**WOODWORK**

**1. PREAMBLE**

The course in Woodwork at the Senior High School level is to enable candidates gain knowledge in the art and craft of woodworking and provide them with basic and necessary skills for technological growth. At this level, the knowledge to be acquired will act as an avenue for further growth during and after school.

It is intended to give students of the subject opportunity to display detailed knowledge of, and skills in

1. technical drawing and designing;
2. practical work;
3. methods and principles of construction;
4. quality control, estimation and costing.

**2. AIMS**

Candidates are expected to demonstrate

(1) creative ability, mental and practical skills in the use of hand and machine tools for construction of basic items using wood and related materials;

(2) good basic knowledge of design and reading of working drawings;

(3) ability to plan and follow a sequence of work operations which are necessary to lead to successful completion of projects;

(4) functional skills capable of providing a means of livelihood in woodworking;

(5) awareness of problems relating to wood and the wood industry;

**3. ASSESSMENT OBJECTIVES**

1. Candidates should be able to demonstrate knowledge and understanding of:
2. terminologies used in woodwork;
3. materials used in woodwork;
4. care and maintenance of hand tools and machines;
5. safety precautions at the workshop;
6. principles of designing and drawing;
7. methods and principles of construction.
8. Candidates should be able to demonstrate the ability to
9. follow a given design brief to produce working drawings;
10. interpret working drawings;
11. use tools, equipment and materials to carry out practical operations in sequential order;
12. prepare surfaces and apply appropriate finishes.

(3) Candidates should be able to:

1. compare features of different items and make comments or judgment, contrast, justify, support or criticize a job;
2. write appraisal report on artefacts.

4.  **STRUCTURE AND SCHEME OF EXAMINATION**

There will be three papers, papers 1, 2 and 3 all of which must be taken. Papers 1 and 2 will composite paper to be taken at a sitting.

**PAPER 1**: will consist of forty multiple-choice objective questions all of which must be answered within 40 minutes for 40 marks.

**PAPER 2**: will consist of theory and design paper of two sections, Sections A and B to be taken within 2hours 20 minutes.

Section A will be short structured questions in three parts. Parts I, II and III as follows:

* Part I will be for candidates in Ghana only.
* Part II will be for candidates in Nigeria, Sierra Leone and The Gambia.
* Part III will be for all candidates. It will comprise of two questions out of which all candidates will be required to answer one.

Section B: shall comprise design and drawing questions, all of which must be answered within 1 hour 40 minutes for 40 marks.

**PAPER 3:** will be a practical test lasting 3 hours. Candidates will be required to make a test piece for which the appropriate drawings will be supplied. It will carry 100 marks.

**5. DETAILED SYLLABUS**

1. **PRACTICAL**
2. The practical activities would require the use of

common hand tools;

1. common hand tools;
2. portable power tools and basic woodworking machines;
3. different joints and shapes;
4. nails, screws and other fasteners and fittings;
5. solid wood, manufactured boards and non-wood materials.

2. Candidates will be required to work from dimensioned sketches, written descriptions or working drawings. They are expected to be able to construct the following joints:

(a) Widening joints – e.g. plain/simple butt, dowelled, tongued and grooved, rebated butt.

1. Angle joints
   1. box-like construction, e.g. common and lapped dovetail, pin joints.
   2. Shelf-like construction, e.g. housing joints, pinned joints, dowelled,

plain mitre.

1. Framing joints – e.g. mortise and tenon, bridle and lapped joints, mitre, dowelled.

Candidates will also be expected to be able to perform the following operations:

(i) cutting – e.g. ripping, cross-cutting;

(ii) planing – e.g. surfacing, thicknessing;

1. shaping – e.g. chamfering, rounding and tapering;
2. assembling and finishing – e.g. testing for squareness, parallelism, use of

diagonals, trial assembly, cramping methods, preparation of surfaces and application of finishes.

**B. THEORY**

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| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 1. | General Workshop Safety | (a) Personal safety  precautions.  (b) General Workshop safety  regulations.  (c) Safety devices and  appliances.  (d) Hand tool safety.  (e) Machine safety:  (i) General machine shop  safety;  (ii) Safety precautions in  the use of portable  power tools and  machines;  (iii) Safety in machines  operations;  (iv) Prevention of  mechanical faults.  (f) First aid. | Types and uses  Safety precautions in carrying, storing, and handling hand tools.  Materials and administration. |
| 2. | Hand tools | (a) Types  (b) Classification:  geometrical, holding and  supporting, impelling and  percussion, cutting,       boring, abrading and       scraping tools. | To include identification, description and sketching. |
| 3. | Special Purpose Hand tools. | Types and uses:   * Planes: spokeshaves rebate Plane, Plough plane, block plane, shoulder plane etc. * Saws: bow saw, pad/ keyhole saw, coping saw, fret saw. * Boring bit: expansion bit, forstner bit, countersink bit, auger bit, etc. * Shapers: scrapers, rasps, surforms, etc. | To include identification, description and sketching. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 4. | Portable Power tools. | (a) Types: Power drill, jig  saw, spray gun, screw  driver, sanders, router,  power circular saw, etc.  (b) Uses. | To include identification, description, care and safe use. |
| 5. | Woodworking machines. | (a) Types: Circular saw,  crosscut saw,  thicknesser, surface  planer, mortiser, lathe,  grinding wheel, drilling         machine, etc.  (b) Uses.  (c) Safety Precautions. | To include identification, description, care and safe use.  To include the use of guards, fences, push sticks, push blocks, gauges etc. |
| 6. | Maintenance | (a) Types: corrective,  routine, predictive and  preventive.  (b) Reasons for maintenance  (c) Maintenance of hand  tools.  (d) Maintenance of  machines. | To include maintenance activities, materials and tools.  To include oiling, sharpening, repairing, storing etc.  To include cleaning, oiling, servicing, replacing parts etc. |
| 7. | West African Timbers in common use. | (a) Timber growth and  structure.  (b) Common West African  Timbers e.g. Iroko  (Odum), abura,  mahogany, obeche  (Wawa), African walnut,  afara, ebony, danta,  emery, shedua,  mansonia, cedar,  afromosia (kokrodua),  avodire, kusia.  (c) Characteristics.  (d) Uses | Structure to include classification, e.g. soft/hardwoods. Parts and their functions  Surface, working and mechanical qualities, similarities and differences.  Specific uses. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 8. | Timber Conversion | (a) Explanation.  (b) Conversion methods:  (i) plain/through and  through/live sawing;  (ii)Tangential/back/flat/  rake sawing  (iii)Quarter/radial/rift  sawing;  (c) Common market sizes:  log, plank, scantling,  board, batten, strip/lath,  squares. | Characteristics, advantages and disadvantages of each method.  Including, identification description and uses. |
| 9. | Timber seasoning | (a) Explanation.  (b) Reasons for seasoning  (c) Methods of seasoning:  Natural/open air ,  artificial/kiln, water and  chemical seasoning.  (d) Determination of  moisture content:  (i) moisture meter  method;  (ii) oven dry method. | Advantages and disadvantages of each method.  Advantages and disadvantages of each method.  Calculation of percentage moisture content. |
| 10. | Timber defects | (a) Explanation of timber        defect.  (b) Types of defects  (i) natural growth defects;  (ii) felling defects;  (iii) conversion defects;  (iv) seasoning defects;  (v) defects caused by  Organisms. | Causes, prevention, remedies, description and sketching. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 11. | Timber preservation | (a) Reasons for preserving  timber.  (b) Common timber  preservatives  (c) Properties of a good  timber preservative  (d) Methods of applying  timber preservatives:  brushing, dipping,  spraying etc. | To include specific uses.  Advantages and disadvantages of each method. |
| 12. | Manufactured boards | (i) types;  (ii) structure;  (iii) characteristics  (iv) uses. | To include description and uses.  Advantages and disadvantages of each type. |
| 13. | Timber Preparation | (a) Selection of tools and  machines  (b) Operational sequence:  (i) hand preparation;  (ii) machine preparation. | To include practical preparation of stock. |
| 14. | Woodwork joints | Classification:  (i) widening joints: simple  butt, dowel, tongued and  grooved, loose tongue,  rebated butt etc.  (ii) angle joints: mortise and  tenon, dowelled butt,  dovetails, housing,  halving etc.  (iii) framing joints: mortise  and tenon, bridle, plain  mitre, dowelled butt,  halving etc. | To include identification, description, sketching, construction, specific use etc. |
| 15. | Wood finishes and finishing. | Wood finishes:  (i) types: fillers, stains,  paints, varnishes,  lacquers, polishes etc.  (ii) application of finishes:   * surface preparation; * tools; * methods: brushing,   spraying, dipping, etc. | To include:  (i) properties, characteristics         and uses of each.  To include:  (i) stages and tools for each        method.  (ii) Safety precautions. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 16. | Wood abrasives | (a) Meaning  (b) Grades: coarse, medium  and fine.  (c) Selection and uses. | Identification, selection and uses.  To include specific application of each grade. |
| 17. | Wood adhesives | Types:  (a) protein: animal, casein  (b) synthetic resins: urea,  phenol and melamine  formaldehydes, epoxyl  resins, polyvinyl acetate  (PVA).  (c) contact/rubber based | To include characteristics, uses, preparation and application and safety precaution during application. |
| 18. | Wood fittings and fasteners | (a) Fittings: e.g. hinges,  locks, handles, bolts,  catches, etc.  (b) Fasteners: Nails, screws,  bolts and nuts, corrugated  fasteners etc. | To include identification, description, sketching, uses, application, fixing etc.  To include identification, description, sketching, uses, application, fixing etc. |
| 19. | Non-wood materials | Types: Glass, plastics, rubber,  ceramics, metal,  leather, etc. | To include identification, description, characteristics, uses and other types of each. |
| 20. | Veneers and Veneering | (a) Veneers: Types  Production.  (b) Veneering:  (i) Methods: hammer,                  press.  (ii) Tools: veneer                    hammer,  pressing iron,  cramps, caul,                            etc. | To include identification, description and uses.  To include the processes for each method.  To include identification, description, sketching and uses. |
| 21. | Wood shaping and bending. | (a) Shaping: Rounding,  moulding, bevelling,  chamfering, tapering,  carving, etc.   1. Bending: Solid, laminated | To include identification, description, sketching, processes, techniques, tools and machines, properties of wood suitable for each. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 22. | Design and Drawing | (a) Concept of design;  (b) Design fundamentals and  processes;  (c) Free hand sketching;  (e) Working drawings;  (f) Cutting list and bill of  materials;  (g) Basic draftsmanship  skills. | Working drawings in the First and Third Angle orthographic projections. Indication of cutting correct sectional representation of the materials are assential. |
| 23. | Project Design and Construction. | (a) Identification and  analysis of given design  problems.  (b) Designing to solve the  problems.  (c) Estimating the cost of the  design.  (d) Constructing to meet the  design specification. | Design problems should arise from customer needs, market survey, situation analysis, etc.  To include evaluating the product to meet design purpose and specification. |
| 24. | Upholstery | (a) Upholstery work.  (b) Hand tools and machines:  needles, pair of scissors,  hammer, webbing  stretcher, sewing  machine, buttoning  machine.  (c) Materials e.g. for framing,  stuffing/padding,  covering, decorating.  (d) Processes and techniques:  framing, padding,  covering, finishing,  decoration, etc. | To include description, types and parts.  Identification, description, sketching, care and uses.  To be applied in constructing upholstery project. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
| 25. | Wood turning | (a) The wood lathe: Parts and  accessories.  (b) Turning tools: chisels,  gouges, calipers, etc.  (c) Turning operations: face  plate turning, turning  between centres and  boring.  (d) Suitable wood for turning:  abura, ebony, mahogany,  etc.  (e) Projects: vase, bowl,  candle holder, etc. | Identification, description, sketching, care, uses and safe use.  To include identification and specific use.  To include description and actual turning. |
| 26. | Wood carving and sculpture | (a) Carving: incise and relief.  (b) Sculpture: Production of  simple ornaments.  (c) Tools e.g. chisels,  gouges, knives, files, etc. | To include description, identification, application and processes.  To include identification, sketching and uses. |
| 27. | Surface Decoration | Types: inlaying, veneering,  marquetry, lamination,  laminated plastics,  mouldings, etc. | Identification, description, processes, techniques and application. |
| 28. | Mass Production | (a) Concept and principles.  (b) Processes: Market  survey, design,  production, quality  assurance,  sales/marketing,  management,  procurement, cost  estimation, tooling up for  production. | To include mass production terms, e.g. templates, fixtures, trial run, departments, section, prototype, quality control, etc.  Basic knowledge of the concepts required. |
| **S/NO.** | **TOPIC** | **CONTENT** | **NOTES** |
|  | **FOR CANDIDATES IN NIGERIA ONLY** | | |
| 29. | Entrepreneurship in Woodworking. | (a) Types of business  organisation e.g. sole  proprietorship,  partnership, cooperatives  etc.  (b) Business opportunities in  Woodworking: e.g.  merchandizing, spray  painting, upholstery  work, wood turning.  (c) Business plans: format  and content.  (d) Sources of fund e.g.          gifts,  personal savings, loans,  inheritance, cooperatives  etc. | To include characteristic advantages and disadvantages.  To include sample plans.  To include benefits and the risks. |

**RECOMMENDED TOOLS AND MACHINES**

A. HAND TOOLS

1. Try square 25. Beveled edge chisels

2. Marking gauge 26. Firmer chisels

3. Mortise gauge 27. Mortise chisels

4. Mitre square 28. Pairing chisels

5. Sliding bevel 29. Claw Hammer

6. Pair of compasses 30. Ball pen hammer

7. Pair of dividers 31. Tack hammer

8. Pair of callipers 32. Braces (ordinary and ratchet)

9. G-Cramps 33. Brace bits

10. Sash Cramps 34. Hand drill(s)

11. F-Cramps 35. Drill bit(s)

12. Work Bench 36. Screw driver sets

13. Rip saw 37. Mallets

14. Crosscut saw 38. Rasps

15. Panel saw 39. Files

16. Dovetail saw 40. Surforms

17. Tenon saw 41. Plough planes

18. Coping saw 42. Rebate planes

19. Fret saw 43. Bullnose Rebate plane

20. Nest of saws 44. Pair of scissors

21. Jack plane 45. Upholstery hammer

22. Smooth plane 46. Webbing stretcher

23. Block plane 47. Needles (straight, curved)

24. Try plane 48. Staplers

B. WOODWORKING MACHINES

1. Cross-cut saw
2. Circular saw bench
3. Dimension saw
4. Band saw

C. PORTABLE POWER TOOLS

1. Plane
2. Router
3. Jig saw
4. Circular saw
5. Power drill
6. Sanders (orbital, belt, disc)

**SUGGESTED READING LIST**

1. Woodwork in Theory and Practice – John A. Walton, Australian Publishing

Company.

2. Woodwork Design and Practice – David M. Shaw – Hodder and Stoughton

3. Woodwork by G. N Green

4. Basic Principles of Woodwork Design and Drawing – Emmanuel A. Nnenji

Aranke woods

5. Practical Upholstery – C. Howes F.A. M.U

Evans Brothers Limited, London.

6. General Certificate Woodwork by H. E. King

7. Fundamentals of Woodworking by Nurudeen et all

8. Woodwork by G. W. Brazier and H. A. Harris

9. Advance Woodworking and Furniture Making by J. Fierre and G. Hutchings

10. Woodwork for Senior Secondary School by CESAC

11. Woodwork for Senior Secondary School by J. N. K. Sackey, G. Manu and R. Y. Baafi

12. Woodwork Made Simple by Tom Pettit

13. Woodwork Technology by John Strefford Guy McMurdo

14. Woodwork by E. J. Wunter

15. Woodwork Technology by J. K. N. Sackey

16. Woodworker’s Pocket Book by Charles H. Hayford

17. Collins complete woodworker’s Manual by Jackson Albert and Day David