CONSTRUCTION STUDIES

Ordinary Level and Higher Level Courses

Aims

The courses have been designed so as

(a) to introduce pupils to the knowledge and skills involved in construction technology and construction materials and practices; through theoretical study and integrated practical projects;

(b) to develop the pupils' ability to communicate ideas and information by appropriate methods, and to encourage them to apply accurate observation and scientific investigation through the exploration of materials and processes;

(c) to contribute towards their general education, and

(d) to provide a basis for those who may wish to study construction technology at third level.

The study of the subject should be primarily related to domestic buildings. It is, however, expected that the teacher will deal with the subject in its broader aspects. Regard should be had to Consumer Education as, for example, in considering the merits and demerits of materials and assembly details. Pupils should be encouraged to develop positive attitudes to their architectural heritage and the impact of the construction industry on the environment.

Form of the Examination

The examination will consist of

Part I: An Ordinary Level and a Higher Level written-paper, including a compulsory drawing question in each case.

Part II: A practical test.

Part III: An assessment of workshop/laboratory work and projects.

Parts II and III will each be marked out of 150 marks. Part I will be marked out of 200 marks at Ordinary Level and out of 300 marks at Higher Level. The grades awarded in the subject will be based on the aggregate marks obtained in the three parts.

Note: Candidates studying Construction Studies in the Leaving Certificate Vocational Programme may also study from the material in Appendix 1 as shown at the end of this section. Examination questions in relation to this appendix will be optional.
SYLLABUS

N.B. The parts of the syllabus which are in *italics* will not be examined at Ordinary Level.

**Part 1 – Construction Theory and Drawings**

**General**


**Substructure**


**Superstructure**


Conventional types of windows, component parts and ironmongery. Choice of windows. Details of head, sills and jambs of casement windows. Types of glass and methods of glazing. Basic door types, component parts and ironmongery. Door schedules including ironmongery. Sizes of doors, door sets and openings. Details at head, threshold and jambs.

Internal Construction

Elements of internal construction. Function and construction of internal walls. Details of brick and block internal walls and openings. Finishes for walls.


Constituent parts and lay out of stairs with landings. Constructional details of rise, going, handrail, height and headroom.

Construction of stud partitions: Details of finishes, fixings and openings. Factors affecting choice of door type. Door schedules including ironmongery. Internal door details at head and jamb including fixing, provision for second fixing and finishes.


Services and External Works

Provision required in substructure for entry and outlet of services. Characteristics of materials used in service installations. Protection of service installations against physical and climatic damage.


Collection and removal of surface water from roofs and paved areas. Fixing and joining eaves, gutters and rainwater pipes. Principal types of effluent and their characteristics. Construction and principles of underground drainage systems. Selection of sanitary fitments. Space required for installation and services. Waste and water connections to these fitments. Single stack system of above ground drainage. Details of separate and combined systems. Septic tanks. Methods of laying rigid and flexible drains.

Construction of flues to domestic fireplaces: Details of ground floor open fireplaces including junction with a suspended timber floor.

Layout of typical domestic electrical installation including power and lighting circuits: Types and sizes of cables used in domestic installations. Protection of circuits. Consumer control gear and equipment required by the Electricity Supply Board at the intake position.
Heat and Thermal Effects in Buildings


Illumination in Buildings

The way we see. Nature of light, Reflection, Refraction, Concept of illumination.


Sound in Buildings

The way we hear. The nature and propagation of sound waves in solids, liquids and gasses. Absolute quantities of sound power, sound intensity and sound pressure. Response of the ear. Threshold of audibility.


Part II – Practical Skills

The aim of the syllabus is to develop a sound grasp of woodworking techniques and skills based on practical experience. The practical test in the examination will be an extension of Woodwork at Intermediate Certificate level and will test the candidates’ knowledge and experience of equipment and processes through tests which will be largely based on workshop practice. All drawings will be in accordance with BS 1192, 1969.

Tools

The need for maintenance and for care in the use of tools. Common woodworking tools and their uses, construction and mechanical principles. Grinding, sharpening and general maintenance of workshop equipment. Safety precautions associated with edged tools and electricity.

Processes

Construction of types of joint used in partitions, floors, stairs, roofs, structural timbers, doors, windows, frames, box and carcase construction and simple fitments. Methods of jointing boards together. Correct use of manufactured boards. Storage methods.

The principles underlying the choice of the above joints for strength, resistance to stress and strain, ease of assembly and decorative effect. Measuring and testing for accuracy. Surface preparation and finishing.

The preparation of cutting lists and the use of the setting-out rod. Workshop preparation and the selection and use of glues and adhesives. Methods of holding and supporting work. The design and use of jigs to facilitate the operation of cutting and locating.

Part III – Course Work and Projects

The aim of the course work is to develop the pupils’ ability to put their knowledge of theory into practice using forms of construction and concepts outlined in the syllabus.

As part of their study of the subject, pupils are required to carry out the following two main types of workshop/laboratory work;

(a) experiments which are assigned and closely supervised by the teacher.

and

(b) projects in which the pupils are given a degree of freedom in carrying out their tasks.

Pupils must submit:

(a) workshop/laboratory course work reports on assignments carried out
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and

(b) the result of a project undertaken during the course.

The project may be

(i) a Building Detail, incorporating a minimum of three craft practices,

   or

(ii) a Building Science Project relating to craft practice,

   or

(iii) a Written/Drawn Project relating to the craft heritage of the architectural heritage or
     the built environment.

Projects must be supported by written reports in the case of (i) and (ii) and by an element of
practical work in the case of (iii) e.g. a scale model or detail from the subject under
investigation.

The following factors will be taken into consideration when projects and course work are
being assessed:

(i) Manipulative skills;

(ii) Selection, care and maintenance of equipment

(iii) The ability to design an appropriate plan of procedure;

(iv) The ability to plan or carry out simple experiments to test and/or compare building materials and assembly details;

(v) The ability to draw conclusions from practical experience and from information produced by practical work;

(vi) The ability to present project and course work.

As far as possible, pupils should submit individual assignments and projects. In cases where
pupils undertake joint coursework, each pupil must keep records of the complete project or
experimental assignment.

Suggested Experiments:

As a guide to teachers the following list has been compiled. It is not intended that all of these
experiments must be done, nor is it intended to exclude other experiments which a teacher may
find suitable. The order in which the experiments are listed here does not specify the sequence to
be followed by the teacher.
Characteristics of soft and hard woods: seasoning and storing; characteristics of manufactured boards. Grading of timber.

Basic types of glues and adhesives and their use: Properties and requirements of glues and adhesives. Selection of appropriate glue or adhesive for a given situation.

Poor structure of typical building materials: Methods of measuring porosity, rate of water absorption, surface tension, capillarity, permeability, saturation coefficient. Crystallisation, efflorescence, disruptive effect of sulphate action on stone mortars, bricks and concrete. Sources of sulphates.

Voids in granular materials; grading of sands and aggregates, effect of grading on mortar and concrete mixes. Concrete – reduction on volume on mixing, relation between (a) strength and density and (b) strength and water cement ratio.

Setting of gypsum and portland cement as examples of hydration. Use of retarders and accelerators, heat of hydration, strength-time relation, strength tests. Setting of lime, determination of insoluble and soluble matters, fineness, soundness and hydraulic strength tests.

Pigments, tinting strength, light fastness, bleeding characteristics; particle size and shape, thermal stability. Solvents – abrasion resistance, drying time, opacity.


Nature and effects of heat: transmission of heat thermometry, calorimetry co-efficient of thermal conductivity, temperature gradients through composite constructions.

Nature of light reflection, refraction, photometry, daylighting, illumination, light source, measurement of light

Electrical circuits: measurement of electricity, generators, motors, earthing considerations.

Acoustics: attenuation of noise at source. Reverberation

Other topics selected from the syllabus.

The following textbooks and reference books may be found useful by pupils or teachers.

Textbooks

Grundy  Construction Technology Volumes (i) and (ii)  Edward Arnold

R. McMullen  Environmental Science in Building  Macmillan
CONSTRUCTION STUDIES - Appendix 1

For the Leaving Certificate Vocational Programme the Construction Studies syllabus will be that set out in the Rules and Programme for Secondary Schools. The workshop/laboratory work and projects listed should emphasise technological applications and good design practice. The following has been compiled as a guide for teachers.

Design

The components of design problems: Descriptions of the design process. Measurement criteria and judgement in design. Design problems and design solutions. The application of simple aesthetic principles related to the appearance of buildings.

Functions of models in design: Models as graphic aids in design. Uses of modelmaking materials and finishes. Design presentation models.

Designing with computers: Simple working drawings on screen and plotter. Hardware. Software.
Structures

**Structural forms**: Projects in relation to space frames, wide-span structures, air-supported membranes, curved and doubly-curved membranes, cable nets, cable-supported roofs, domes, bridges, etc.,. The relationship between some of these forms and ones that occur in nature.

**Structural functions**: The ability of simple structures to resist dead loads and dynamic loads. Structural tests/analyses using models and test rigs.

New Technology Applications

The principles of electronic control circuits and devices and their applications in relation to models and mechanisms. The operation, control and management of computer aided machine. The role of block models in computer-aided manufacture.

Marketing

The establishment of school-based enterprise activities. Market research, cost analyses, and quality control. Sales techniques including presentation and exhibition of goods.