193 – BUILDING/ENGINEERING DRAWING

General Objective

This subject is intended to introduce the trainee to the use of drawing as a language and to enable them to make and interpret simple technical drawing, the basic knowledge of the application of geometrical methods in the analysis, solution to elementary space problem and skill in making and interpreting engineering drawing.

Examination Structure

This subject will be examined under two papers:

193-1 – PAPER I: OBJECTIVE: This paper will consist of forty (40) multiple choice (Objective) questions to be attempted by candidates in forty (40) minutes. This section carries forty (40) marks.

193-2 – PAPER II : PRACTICAL: This will consists of three sections, viz:

SECTION A: This section will comprise three (3) PRACTICAL DRAWING questions for all candidates to attempt two (2) in 40 minutes. This section carries twenty (20) marks.

SECTION B: This section will comprise one (1) BUILDING DRAWING question for all candidates in some Construction trades. Time allowed will be two (2) hours twenty (20) minutes. This section carries forty (40) marks.

SECTION C: This section will comprise one (1) compulsory ENGINEERING DRAWING question for all candidates in Engineering & Miscellaneous trades. Time allowed will be two (2) hours twenty (20) minutes. This section carries forty (40) marks.

NB. The course is a trade-related course which should be taken by all candidates in Engineering, Construction & Miscellaneous Trades EXCEPT CATERING CRAFT PRACTICE.

Topic / Objective	Contents	Activities / Remarks
1.0 **Forms of Drawing and their Applications** 1. Explain the application of various forms of drawings in the manufacturing and construction industries.	1. The use of drawing – communication, expression and draughtsmanship of ideas and intentions. 2. Form of drawings-pictorial (axonometric perspective, oblique, isometric) and orthographic drawings. 3. Applications of drawings: pictorial drawings: clear expression of an object in three – dimensional view at a glance, guides fabrication of an object. - Orthographic drawing: expression of an object in single planes; working.	1. Look at any photograph or drawing for sense of identification of the object or scene. 2. Look at an object presented in pictorial and orthographic drawings to see the different forms of drawings. 3. Forms of drawings should include, (pictorial drawing (axonometric, perspective, oblique) and orthographic drawing.
2.0 **Drawing Instruments and Equipment** 1. Explain the use of various drawing instruments and equipment.	1. Common drawing instruments and equipment e.g. metric scale rule, T-square, drawing boards/tables, set-square (30^0/ 60^0 and 45^0), adjustment set-square, pencils (grade 5B to 9H pencil. Sharpener, compasses (bow spring, drop spring, beam), templates (letter, circles, ellipse), irregular or French curves, dividers. 2. Sizes of drawing papers (BS 3429) (A0) 841 x 1189mm, (A1) 594 x 841mm, (A2) 420 x 594mm. 3. Demonstration of the uses of instruments. 4. Cleaning and storage of instruments and equipment after use.	1. Touch and look at these Instruments and equipment in the drawing studio. 2. State the uses of each instrument and equipment. 3. Emphasize the neatness of work, the importance of careful handling, maintenance, storing of drawing instruments and equipment. 4. Examine the various sizes of drawing papers. 5. Carry out simple exercise by demonstrating in the studio the use of each instrument. 6. Clean and store the instruments after use.
3.0 **Lines and**	1. Types of lines: Thick and thin	Mount a drawing paper on

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Lettering 1. Illustrate the application of the alphabet of lines and various types of lettering.	continuous, short dash, chain, continuous wavy, short zig-zags and continuous irregular thin lines. 2. Types of lettering:– single line lettering, incline lettering, script lettering, broad pen lettering, stencil (pen guide) lettering.	the drawing table and use appropriate instruments to: 1. draw the various lines horizontally; 2. write various types of lettering; 3. state the uses of each line and lettering. 4. Emphasize using various production drawings (engineering and building should be used to study the application of various lettering styles).
4.0 **Geometric Constructions** 1. Identify and construct, using given data, various geometrical shapes and figures (solid and plane).	1. Division and construction of a line and angles to given ratio and scales. Geometrical shapes and figures and their properties e.g. - Plane figures: e.g. triangles, circles, quadrilaterals, polygons; - Solid shapes: e.g. prisms, pyramids, cones; etc. 2. Tangency – construction and application e.g. engine gaskets, open ended spanner, crane hook, etc. 3. Construction of angles e.g. 15^0, $22½^0$, 30^0, 45^0, 60^0, 90^0, etc. 4. Terms e.g. point, line, segment, arc, etc.	Using the appropriate drawing instruments and equipment to divide a given line into given ratio.
5.0 **Freehand**	1. Functions of sketching e.g.	Use pencil and drawing

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Sketching 1. Explain with sketches the basic principles and requirements of freehand sketches of single objects in isometric and oblique drawings.	- quick means for recording and communicating design ideas; - instrument for the analysis and refinement of design ideas; - means for making quick graphic interpretation of production drawings. 2. Freehand drawing of straight lines, circles, arc and angles. 3. Basic requirements of free hand sketching and use of correct grade of pencil and papers, line quality, neatness and proportion etc. 4. Examples of simple objects to be sketched e.g. vee block, angle plates, hand tools, simple casting and forging, etc.	paper to: 1. State the functions of sketching; 2. Sketch straight line circles, arcs and angles; 3. State the requirements of freehand sketching; 4. Given simple objects in isometric and oblique, etc.
6.0 **Basic Principles of Orthographic Projection** 1. Explain the principles, concept and principal planes of orthographic projections. 2. Draw pictorial view from given orthographic drawings and missing orthographic views.	1. Definition and use of orthographic, projection: e.g. - orthographic projection is the representation of an object in flat planes. - used mainly for working drawings. 2. Concept of angles of projections; - first angle projection; views are drawn on opposite side of view vision. - third angle projection; views are drawn on the same side of vision. - (1^{st} stand 3^{rd} angles have the same shape but in different positions). - second and fourth angle projection view are superimposed and not useful for representation of object.	1. Use model or real objects with each surface painted with different colours to illustrate various planes and views. 2. Produce, using freehand orthographic sketch from given pictorial drawing. 3. Reasons for non-use of the second and fourth angles should be explained. 4. Use appropriate instrument to draw to scale. (i) orthographic views from given pictorial view.
	3. Principal planes of projection.	(ii) pictorial view from

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	- horizontal and vertical planes. 4. Principal views of an object: - elevations (front/back), - end elevations (sides), - plans (top/bottom), - sectional views (sectional elevations and plans)	given orthographic views. (iii) an incomplete or missing orthographic view from two given views. 5. A variety of dimensioned isometric drawings of simple machine casting and forging as well as real objects should be used.
7.0 **Principles of Dimensioning** 1. State the purpose of dimensioning and distinguish between various forms of dimension lines. 2. Dimension simple pictorial and orthographic views.	1. The purpose of dimensioning: - to convey the designers requirement to the production personnel. 2. Forms of dimension lines: - leader dimension lines (should be about 10mm from line of drawing). - extension line (should start with visible space of about 1.5mm and external about 3mm from last dimension line). 3. Application of forms of dimension line on various features of drawing (orthographic and pictorial). 4. Dimensioning of drawings from given datum. 5. Redundant lines e.g. - lines that duplicate dimension or drawn without dimensions on them.	Apply the appropriate dimension line in dimensioning given drawings.
8.0 **Sectioning** 1. State the purpose and methods of	1. The purpose of sectioning. - to expose hidden details and enhance understanding of the designers requirements during	1. Use a cut model or real object to explain sectioning.

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sectioning. 2. Draw correctly the sections of simple casting apply appropriate method.	production. 2. Methods of sectioning (Types) - full-section, half-section, broken out section, removed section and off-set section etc. 3. Drawing of simple casting sections, application and appropriate symbols.	2. Apply the various methods of sectioning to draw the sections of simple casting in isometric. 3. Display cut models and emphasize the symbols and conventions involved in sectioning.
9.0 **Auxiliary** 1. Explain the concept of auxiliary plane and elevation from given principal views.	1. The meaning or auxiliary projection, - is the reflection of an object onto view. 2. Application of auxiliary projection - determine the true size/shape of opening and lengths. - to determine the volume of space occupied by given objects in relation to vertical and horizontal planes and angle of inclination. 3. Demonstration of the concept of auxiliary plane using mirror. 4. Projection of the plane and elevation of indicated and immediate effect - lines, plane surfaces, simple solid objects.	1. Use plain mirror and 'L' shaped plywood structure to represent vertical and horizontal planes during studio demonstration. 2. Draw, using the necessary geometrical construction and instruments the first auxiliary plane and elevation of inclined and uninclined: - lines plane figure (surfaces) simple solid objects.
10.0 **Assembly Drawings** 1. Assemble and make pictorial and orthographic sketches of simple mechanical devices.	1. Simple mechanical devices for assembly drawing practice e.g. - bicycle pump, faucet or tap, pipe joints, etc.	Using real simple mechanical devices to: 1. Dismantle/assemble and note the parts.
	2. Drawing in orthographic, isometric and other pictorial views the dismantled and assembled simple mechanical	2. Take measurement of parts. 3. Make orthographic

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	devices, e.g. - Bolts - Nuts - Washers etc.	pictorial sketches of dismantled parts and assembled devices. 4. Draw to scale the orthographic pictorial projections of the dismantled parts and assembled devices.
11.0 **Plumbing Drawings** 1. Interpret and apply common graphical symbols for plumbing pipes fittings, valves, etc.	1. Plumbing graphical symbols for soils, manhole (surface water), rain water pipe, vent pipe, cold water tank, hot water cylinder, hot or cold water draw off, stop valve, boiler, cooker, sink, bath, wash basin, shower, etc. 2. Types of plumbing joints e.g. - Hepseal joint, cement joint, draw flex joint, sleeve joint, couple joint, screw joint.	1. Use textbooks and Architects manual to list and indicate the symbols of plumbing terms on the drawing paper. 2. Draw the orthographic projections of joints. 3. Draw the plan of one bedroom bungalow to show the layout of plumbing accessories using symbols.

DESCRIPTIVE GEOMETRY (CTD 12)

Topic / Objective	Contents	Activities / Remarks
1.0 **Loci.** 1. Describe, construct and solve problems on link mechanism.	1. Definition of locus of a point. 2. Construction of ellipse, parabola and hyperbola, helix, involute, cycloid curves, etc. 3. Problems and solutions to link mechanism.	1. Draw ellipse, parabola, etc and other link mechanism.
2.0 **True Lengths, Angles and Surface** 1. Determine the true lengths, angles and surfaces from given projected views.	1. Drawing of true lengths. 2. Drawing of true angles e.g. development of hopper, pipes cut at angles, etc.	- Draw the true auxiliary plans and elevations from simple casting or components of machines. - 1st and 2nd auxiliary plan use illustration to state the rule of 1st and 2nd auxiliary plans.
3.0 **Auxiliary Projections** 1. Draw auxiliary plans and elevations from principal views of simple machine components.	1. Projection of auxiliary views e.g. 1st and 2nd auxiliary plans and elevation from normal views. 2. Draw the given position of auxiliary plans and project auxiliary elevations and plans from principal view of a simple machine component.	Draw line of intersection of two meeting surfaces.
4.0 **Intersections and Development** 1. Use auxiliary and cutting plane methods to determine the line of intersection of two meeting surfaces. 2. Explain with sketches the various methods of development.	1. Intersection of surfaces e.g. intersecting cylinders, ducts, prisms, cones, etc. 2. Methods of development. (a) parallel lines for cylinder, ducts, etc. (b) radial line for cones and hopper. (c) triangulation for frustums. 3. Development of simple surfaces e.g. intersecting cylinders, prisms, pyramids, oblique cones, transition pieces (square to square, round to square or rectangular), etc.	- Draw the development of surfaces using appropriate methods. - Use diagrams to show method of determining lines of intersection.

ENGINEERING DRAWING (CTD 11& 13)

Topic/Objective	Contents	Activities/Remarks
1.0 **Symbols and Conventions** 1. Illustrate with sketches the symbols and conventions for building and engineering materials and components.	1. Representation and application of symbols and conventions for engineering materials and components, such as: springs, gears, screw threads, electronic transistors, electronic valves, and tubes, rubber, brass, steel, glass, concrete, cast – iron, etc. 2. Representation and application in drawing various electrical, welding, plumbing and surface finish symbols. 3. The B.S. 308: part 1:1972 conventional methods of: - drawing symmetrical objects, - drawing enlarged part view, - indicating repetitive information - indicating common features such as nut and bolt, set bolt, nut and stud, machine screw, ball and roller bearing, screw threads, shaft and web. 4. The illustration of locking devices such as: lock unit, split pin, taper pin, slotted nut, tab castle nut, ring nut, tab washer, locking plate, grup screw, key and cotters in an assembly.	1. Illustrate with sketches the symbols and conventions for engineering materials and components e.g. springs, gears, screw threads, electronic valves and tubes, brass, glass, concrete, etc. 2. Represent in drawings the symbols for the following: - electrical terms, such as power point switch, switch socket outlet, earth, etc. - welding terms, such as, stop valve, sink, vent pipe, etc. - surface finish term, such as, plated metal, concrete, glass, etc. 3. Draw to scale the orthographic projection (full view and sectional assemblies) of the following machine parts: nut and set bolts, nut and stud, machine screw, ball and roller bearing, screw threads, shaft, and web. 4. Illustrate with sketches and also draw to scale the following locking devices – lock nut, split pin, tapper pin, slotted nuts, castle nut, ring nut, tab washer, locking plate, grup screw keys

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		and cotters in an assembly.
2.0 **Cams** 1. Illustrate with sketches different classes of cams, types of cam followers. 2. Draw the profile and displacement diagram of a cam from a given data.	1. Definition of cam: e.g. cam is a device by means of which a desired controlled motion is produced in conjunction with a follower. 2. Term relating to cams, e.g. contour or profile, bowl, dwell, etc. 3. Classes of cams: - radial (edge of plate) cams. - cylindrical cams. 4. Types and application of followers, e.g. - flat or mushroom surface follower. - roller follower. - knife or vee – shape of follower. 5. Types of cam motion - uniform or linear motion. - harmonic motion. - uniformly accelerated and decelerated motion. 6. Outline of the steps in the construction of plate cam profile, e.g., - note the diameters of shaft, bowl, outer limit field of the cam lift, rise, outer dwell, fall, lift, inner dwell, direction of motion. 7. The displacement diagrams and layout of a cam profile with given data.	1. Illustrate with sketches terms relating to cams e.g. contour or profile, bowl, dwell, etc. 2. Sketch two classes of cams (radial and cylindrical). 3. Sketch three types of followers, e.g. flat surface, roller and knife followers. 4. Illustrate, graphically, types of cam motion, e.g. uniform, harmonic and uniformly accelerated and decelerated motion. 5. Draw the profile and displacement diagram of a cam from given data, e.g. a cam whose shaft is 25mm, 40mm,rise in 12, outer dwell 60, fall in 150, inner dwell 30, with clockwise direction of motion and uniform rate of fall and rise.

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3.0 **Gears** 1. Describe the functions, basic features and application of types of gears. 2. Compute simple calculation involving the use of gear formula. .	1. The functions of gears. 2. The basic features and application of types of gears e.g. involute spur gears - rack and pinion gears. - bevel gears. - worn wheels gears. 3. The definition and illustration of involute spur gear terms e.g. pitch circle, pressure angle, addendum, diametral pitch, circular pitch, etc. 4. Simple calculations involving the use of gear formula e.g, PC, P.C.D =$\frac{1}{D.P}$ 5. Scale drawing of meshing gear profiles from given data.	1. Compute the features such as shape of teeth of types of gears (involute spur gears, rack and pinion gears, bevel gears and worm wheels gears). 2. Illustrate with sketches the types of gear. 3. Illustrate with sketches the involute spur gear terms. 4. Simple calculations involving the use of gear formula e.g. P.C.D. = $\frac{T}{D.P}$ 5. Draw to scale meshing gear profiles for given data, such as pitch circle and pressure angle.
4.0 **Tolerances and Fits** 1. Illustrate with sketches tolerance and the application of tolerance in drawings in accordance with B.S. 308 part 3:1972.	1. The importance of interchanging parts of machinery. 2. The means of achieving interchanging of parts e.g. - use of standards (gauges, comparators) - tolerance specification. 3. Representation, using sketches, the meaning of: tolerance, high limit, limit, normal size, bilateral tolerance and unilateral tolerance. 4. The application of tolerance in drawings in accordance with BS 308 part 3:1972.	1. Illustrate with sketches tolerance terms, e.g. - high limit, lower limit, normal size, bilateral tolerance and unilateral tolerance. 2. Draw to scale the production drawing of given machine parts; dimension the work and indicate the necessary tolerances.
5.0 **Drawing and Reproduction**	1. The stages in the preparation of working drawing e.g.	1. Prepare full and sectional pictorial

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1. Prepare full and sectional pictorial and orthographic drawings of simple machine casting and reproduce in printing device.	- pencil drawing on drawing papers. - tracing in ink or pencil form drawing paper using the tracing paper. 2. Methods of reproduction of drawings, e.g. diazo, true-to-scale, blue print, contact copying, optical copying methods. 3. Preparation of working drawings and Sketches (orthographic and pictorial) of mechanical devices e.g. pump, bench vice, G. clamp, jig, fixture tailstock, tools post, etc. from pencil work to printing stages. 4. Evaluation of quality drawing from print.	drawings form given orthographic views of simple machine casting by drawing in pencil, tracing in pencil or ink and reproduce in printing device (include part list in your design). 2. Prepare full and sectional orthographic drawings of simple machine casting from pencil design to reproduction (include part list if your design). 3. Sketch using free hand the orthographic and pictorial views of mechanical devices e.g. pump, bench vice, G. clamp, jig, fixture, tailstock, tool pest. 4. Trace and print the sketches. 5. Compare the printed Drawings with existing prints for quality printing.
6.0. Electrical Circuit Drawing 1. Describe the functions of electrical and electronic circuit components. 2. Prepare the block	1. The definition and functions of electrical and electronic circuit components, e.g. antenna, and audio transducers, (microphone, loudspeaker, head phone, buzzer), capacitors (fixed and variable),inductance, meter, rectifier (gas filled tube, vacuum tube, solid state), resistor (fixed	1. Discuss the definitions and functions of electrical and electronic circuit components. 2. Illustrate, using sketches, the conventional symbols for the components.

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and schematic diagrams of electrical and electronic circuit and estimate power supply required for a simple dwelling or workshop.	and variable), transistors, transformer, switches, sockets, earth mainfuse board, etc. 2. Illustration of the conventional symbols of the components 3. Preparation of block and schematic diagrams of electrical and electronic circuits e.g. - ignition system of a motor vehicle. - Power supply system of a center lathe. - Radio receiver, and - Television receiver 4. Estimation of power supply requirement for buildings 5. Preparation of electrical installation drawings (surface and conduit wiring system) and fixture schedule for small dwelling and workshop.	3. Prepare the block and schematic diagrams of electrical and or electronic circuits e.g. - ignition systems of a motor vehicle - power supply system of a center lathe. - radio receiver - television receiver. 4. Prepare an estimated power supply required for simple dwelling or workshop. 5. Prepare the electrical installation drawing drawings (surface and conduit wiring system) and fixture schedule for simple building.
7.0. Explode illustrations 1. State the advantages of exploded drawing and sketch the exploded views of simple devices in axonometric, oblique, isometric and perspective.	1. The uses of exploded drawings e.g. - assembling of devices - maintenance/services - guides production - identification of parts 2. The advantages of exploded drawings e.g. - easy assembling of devices - unfamiliar object can be worked. - Clear understanding of a device. 3. Drawing and interpretation of exploded illustrations of simple mechanical devices. 4. Demonstration of exploded sketches of simple objects in pictorial (axonometric, oblique,	1. Discuss the uses and advantages of exploded drawings. 2. Sketch the exploded views of simple devices in axonometric, oblique, isometric and perspective. 3. Compare each pictorial sketches and check for - clarity, and - aesthetic impression 4. Draw, using appropriate drawing instruments, the exploded view of simple mechanical devices (e.g. bicycle pump, bench vice,

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	isometric and perspective) views. 5. Drawing and interpretation of exploded illustration of simple mechanical devices, e.g. bicycle pump, bench vice, machinist clamp, screw jack, etc.	machinist clamp, screw jack, etc) 5. Interpret a given exploded drawing of a device by using it to identify and assemble the parts of the device.

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1.0	**Standard Practice** 1. Recognise and draw commonly used graphical symbols and representation in building drawing. 2. State the standard scales and factors which govern choice of scales	1. Graphical symbol. 2. Lettering style and application standard layout. 3. Title block-essential information standard layout. 4. Dimensioning methods. 5. Factors which govern choice of scale e.g. - Need for lucid working information - Need to achieve economy of effort and time in drawing preparation. - Nature of drawing 6. Range of standard scales for the following site plans, floor plans, elevation, component details	- Draw graphically symbols used in representing building. - Show models of lettering styles - Sketch dimensioning methods in building drawing. - Emphasize symbols contained in BS 1192 or similar Nigerian standard. - Emphasize title block on BS 1192 of similar Nigerian standard.
2.0.	**Draughty Materials and Equipment** 1. Recognise various Standard sizes of drawing material, explain their uses 2. Select appropriate	1. Drawing papers-various standard sizes uses. 2. Triangular and flat scales. 3. Drawing instruments: -drawing pens, lettering, templates, adjustable sets square instrument set, irregular (French) curves, t-square/parallel ruling straight edge/draugting machine etc. 4. Plan printing machine and device	1. Identify appropriate instrument for making building drawings. 2. Emphasize accurate interpretation of details.

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	instruments and use them effectively in the making of building drawings		
3.0	**The use of Computer in Drawing**	1. Identify, classify the history, development, relevance, types of computers. 2. Advantages of the application of various software e.g. Apple, MS-DOS, Auto CAD, Archicad, Power point, Power draw, Corel draw etc. 3. Application of the various software in the drawing of lines and geometrical shapes	1. Explain historical development of computer. 2. Identify suitable computer and soft ware tools for making drawing.
4.0.	**Basic Principles of Design** 1. Explain the concepts of forms, function and beauty as applied in building design	1. Building plan. - form, function, beauty etc. 2. Modern residential bungalow – Basic parts e.g. dinning –room - Bedroom, kitchen, garage (internal or annex), bath/toilet, launderette and store. - Functional relationship - Design requirements 3. Water and sanitary services - installation standards e.g. shower, w.c. sink, bath, water heater, bidet, wash hand basin. 4. Exterior and interior finishes 5. Town planning authority regulations. 6. Site characteristics 7. Floor plan - Characteristics e.g. adequate and properly located openings, good functional relationship etc.	

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		8. Design of Residential building in Nigeria. - Factors influencing the design e.g. site, town planning authority regulations, materials and labour availability, client taste, culture, financial ability - Essential elements of good site plan.	
5.0	**Preliminary Sketch Design** 1. Prepare a preliminary sketch design of a modern bungalow in a survey's plot plan and justify space arrangement.	1. Surveyor's plot plan - Characteristics e.g. solar orientation plot size, access road, prevailing wing etc. 2. Preliminary sketch design of a modern 3-bedroom bungalow. 3. Space arrangement and choice of materials	- Examine survey's plot plan, prepare a preliminary sketch design of a modern 3-bedroom bungalow.
6.0	**Production Drawing** 1. Draw the site and floor plans, elevations and sections of a proposed 3-bedroom bungalow.	1. Floor plan presentation 2. Elevations production e.g. front, rear, left and right - Determination and drawing details of essential sections 3. Foundation plan. 4. Site.	- Draw the following view: - Plan (floor and site) - Elevations - Sections Emphasize that site plan should conform with local authority planning regulation and in particular indicate drainage plan e.g. septic tanks, soak-always, inspection chambers, pipe, lines, boundary wall, access road.
7.	**Components Details** 1. Prepare essential detail	1. Components – floor, beams, lintels, hood railings, screen walls, fire place, boundary wall and gate, plumbing.	- Draw to scales essential details of components. - Prepare working drawings of septic

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	drawings of components	2. Septic tank and soakaway. 3. Interior elevations - Sections e.g. kitchen, launderette - Details of cabinets and work-top.	tank and soakaway. - Draw the interior elevations and sections of the kitchen and launderette.
8.	**Electrical Service Plan** 1. Draw detail plan of the electrical services.	1. Types and location of electrical plan - steel conduit, pvc conduit - M.I.C.S. (Mineral insulated copper sheating) T.R.S. (Tough Rubber Sheating) I.E.E. (Regulations for Electrical Equipment of buildings)	- Demonstrate types of wiring applicable to domestic buildings. - Discuss types of wiring. - Draw the electrical service plan for the bungalow. - Visit building sites and observe types of wiring. - Emphasize safety regulations.
9.0	**Preparation of Schedules** 1. Demonstrate knowledge of the principle and methods of preparing schedules	1. Schedules – meaning of scheduling, uses of schedules, typical subjects for schedules, information in schedule e.g. i. a specification of material, component or activity. ii. the location of these specifications	- Explain the meaning of scheduling and prepare the following schedules: i. Doors ii. Window iii. Electrical installation iv. Plumbing v. Painting vi. Reinforcement
10.0	**Reproduction** 1. Reproduce drawings through tracing and printing.	Plan production: - Inking and tracing - Printing plan from printing machine. - Assessment of quality	- Trace and ink working drawings. - Produce drawings from printing machine and access the quality of work.