Objectives

On completion of this module, the trainee should be able to:

- 1.0 Understand the Preparation of site plan from the given survey drawing without supervision.
- 2.0 Understand how be able to produce complex design sketch from an architect with little or no supervision.
- 3.0 Know how to interpret and label the working drawings with the adequate given dimensions and Annotations with no supervision
- 4.0 Know how to preparation of finished working drawings
- 5.0 Understand the functions of clerk of works on the site.
- 6.0 Know how to prepare shop Drawings and Manufactured components details: Roof profiles Hanging details, Detailing for shoring etc
- 7.0 Know how to produce detail and rendered 3 dimensional drawings
- 8.0 Understand the technique of circling ring important parts of drawing
- 9.0 Understand how to detaining out the circled parts of the drawings into elaborate scales
- 10.0 Know how to write out dimensions and annotations on the detailed drawings.
- 11.0 Know how to inking and stencil out the detailed parts on tracing paper as finishing, using lorry sets, Letterset, Symbol, Stamp- pad e.t.c.
- 12.0 Understand the use of model in Architectural work
- 13.0 Know enumerate the materials, equipments and tools used in models
- 14.0 Know how to produce the model based on the given scale.

PROGRAMME: NTC IN ARCHITECTURAL DRAFTING			
Module: ADVANCED ARCHITECTURING DRAWING		Course Code: CAD 21	Contact Hours:
Course Specification:			
WEEK 1 & 2	General Objective 1.0: Understand the preparation of site plan from the given survey drawing without supervision.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 1.1 Study a given survey drawing. 1.2 Interpret the given survey drawing using sectional profile and other graphical. 1.3 Draw out the site techniques material plan into an elaborate scale locating the buildings.	Describe a given survey drawing. Explain given survey drawing. Illustrate site techniques materials plan.	
General Objective 2.0: Understand how to produce complex design sketch from an architect with little or no supervision.			
	2.1 Use the drawing tools to detail out complex buildings. 2.2 Section with Elaborate scale to show various components 2.3 Detail out some components e.g. gutter detail in a reinforced concrete roof Beams, Lintels, Hood, e.t.c.	Demonstrate with the drawing tools. Sketch some components e.g. gutter detail in 5 reinforced concrete.	Drawing tool Diagrams
General Objective 3.0: Know how to interpret and label the working drawings with adequate given dimensions and Annotations with no supervision			
	3.1 Write out the dimensions on detailed drawings Mostly in plans and sections. 3.2 Write out architects annotations.	Show dimensions on detailed drawings. Show architects annotations.	

	General Objective 4.0: Know how preparation of finished working drawings		
	General Objective 5.0: Understand the functions of a clerk of works on the site.		
	5.1 Carry out Planned site visits to represent the architect. 5.2 Read out the drawings in conjunction with the site supervisor or the foremen.	Take students to site visits. Interpret drawings in conjunction site supervision	Site supervision.
WEEK 1 & 2	General Objective 6.0: Know how to produce detail and rendered 3 dimensional drawings		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 6.1 Project the sectional perspective view from the position of the viewer. 6.2 Introduce life elements into the drawing rendition. 6.3 Produce a colour presentation of the drawing using the appropriate medium.	Demonstrate how sectional views can be rendered. Demonstrate how to render the building with people, trees, and cars. Demonstrate how colour rendering is applied to drawings.	Chalkboard T-squares setsquares prospectors. Colour pencils pens and others
WEEK 1 & 2	General Objective 7.0: Understand the technique of circle ring important parts of drawing		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 7.1 Circle important components parts from sections drawn e.g. Gutter part of concrete roof window sill, foundation e.t.c. 7.2 Detail it out into larger scale e.g. scale 1.5.	Circle component parts from sections Draw it into large scale	Drafting Instruments - do -

	General Objective 8.0: Understand how to detail our the circle parts of the drawings into elaborate scale		
On completion of this module, the trainee should be able to: 8.1 Draw detailed components parts to specification. 8.2 Assemble all detailed parts into a sheet to show detailed sheets.	Illustrate by drawing detailed components parts to specification	- do -	
	General Objective 9.0: Write out dimensions and annotations on the detailed drawings.		
On completion of this module, the trainee should be able to: 9.1 Know how to write out dimensions for the detailed components parts. 9.2 Write out specifications	Describe how to write out discussion for detailed component parts. Describe how to write out specification.	Drawing Instruments Drawing papers	
	General Objective 10..0: Know how to ink and stencil out the detailed parts on tracing paper as finishing, using lerroy sets, Letraset, Symbol, Stamp-pad etc.		
On completion of this module, the trainee should be able to: 10.1 Ink and stencil out detailed parts on a sheet. 10.2 Print for final distribution.	Show how to ink and stencil out detailed parts. Demonstrate how to print for final distribution.	Tracing paper pens Leroy sets Letraset.	

WEEK 1 & 2	General Objective 11.0: Understand the use of model in Architectural work		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	<p>On completion of this module, the trainee should be able to:</p> <p>11.1 Present model as an aspect of Architectural presentation</p> <p>11.2 Present model as a true representation of an Architectural building</p>	<p>* The teacher explains to the students the role of modeling in Architectural presentation.</p> <p>*The teacher lists and shows the materials, tools and equipments used in model making e.g. base board, card board, modelling paper, glazing material, roof board, roads materials, grasses, trees, cars human figures, etc.</p> <p>* The teacher lists and shows the cutting and gluing items e.g. knife, straight edge, flat surface, evostik, uhu etc.</p> <p>* The teacher demonstrates to students how to measure and cut the given model parts, assemble and encase the model for presentation.</p>	<p>Modeling papers, trees, grasses, human figures, base, knife, glue uhu, landscape element, glass.</p>

	General Objective 12.0: Know how to enumerate the materials, equipments and tools used in models		
	On completion of this module, the trainee should be able to: 12.1 Identify the floor materials, wall materials, roof materials, glazing materials and electrical materials. 12.2 Identify the cutting tools, and glueing materials	List types of floor materials wall, roof glazing and electrical. Describe cutting tools and gluing materials.	The cutting tools
	General Objective 13.0 : Know how to produce the model based on the given scale		
	On completion of this module, the trainee should be able to: 13.1 Identify the suitable materials, tools, measuring tools and scale 13.2 Cut the Base, walls roof and glazing components, to the scale in 3:1 roads and landscape. 13.3 Assemble the various materials as on 3:2 above sequentially, e.g. gluing the base, wall, roof, glazing landscaping and roads. 13.4 Casing the model, and write necessary titles for presentation.	Describe suitable materials, tools, measuring tools & scale. Draw to the scale of 3:1 road & landscape	Drawing papers Drawing Instrument

PROGRAMME: Advanced National Technical Certificate in Draughtsman ship Craft Practice

MODULE: CAD 22 ADVANCED STRUCTURAL DETAILING

DURATION: 36 Hours

PRE-REQUISITE: CAD 11

GOAL:

General Objectives

On completion of this module, the trainee should be able to:

- 1.0 Know the basic types of foundation details.
- 2.0 Know the basic types of floor details.
- 3.0 Know the basic types of walls construction details.
- 4.0 Know the basic types of staircase construction details.
- 5.0 Know specification notes
- 6.0 Know annotation
- 7.0 Know how to prepare Annotations from specification Notes
- 8.0 Know the signs symbols and convections used in topographic and mapping drawings as it relates to the representation of the natural and artificial features.
- 9.0 Know how to draw contour lines.
- 10.0 Know how to draw topographical maps of an area in town and cities.

Module: ADVANCED STRUCTURAL DETAILING		Course Code: CSD 21	Contact Hours:
Course Specification:			
WEEK	General Objective 1.0: Know the basic types of foundation details.		
1 & 2	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 1.1 Illustrate some types of structural details drawings e.g. rafter, cellular rafter, deep pipe foundation, etc. 1.2 Draw key plan showing main Beam, pillar secondary Beams, main Beam and foundations. 1.3 Identify basic types of structural details in steel and structural drawing. 1.4 Produce details drawing of damp-proofing courses.	* Demonstrate with sketches various types of structure details, walls and stairs* * Draw in scale typical details drawing involving foundation, floors, walls and stairs.	- Chalkboard - Drawing Instruments -Transparent projector. - Charts.
General Objective 2.0: Know the basic types of flows details.			
	2.1 Show econometric detail of pillar beams and slab. 2.2 Draw/sketch various types of 1 & 2 above. 2.3 Identify various types of concrete follow dittoing showing distribution of reinforce.	* Produce pictorial drawings along with students that involve foundation, walls, floors and stair construction details.	* Chalkboard* *Drawing Instruments
General Objective3.0: Know the basic types of walls construction details.			
	3.1 Identify various types of walls construction details, e.g. timber, block/concrete, sheets metal, plastic walls 3.1 Draw various types of walls construction details e.g. solid, partition and wardrobes.	Enumerate various types of walls construction,	Diagrams Drawing Instruments

	General Objective 4.0: Know the basic types of staircase construction details.		
	4.1 Identify the various types of staircase construction details e.g. timber, Aluminum staircase. 4.2 Draw various types of Staircase construction details above 4.1.	Enumerate the types of staircase of construction details	- do -
WEEK 1 & 2	General Objective 5.0: Know specification Notes		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 5.1 Define specification 5.2 Identify specification notes 5.3 Explain the importance of specification notes 5.4 State types of specification notes 5.5 Enumerate the ingredients of a goal specification note, e.g., Materials, colour, texture, size installation processes/techniques etc.	Explain specification and specification notes. Describe type of. List ingredients of specification etc.	

	General Objective 6.0: Know Annotations
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	<p>On completion of this module, the trainee should be able to:</p> <p>6.1 Explain the concept annotations</p> <p>6.2 Identify annotations</p> <p>6.3 Explain the importance of annotations on drawings</p> <p>6.4 State the ingredients of good annotations, e.g., material, colour, size, etc.</p> <p>6.5 Identify the qualities of good annotations, e.g., brevity, pungency, position on drawing, etc.</p> <p>6.6 Distinguish between Specifications Notes and Annotations.</p>	<p>Explain concept annotations.</p> <p>Describe annotated.</p>	
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	General Objective 7.0: Know how to prepare Annotations from Specification Notes		
	7.1 Produce annotations from given specification notes. 7.2 Produce the various formats for annotation drawings. 7.3 Annotation complex project drawings and detents.		
WEEK 1 & 2	General Objective 8.0: Understand the principles and methods of course taking lines of intersection between various types of surfaces.		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 8.1 Interpreter topographic and mapping signs, symbols and conventions. 8.2 Draw topographic and mapping signs, symbols and conventions to scale.	* Show the student the various types of topo maps. * Demonstrate the process of Contouring.	- Globe and plain map. - Site model of areas in town of cities - charts - scanners
	General Objective 9.0: Know how to draw contour		
	9.1 Plot points, lines, intervals and Datum 9.2 Draw hills, Rivers and section contour 9.3 Construct ground line profile.	* Demonstrate the process of sectioning land profile*	
	General Objective 10.0: Know how to draw topographical maps of an area of town or cities		
	10.1 Draw the topography of an area showing lot, streets, roads, contours and other important features. 10.2 Draw land subdivisions and landscaping map 10.3 Draw highway plan and profile	Illustrate by drawing the topography of an area showing of, streets, roads e.t.c.	Maps Diagrams

PROGRAMME: **Advanced National Technical Certificate in Draughtsman ship Craft Practice**

MODULE: **CAD 23 ENGINEERING SERVICES DRAWINGS AND DETAILING**

DURATION: **36 Hours**

PRE-REQUISITE:

GOAL: The course is designed to provide the students with the working knowledge of topography and map drawings.

General Objectives

On completion of this module, the trainee should be able to:

- 1.0 Know how to Acquire produce pipes and ducts drawings as passed down by the designer
- 2.0 Knowledge of drawing air conditioning, heating, ventilators and escalators
- 3.0 Understand plumbing construction of drawing waste disposal drainage
- 4.0 Understand the principles and methods of course taking lines of intersection between various types of surfaces.
- 5.0 Understand the principle and method of developing complex intersecting surfaces.
- 6.0 Producing working drawing of structural steel work project

PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE			
Module: CSD 23		Course Code:	Contact Hours:
Course Specification:			
WEEK 1 & 2	General Objective 1.0: Interpret and produce pipes and ducts drawings as passed down by the designer		
	Specific Learning Outcome:	Teacher Activities:	Resources:
	On completion of this module, the trainee should be able to: 1.1 Describe the various pipes, ducts and their application in Drawing. 1.2 Produce the pipe and duct drawing with specification and conventions based on the designer's sketch.		
General Objective 2.0: Acquire the knowledge of drawing air conditioning, heating, ventilators and escalators			
	2.1 Prepare the installation drawing of the following: Air- conditioner escalators, waste disposal unit. 2.2 Interpret drawing of installation, design as in 2.1 above.	Apply all symbols and convention to prepare good drawings.	
General Objective 3.0: Understand plumbing construction of drawing waste disposal drainage			
	3.1 Interpret fully symbols, conventions, notations including dimension given on sketch by the designer. 5.3 Identify and know all pipe fittings and the conventional representations in line diagram. 3.3 Interpret drawing to its applications and to communicate well to other related Technicians on the field.	Able to produce, reproduce, Interpret all service drawings.	

WEEK 1 & 2	General Objective 4.0: Understand the principles and methods of constructing lines of intersection between various types of surfaces.		
	Specific Learning Outcome:	Teacher Activities: Resources:	
	<p>On completion of this module, the trainee should be able to:</p> <p>4.1 Explain the principles, of:</p> <ol style="list-style-type: none"> a. individual line (or surface line) method b. cutting – plane method c. cutting cylinder method establishing lines of Intersection of surface. <p>4.2 Using illustration apply the various method in 4.1above.</p> <p>4.3 Draw the line of intersection of plane surface with a polyhedrons single-curve, warped or double-curved surface e.g.</p> <ol style="list-style-type: none"> a. A plane and cone (conic section) b. A place and a plane c. A plane and prism <p>4.4 Construct the line of intersection of any intersecting surfaces, e.g. cylinders and elbow pieces, elbow piece and sphere, two oblique cones on common base, two oblique cylinders, oblique cylinders and core.</p>	<p>* demonstrate how to construct line of intersect ion of a plane cone, prism etc.*</p> <p>* Help the students to solve problems which include lines of intersection e.g cylinder and elbow peace.</p>	<p>Drawing instrument chalkboard lesson plan</p> <p>- do -</p>

	General Objective 5.0: Understand the principle and method of developing complex intersecting surfaces.		
	<p>5.2 Explain with illustrative example the principles of the following methods of development.</p> <ol style="list-style-type: none"> Parallel – line methods Radial – line methods Triangulation Appropriate method (gone or zone method for sphere <p>5.3 Develop any given suitable using appropriate methods e.g. Right/oblique conic hood a noon – symmetrical nozzle, cross pipe of equal diameter etc.</p> <p>5.4 Produced working drawings to suitable scale of a prescribed sheet metal project. e.g. garden, watering can, ventilating duct, ventilator head, hopper etc.</p> <p>5.5 Make a pattern for the production of a chosen project in 2.3 above.</p>	<p>* Demonstrate methods of development of 2.1 a-d.*</p> <p>* Carry out surface development in 2.3*</p> <p>* Help the students to make patterns through the production of working drawing as in 2.4*</p>	<p>* Drawing instrument*</p> <p>- do -</p> <p>- do -</p>

General Objective 6.0: Understand how to produce working drawing of structural steel work project			
6.1	Describe with illustrations various methods of joining members of structural steel work including steel pipes e.g. bolting, riveting, welding et.	Explain method of joining structural steel work using bolt, rivets, welding etc. Carryout project drawing which involves structural steel work	Drawing Instrument
6.2	Interpret conventional sign and symbols relating to joining methods in 3.1 above.		
6.3	Interpret design sketch data and standards relating to fabricated steel work.		
6.4	Prepare a standard project drawing of given structural steel projects using designers sketches data and relevant design standard example to include water tank structure, Bridge girders stanchion on roof struts, Ducting and pipe system.		

TEXT BOOK

1. Technical Drawing, seventh Edition by Giesecke Mitchell, Spencer, Hill, Thomas London 1980.
2. Technical Draw of by Fredrick Eglesecke, Alv a Micchel, Henry Cecil, Ivan Leroy Hill John Thomas e.g.
3. Technical Drawing by Frederic, Gieseks, Alva spansks & Co., published in London published on the an New York long Macmillan publishers

TEXT BOOKS FOR STRUCTURAL DRANTINAL

ARCHITECTURAL DRANING

- FIELD, W.B. Architectural Drawing Me fraw-Hill
- Kinny, J.E., and Mc Grail, J. P. Architectural Drawing for the **Building Trades Mc Graw- Hill**
- **Martin, C. L. Architectural Graphic Macmillan**
- **Morgan S. W. Architectural Drawing. Mc Graw – Hill**
- **Ramsey, C. G., and sleeper, H.R. Architectural Graphic standards. John Wiley**
- **The Detailing of Reinforced concrete. London concrete society/Institute or of structural/Engineers**

LIST OF PHYSICAL FACILITIES

1. **Achitectural/Drafig studio – 1 (70 students)**
2. **Architectural equipment (SETS) for 30 st.**
 - i) A1 size drawing boards with stools – 30
 - ii) Rapidographs –(sets of 8 pans) -
 - iii) Graphys pens – 30 Sets
 - iv) Pantographs - 30
 - v) Adjustable set squares-30
 - vi) Pencil sharpening M/c – 2

- vii) Architects, metric scales - 10
- viii) Drawing instruments – 30 sets
- ix) Leroy lettering sets - 30
 - x) French anvils (Assorted) – 30
 - xi) Stanocript lettering sets –
 - xii) Display boards
 - xiii) Filing cabinet for drawings – 2
 - xiv) Display boards
 - xv) Filing cabinet for drawings – 2
 - xvi) Tee squares (AO size) – 30
 - xvii) Light tables – 30
 - xviii) Lettering stencils and templates – 30

SOME REFERENCES

BS 1192 Construction Drawing Practice

- Part 1: 1984 Recommendation for general principles
- Part 2: 1987 Recommendation for architectural and engineering drawings
- Part 3: 1987 Recommendations for symbols and other graphic conventions
- Part 4: 1984 Recommendation for landscape drawings
- Part 5: 1990 Guide for structuring of computer graphic information

- Halse A. O. Architectural Rendering
(New York: McGraw – Hill, 1960)
- Jacoby H. New Architectural Drawings.
(London: Thames & Hudson 1969)
Jacoby H. New Techniques of Arch. Rendering
(London Thomas and Hudson, 1971)
- Carson G. S. Computer Graphics
- Carson G.S. (ed) into to computer Graphics Mondays computer Graphics vol 27
- Crosley M.L. The Architect's Guide to computer Aided Design. New York John W., 1988