

IVQs in Construction (6165)

Level 2 IVQ Technician Certificate in Construction
(6165-10) (500/5790/X)

Qualification handbook for centres



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Important notice

Following the accreditation of the Technician IVQs in Construction (6165) on the National Qualifications Framework of England, Wales and Northern Ireland (NQF), some changes have been made to the qualification, at the request of the Office of the Qualifications and Examinations Regulator (Ofqual), the qualifications regulator in England.

These changes took effect on 1 June 2009 and are outlined on this page.

Note: the content of the qualifications has not changed following accreditation.

Changes to the qualification title

The qualification title has changed as follows:

Technician Certificate in Construction (6165-10)
changed to

Level 2 IVQ Technician Certificate in Construction (6165-10)

Accreditation number: 500/5790/X

Changes to the unit titles

Following the accreditation of Technician IVQs in Construction, each unit has been given an accreditation reference number which will appear on the Certificate of Unit Credit.

The content of the units is unchanged.

Level 2 IVQ Technician Certificate in Construction (6165-10)

Accreditation number: 500/5790/X

Mandatory units

J/502/2729 – Core Construction Skills Principles

A/502/2730 – Basic Construction Skills Principles

F/502/2731 – Core Construction Skills Practice

R/502/2782 – Construction Technician Principles 1

Y/502/2783 – Construction Technician Practice 1

Optional units (one required)

M/502/2739 – Timber Vocations Basic Skills Practice

L/502/2733 – Trowel Vocations Basic Skills Practice

R/502/2734 – Painting and Decorating Basic Skills Practice

Y/502/2735 – Plumbing Basic Skills Practice

D/502/2736 – Refrigeration and Air Conditioning Basic Skills Practice

H/502/2737 – Electrical and Electronic Basic Skills Practice

Registration for theory examination

Registration process for the theory examination has not changed.

Result submission for practical assessment

Result submission process for the practical assessments has not changed.

Change to the grading

The grade 'Credit' has been changed to 'Merit'. All other grades are unchanged. The content of the units concerned is also unchanged.

Notification of Candidate Results (NCR) and Certificate of Unit Credit (CUC)

Notification of Candidate Results (NCR) and Certificate of Unit Credit (CUCs) continue to be available on completion of each assessment (theory or practical).

Final certificate will be issued on successful completion of all the required assessments.

'Theory only' route

The 'Theory only' route continues to be available as an unaccredited qualification.

Changes to the certificate layout

Certificates issued on completion of an accredited IVQ show the accredited title and the accreditation number for the qualification. The level in the accredited title refers to the NQF level the qualification is accredited at.

The certificate also lists all the units achieved, including the grade and the unit accreditation number.

The certificate carries the logos of the regulatory authorities in England, Wales and Northern Ireland indicating that the NQF accreditation only applies to these countries.

Levels of City & Guilds qualifications

All City & Guilds qualifications are part of an integrated progressive structure of awards arranged over eight levels, allowing people to progress from foundation to the highest level of professional competence. Senior awards, at levels 4 to 7, recognise outstanding achievement in industry, commerce and the public services. They offer a progressive vocational, rather than academic, route to professional qualifications. An indication of the different levels and their significance is given below.

NQF level#	City & Guilds qualifications/programmes	Other qualifications*
8	Fellowship (FCGI)	Doctorate
7	Membership (MCGI) Master Professional Diploma Level 5 vocational awards NVQ/SVQ Level 5	Master's Degree Postgraduate Diploma Postgraduate Certificate
6	Graduateship (GCGI) Associateship (ACGI)**	Bachelor's Degree Graduate Certificate and Diploma
5	Level 5 IVQ Advanced Technician Diploma Full Technological Diploma	Higher National Diplomas Foundation Degree Diplomas of Higher and Further Education
4	Licentiatehip (LCGI) Higher Professional Diploma Level 4 vocational awards NVQ/SVQ Level 4	Certificate of Higher Education
3	Level 3 IVQ Advanced Diploma Level 3 IVQ Specialist Advanced Diploma*** Level 3 IVQ Technician Diploma Level 3 vocational awards NVQ/SVQ Level 3	A Level Scottish Higher Advanced National Certificate in Education BTEC National Certificate/Diploma
2	Level 2 IVQ Diploma Level 2 IVQ Specialist Diploma*** Level 2 IVQ Technician Certificate Level 2 vocational awards NVQ/SVQ Level 2	GCSE grades A*-C Scottish Intermediate 2/Credit 5 Grade BTEC First Certificate
1	Level 1 IVQ Certificate Level 1 vocational awards NVQ/SVQ Level 1	GCSE grades D-G Scottish Intermediate 1/General 5 Grade Scottish Access 1 and 2

National Qualifications Framework of England, Wales and Northern Ireland (NQF)

* Broad comparability in level

** Only graduates of the City & Guilds College, Imperial College of Science, Technology and Medicine, are awarded the Associateship (ACGI)

*** Part of a new qualification structure which is being introduced across the IVQ provision

IVQ International Vocational Qualifications

NVQ National Vocational Qualifications

IVQ in Construction Industry 6165

About City & Guilds

We provide assessment and certification services for schools and colleges, business and industry, trade associations and government agencies in more than 100 countries. We have over 120 years of experience in identifying training needs, developing assessment materials, carrying out assessments and training assessment staff. We award certificates to people who have shown they have mastered skills that are based on world-class standards set by industry. City & Guilds International provides a particular service to customers around the world who need high quality assessments and certification.

Introduction to this programme

We have designed the Technician Certificate in Construction programme for those undergoing training or employed in this area of work. The programme aims to reflect the international nature of the knowledge and skills and activities needed for different countries or cultures.

We do not say the amount of time a candidate would need to carry out the programme, but we do provide advice on guided learning hours for each level (see below). The programme has three levels.

Certificate

The certificate (about 375 guided learning hours) provides a broad introduction to the theory and practical side of construction for a person beginning an academic training programme.

Diploma

The diploma (about 720 guided learning hours) provides more practice involving a broader range of skills appropriate to a person who will be working independently.

Advanced Diploma

The advanced diploma (about 660 guided learning hours) takes these skills to the level appropriate for a person preparing for or working in a supervisory or management role.

We stress that these figures are only a guideline and that we award certificates and diplomas for gaining and showing skills by whatever mode of study, and not for periods of time spent in study.

We provide certificates for all work-related areas at seven levels within our structure of awards shown in appendix B. This programme covers level 2. The standards and assessments for the diploma (level 3) and the advanced diploma (level 4) are published separately.

Full Technological Diploma

We will award the Full Technological Diploma (FTD) in Construction to someone who is at least 21, who has had at least two years relevant industrial experience, and who has successfully finished the assessments for the diploma and advanced diploma levels of this award. If candidates enter for this diploma, they must also send us a portfolio of evidence to support their application.

Making entries for assessments

Candidates can only be entered for the assessments in this subject if the approved examination centres agree. Candidates must enter through an examination centre we have approved to carry out the assessments for 6165 Technician Certificate in Construction.

There are two ways of entering candidates for assessments.

Internal candidates

Candidates can enter for examinations if they are taking or have already finished a course at a school, college or similar training institution that has directed their preparation whether by going to a training centre, working with another institution, or by open learning methods.

External candidates

These are candidates who have not finished a programme as described above. The examination centres must receive their application for entry well before the date of the examination concerned. This allows them to act on any advice you give about assessment arrangements or any further preparation needed. External candidates must carry out practical assessments and projects if necessary, and they will need extra time and guidance to make sure that they meet all the requirements for this part of the assessment.

In this publication we use the term 'centre' to mean a school, college, place of work or other institution.

Resources

If you want to use this programme as the basis for a course, you must read this booklet and make sure that you have the staff and equipment to carry out all parts of the programme. If there are no facilities for realistic practical work, we strongly recommend that you develop links with local industry to provide opportunities for hands-on experience.

Assessments

There is one level of this award.

Certificate

We use a numbering system to allow entries to be made for our awards. The numbers used for this programme are as follows.

Award number

6165-10 Technician Certificate in Construction

We use award numbers to describe the subject and level of the award.

Component numbers

001	Core Skills Principles
002	Basic Construction Skills Principles
011	Construction Technician Principles 1
101	Core Skills Practice
102	Timber Vocations Basic Skills
103	Trowel Vocations Basic Skills
104	Painting and Decorating Basic Skills
105	Plumbing Basic Skills
106	Refrigeration and Air Conditioning Basic Skills
107	Electrical Installation Basic Skills
111	Construction Technician Practice 1

We use component numbers to show units for which we may award a certificate of unit credit.

We use these numbers throughout this booklet. You must use these numbers correctly if you send forms to us.

Technician Certificate in Construction

To carry out what is needed for the Technician Certificate in Construction, candidates must be successful in all of the following assessments.

6165-10-001	Core Skills Principles (written multiple choice paper which lasts one hour)
6165-10-002	Basic Construction Skills Principles (written multiple choice paper which lasts one and a half hours)
6165-10-011	Construction Technician Principles 1 (written multiple choice paper which lasts two and a half hours)
[6165-10-101]	Core Skills Practice
[6165-10-111]	Construction Technician Practice 1

(Total three written papers)

Candidates must also be successful in any one of the following practical assessments.

[6165-10-102]	Timber Vocations Basic Skills
[6165-10-103]	Trowel Vocations Basic Skills
[6165-10-104]	Painting and Decorating Basic Skills
[6165-10-105]	Plumbing Basic Skills
[6165-10-106]	Refrigeration and Air Conditioning Basic Skills
[6165-10-107]	Electrical Installation Basic Skills

The practical assessment is carried out during the learning programme and should be finished by the date of the written examination so you can send all the results to us. (See appendix A.)

If you have results to confirm that candidates have successfully completed any of the above assessments in the 6161 certificate level programme, they will not have to do them again in the 6165 programme.

We provide assessments in two ways.

a Fixed date

These are assessments which are carried out on dates and times we set. These assessments have no brackets around their numbers.

b Free date

These are assessments which are carried out at a college or other training establishment on a date or over a period which the college chooses. These assessments have brackets around their numbers.

In this programme the written assessment is fixed date. The practical assessments are free date.

You must carry out assessments according to our International Directory of Assessments and Awards. If there are any differences between information in this publication and the current directory, the Directory has the most up-to-date information.

Results and certification

Everyone who enters for our certificates, diplomas and advanced diplomas receives a 'Notification of Candidate Results' giving details of how they performed.

If candidates successfully finish any assessment within this programme (for example, any one of the examination papers) they will receive a certificate of unit credit towards the certificate for which they are aiming. We grade course work assessments as pass or fail. We grade written assessments on the basis of fail, pass, credit or distinction. The certificate of unit credit will not mention assessments which they do not enter, which they failed or from which they were absent.

Each certificate clearly states what candidates need for full certification at the relevant level, allowing schools, colleges and employers to see whether they have met the full requirements.

If candidates successfully finish all the requirements for a full certificate, they will automatically receive the appropriate certificate.

We will send the 'Notification of Candidate Results', certificates of unit credit and certificates to the examination centre to be awarded to successful candidates. It is your responsibility to give the candidates the certificates. If candidates have a question about the results and certificates, they must contact you. You may then contact us if necessary.

We will also send you a results list showing how all candidates performed.

How to offer this programme

To offer this programme you must get approval from us. There are two categories of approval.

Subject approval

We give approval to offer a teaching course based on this syllabus.

Examination centre approval

We give approval to enter candidates for examinations.

To be approved by us to offer a teaching course you must send us the application form.

To enter candidates for examinations you must be approved by us as an examination centre. For this programme it is possible to act as a registered examination centre only, and accept external candidates. Approved examination centres must provide suitable facilities for taking examinations, secure places to keep the examination papers and materials, and may have an appointed visiting verifier to review practical work.

After we have received and accepted an application, we will send an approval letter confirming this. You can then send entries in at any time using the International Directory of Examination and Assessments for guidance.

Please note that in this section we have provided an overview of centre approval procedures. Please refer to the current issue of 'Delivering International Qualification – Centre Guide' for full details of each aspect of these procedures.

Other information

Designing courses of study

Candidates for the Technician Certificate in Construction will have come from different backgrounds and will have different employment and training experiences. We recommend the following:

- carry out an assessment of the candidates' achievements so you can see what learning they already have and decide the level of entry they will need; and
- consider what learning methods and places will best suit them.

When you assess a candidate's needs, you should design teaching programmes that consider:

- what, if any, previous education qualifications or training the candidate has, especially in the various general vocational education certificates we provide; and
- what, if any, previous practical experience the candidate has which is relevant to the aims of the programme and from which they may have learned the relevant skills and knowledge.

When you choose learning methods and places, you should consider the results of your assessments and whether the following are available.

- Open or distance learning material.
- Workplace learning that can be carried out on site or between you and a local workplace. This will allow the candidates access to specialised equipment and work experience.
- Working with other registered centres to share facilities.
- Opportunities for co-operative learning between candidates who need to gain similar skills.

As long as the candidates meet the aims of this learning programme the structures of courses of study are up to you. So, it is possible to include extra topics that meet local needs.

You should avoid teaching theory alone. As far as possible the practical work should be closely related to work in the classroom so that candidates use their theory in a realistic work environment. You can use formal lectures in the classroom with appropriate exercises and demonstrations. Candidates should keep records of the practical work they do so they can refer to it at a later date.

We assume that you will include core skills, such as numeracy, communication, working with people, and organisation and planning throughout a teaching programme.

Presentation format of units

Practical competences

Each module starts with a section on practical competences which shows the practical skills candidates must have.

At times we give more detail about important words in each 'competence statement'.

For example

- 1.10a Identify the various types of protective clothing/equipment and their uses.
Protective clothing: overalls, ear defenders/plugs, safety boots, knee pads, gloves/gauntlets, hard hats, particle masks, glasses/goggles/visors

In the above statement the words 'protective clothing' are given as a range which the candidate should be familiar with. Candidates should cover the complete range. When a range starts with the abbreviation 'eg' the candidates only need to cover some of the ranged areas or you can use suitable alternatives.

Knowledge requirements

Immediately after the section on practical competences the module tells you what knowledge is needed for that area. The knowledge needed is closely linked to the practical competences, so it is best to teach the two together so that the candidate appreciates the topic more.

Practical assessments

The end of each unit contains practical assessments which deal with the practical competences we mentioned earlier. Candidates must carry out the practical assessments. You should make sure all practical assessments are supervised and instructors should make sure that the results reflect the candidate's own performance. You must hold all the evidence in a file (portfolio) for each candidate for eight weeks after the application for a certificate. You must also keep separate records of the dates of all attempts by each candidate.

Entry levels

We consider the following programmes to be relevant preparation for this programme.

Numeracy (3750)
Certificate Awards in the Construction Industry (6161)

We also consider the following Pitman Qualifications award as relevant alongside this programme.

English for Speakers of Other Languages – higher intermediate level

Progression routes and recognition

We have a range of related programmes for onward progression. These include:

Diploma Awards in The Construction Industry (6161)
Technician Diploma Award in Construction (6165)

A number of UK universities and other higher-education institutions may accept success in this programme combined with the Technician Diploma and Advanced Technician Diploma awards towards evidence for direct entry onto higher-level programmes. The decision to accept a candidate on to a degree programme, and the level of entry, is up to the institution. We provide details of organisations recognising achievement in this programme.

Useful publications

We can provide a list of suggested text books covering specific areas of this programme. We may also have knowledge about other support materials. You should make sure that you have the latest information. We will automatically send updated lists to centres we have approved to offer this programme.



Plain English Campaign's Crystal Mark applies to the 6165 Technician Certificate in Construction regulations pages 07 to 10 inclusive

Syllabus

IVQ in Construction Industry 6165

Sections component numbers

001 Core skills principles

Core skills: Safety at work

Core skills: Mathematics and drawing

Core skills: Communications and information technology

101 Core Skills Practice

Note

Instructors must ensure that candidates cover all of the practical competences and knowledge requirements for these components, which are on pages 12 to 15 inclusive.

002 Basic Construction Skills Principles

Timber Vocations

Trowel Vocations

Painting and Decorating

Plumbing

Refrigeration and Air Conditioning

Electrical Installation

102 Timber Vocations Basic Skills

103 Trowel Vocations Basic Skills

104 Painting and Decorating Basic Skills

105 Plumbing Basic Skills

106 Refrigeration and Air Conditioning Basic Skills

107 Electrical Installation Basic Skills

Note

Instructors must ensure that candidates cover all of the knowledge requirements for component 002. These are found in modules 2 to 7 on pages 19 to 30 inclusive. Instructors must also ensure that candidates demonstrate the practical competences in ONE (only) of the occupational areas in components 102 to 107 inclusive. These are also found in modules 2 to 7 each of which is followed by the associated assessment checklist (pages 20, 22, 24, 26, 28 and 30).

011 Construction Technician Principles

Construction Mathematics

Technical Science

Communications

Information Technology

Technical Drawing

Construction Technology

111 Construction Technician Practice

Construction Mathematics

Technical Science

Communications

Information Technology

Technical Drawing

Construction Technology

Note

Instructors must ensure that candidates cover all of the practical competences and knowledge requirements for these components, which are on pages 31 to 42 inclusive. The associated assessment checklists can be found on pages 44 to 49 inclusive.

1a Core skills: Safety at Work

Introduction

The aim of this module is to introduce the candidate to:

- a safe working within their own area of work
- b the prevention of hazards.

Practical competences

The candidate must be able to do the following:

- 1.1a Carry out basic first aid treatments in simulated conditions.
Treatments: shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries
- 1.2a Select correct equipment and carry out basic fire fighting techniques in simulated conditions.
Equipment: fire extinguishers (water, CO2, foam, powder), sand/water bucket, blanket, fire hose
Simulations: wood/paper, oil/spirit, electrical
- 1.3a Participate in emergency procedures.
Procedures: raising alarms, alarm types, safe/efficient evacuation, means of escape, assembly points
- 1.4a Carry out manual handling operations.
Handling: lifting techniques, mechanical lifting devices
- 1.5a Select and use protective clothing and equipment as applicable to the task.
Protective clothing: overalls, ear defenders/plugs, safety boots, knee pads, gloves/gauntlets, safety helmet (hard hat), particle masks, glasses/goggles/visors
Equipment: machine guards, residual current devices
- 1.6a Apply good housekeeping practices at all times.
Practices: clean/tidy work areas, removal/disposal of waste products, protect surfaces
- 1.7a Carry out risk assessments as applicable to the task and prepare a report identifying potential hazards.
Risk assessment: hazard identification, dangerous substances (adhesives, oils, greases, solvents, gases), site machinery, noise, reports
- 1.8a Prepare an accident report.
Report: name, date/time of incident, date/time of report, location, weather conditions, lighting conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified
- 1.9a Use all equipment, powered or hand operated, safely and in accordance with National Standards.
- 1.10a Correctly wire appliance plugs.
- 1.11a Use low level access equipment safely and in accordance with National Standards.

Knowledge requirements

The instructor must ensure the candidate is able to:

- 1.1a State the responsibilities of employers and employees for creating and maintaining a safe working environment.
Employers: safe working environment, tools, equipment, supervision, records, training
Employees: safe working practices
- 1.2a Identify the appropriate basic first aid treatments.
Treatments: shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries
- 1.3a State the essential contents of a first aid box.
Contents: bandages, plasters, eye bath, antiseptic, sling, tweezers, scissors
- 1.4a State the basic principles of fire and identify the different types of fire.
Principles of fire: heat, fuel, oxygen
Types: wood/paper, oil/spirit, electrical
- 1.5a Identify the types of fire fighting equipments and their uses.
Equipment: fire extinguishers (water, CO2, foam, powder), sand/water bucket, blanket, fire hose
Uses: wood/paper, oil/spirit, electrical
- 1.6a Describe emergency procedures.
Procedures: raising alarms, alarm types, safe/efficient evacuation, means of escape, assembly points
Emergencies: fire drill, bomb warning
- 1.7a Describe the procedures for the safe storage of materials and fixings.
Procedures: loading, unloading, storage
- 1.8a Describe the methods for the safe handling of materials.
- 1.9a Identify the various types of protective clothing/equipment and their uses.
Protective clothing: overalls, ear defenders/plugs, safety boots, knee pads, gloves/gauntlets, safety helmet (hard hat), particle masks, glasses/goggles/visors
Equipment: machine guards, residual current devices

- 1.10a State the reasons for carrying out good housekeeping practices.
Practices: clean/tidy work areas, removal/disposal of waste products
Reasons: safety, efficiency, security
- 1.11a State the reasons for carrying out a risk assessment for all working practices.
Reasons: hazard identification, dangerous substances (adhesives, oils, greases, solvents, gases), site machinery, noise
- 1.12a Describe reporting procedures for risk assessment and hazards.
Procedures: written, verbal
- 1.13a State the contents of an accident report.
Contents: name, date/time of incident, date/time of report, location, weather conditions, lighting conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified
- 1.14a Identify the sources of electrical danger and the methods of protection.
Sources: damaged (sockets, cables, plugs, equipment), incorrectly wired appliance plugs, water
Methods of protection: transformers, fuses, plugs, circuit breakers, double insulation, safe working practices
- 1.15a Identify the hazards associated with pneumatic equipment.
Hazards: directing the air jet at body/clothing
- 1.16a Describe the method of correctly wiring appliance plugs.
Method: use of colour coding, fuse rating
- 1.17a Identify low level access equipment.
Equipment: hop up stools, steps, trestles

1b Core skills: Mathematics and Drawing

Introduction

The aim of this module is to introduce the candidate to:

- a mathematical calculations
- b drawing equipment
- c construction drawings.

Practical competences

The candidate must be able to do the following:

Mathematics

- 1.1b Carry out calculations applied to whole and decimal numbers.
Calculation: addition, subtraction, multiplication, division
- 1.2b Read measuring equipment.
Equipment: rule, tape
- 1.3b Solve calculations, involving the use of an electronic calculator, applied to whole and decimal numbers.
Calculation: addition, subtraction, multiplication, division, square, square root, reciprocal
- 1.4b Calculate the areas and perimeters of various shapes.
Shapes: square, rectangle
- 1.5b Calculate percentage increases and decreases.

Drawing

- 1.6b Set out a drawing sheet to required standards with borders and title blocks.
Standards: eg national/local standards
- 1.7b Produce, read and work from scale drawings.
Scale: eg 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:500
- 1.8b Construct lines and angles using drawing equipment.
Equipment: rule, tee square, set square, protractor, scale rule, compasses
- 1.9b Bisect lines and angles using drawing equipment.

Knowledge requirements

The instructor must ensure the candidate is able to:

Mathematics

- 1.1b Identify calculations applied to whole and decimal numbers.
Calculation: addition, subtraction, multiplication, division
- 1.2b Identify the various types of basic linear measuring equipment.
Equipment: rule, tape
- 1.3b Identify calculations, involving the use of an electronic calculator, applied to whole and decimal numbers.
Calculations: addition, subtraction, multiplication, division, square, square root, reciprocal
- 1.4b Identify calculations involving the areas and perimeters of various shapes.
Shapes: square, rectangle
- 1.5b Identify calculations involving percentage increases and decreases.

Drawing

- 1.6b State the various equipments used in drawing.
Equipment: rule, tee square, set square, protractor, scale rule, compasses
- 1.7b Identify the symbols and abbreviations used in the construction industry.
Symbols/abbreviations: materials, fixtures/fittings, electrical, plumbing, heating
- 1.8b State the use of the scale ratios used in construction drawings.
Scale: 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:500, 1:1250, 1:2500, 1:5000
- 1.9b Identify the various elements of a circle.
Parts: radius, diameter, circumference, chord, tangent, sector, segment, arc, radian

1c Core skills: Communications and Information Technology

Introduction

The aim of this module is to introduce the candidate to:

- a communication in the workplace.
- b the use of information technology in the workplace

Practical competences

The candidate must be able to do the following:

Communications

- 1.1c Interpret drawings, specifications and other administrative documents.
- 1.2c Use different methods of communication to liaise with the building team.
Methods: oral, written
- 1.3c Receive customer requirements and promptly deal with them.
Receipt: orally (face to face), written, telephone
- 1.4c Fill out a daily/weekly diary or log of work activities.
- 1.5c Access and use technical information from different sources.
Sources: trade/suppliers catalogues, libraries

Information technology

- 1.6c Prepare a report identifying computer information technology system hardware.
- 1.7c Prepare a report identifying the use of computer information technology systems.
Use: word processing, database, spreadsheet, computer aided design (CAD), e-mail, Internet
- 1.8c Prepare a report identifying the types of electronic communication system used in the construction industry.

Knowledge requirements

The instructor must ensure the candidate is able to:

Communications

- 1.1c Describe the various documents used in the construction industry.
Documents: location drawings, block plans, site plans, general location plans, component drawings, specifications, schedules, bill of quantities, conditions of contract, terms of employment

- 1.2c Describe the use of various site administration documents.
Documents: time sheets, day work sheets, orders/requisitions, delivery records, disciplinary rules
- 1.3c Identify the main types of communication used to liaise with staff.
Communications: verbal, written, drawings/diagrams, telephone, radio, signs, tannoy
- 1.4c Identify the main types of communication used to liaise with the customer.
Communications: verbal, written, telephone, fax, telex, e-mail
- 1.5c Describe the use of libraries and the selection of information from different sources.
Library: index, classification systems, document index/contents pages
Sources: appropriate to each stage of investigation, use of trade/suppliers' catalogues
- 1.6c List the members of the building team and explain their role in the industry.
Member: client, architect, surveyor, specialist engineers, clerk of works, local authority, health and safety personnel, building contractors, craftspeople, suppliers

Information technology

- 1.7c Identify computer information technology system hardware and software.
Hardware: computer, four stage model, memory, input devices, CD ROM, printers/plotters, visual display units/monitors, auxiliary storage systems, communication
Software: operating systems, word processing, database, spreadsheets
- 1.8c State the use of computer technology systems for word processing, databases and spreadsheets.
Word processor: letters, job application, curriculum vitae/résumé, instruction sheets, reports
Database: technical information, client records, employee records, legal requirements for the protection of data
Spreadsheets: financial planning
- 1.9c Identify the types of electronic communication system used in the construction industry.
Systems: telephone, telex, facsimile, e-mail, Internet

1a Core skills: Safety at Work

Practical competences

The candidate must be able to do the following:

- 1.1a Carry out basic first aid treatments in simulated conditions.
- 1.2a Select correct equipment and carry out basic fire fighting techniques in simulated conditions.
- 1.3a Participate in emergency procedures.
- 1.4a Carry out manual handling operations.
- 1.5a Select and use protective clothing and equipment as applicable to the task.
- 1.6a Apply good housekeeping practices at all times.
- 1.7a Carry out risk assessments as applicable to the task and prepare a report identifying potential hazards.
- 1.8a Prepare an accident report.
- 1.9a Use all equipment, powered or hand operated, safely and in accordance with National Standards.
- 1.10a Correctly wire appliance plugs.
- 1.11a Use low level access equipment safely and in accordance with National Standards.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

1b Core skills: Mathematics and Drawing

Practical competences

The candidate must be able to do the following:

Mathematics

- 1.1b Carry out calculations applied to whole and decimal numbers.
- 1.2b Read measuring equipment.
- 1.3b Solve calculations, involving the use of an electronic calculator, applied to whole and decimal numbers.
- 1.4b Calculate the areas and perimeters of various shapes.
- 1.5b Calculate percentage increases and decreases.

Drawing

- 1.6b Set out a drawing sheet to required standards with borders and title blocks.
- 1.7b Produce, read and work from scale drawings.
- 1.8b Construct lines and angles using drawing equipment.
- 1.9b Bisect lines and angles using drawing equipment.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

1c Core skills: Communications and Information Technology

Practical competences

The candidate must be able to do the following:

Communications

- 1.1c Interpret drawings, specifications and other administrative documents.
- 1.2c Use different methods of communication to liaise with the building team.
- 1.3c Receive customer requirements and promptly deal with them.
- 1.4c Fill out daily/weekly diary or log of work activities.
- 1.5c Access and use technical information from different sources.

Information technology

- 1.6c Prepare a report identifying computer information technology systems hardware.
- 1.7c Prepare a report identifying the use of computer information technology systems.
- 1.8c Prepare a report identifying the types of electronic communication system used in the construction industry.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

02 Timber Vocations: Basic Skills

Introduction

The aim of this module is to introduce the candidate to:

- a basic tool skills
- b setting out and making basic joints and components to form products.

Practical competences

The candidate must be able to do the following:

- 2.1 Select, use, clean and store basic hand tools to prepare timber joints, components and products.
Tools: tenon saw, smoothing plane, chisel, marking out equipment, setting out equipment, mallet, screwdriver, rules, tape, wheel brace, twist bits, countersink bit, bradawl
Joints: halving, mortice and tenon, bridle
Components: stiles, rails
Products: frames
- 2.2 Select, use, clean and store portable power tools.
Use: frames (clean, smooth)
Tools: orbital sander
- 2.3 Set out basic joints and components to form products.
Joints: halving, mortice and tenon, bridle
Components: stiles, rails
Products: frames
- 2.4 Produce basic joints to form components and products.
Joints: halving, mortice and tenon, bridle
Components: stiles, rails
Products: frames
- 2.5 Assemble and finish components to form products.
Components: stiles, rails
Products: frames
Assemble: square, true, flat
Finish: plane, sand

Knowledge requirements

The instructor must ensure the candidate is able to:

- 2.1 Identify a selection of basic hand tools and explain their use.
Tools: saws (coping, rip, tenon), planes (smoothing, block), chisels (bevel edge, firmer, mortice), marking out, setting out, driving (hammer, mallet, screwdrivers), measuring (rules, tapes), boring (wheel brace, twist bits, countersink bit, bradawl)

- 2.2 State the method of cleaning and storing basic hand tools.
Method: wipe clean/dry, secure storage
- 2.3 Identify portable power tools suitable for cleaning and smoothing frames and explain their use.
Tools: sander (orbital, belt), transformer
Power: electric, pneumatic
- 2.4 State the method for cleaning and storing portable power tools.
Method: clean, dry, lubricated, cable care, secure
- 2.5 Identify the basic types of materials and fixings used to form joints, components and products.
Materials: softwood, hardwood, sheet materials
Fixings: dowels, screws, nails, wedges, adhesives
- 2.6 Identify the basic joints used to form components and products.
Joints: halving, mortice and tenon, bridle
- 2.7 Identify basic products associated with the industry.
Products: windows, doors, stairs, tables, units/fitments, roofs, partitions, flooring

02 Timber Vocations: Basic Skills

Practical competences

The candidate must be able to do the following:

- 2.1 Select, use, clean and store basic hand tools to prepare timber joints, components and products.
- 2.2 Select, use, clean and store portable power tools.
- 2.3 Set out basic joints and components to form products.
- 2.4 Produce basic joints to form components and products.
- 2.5 Assemble and finish components to form products.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

03 Trowel Vocations: Basic Skills

Introduction

The aim of this module is to introduce the candidate to:

- a basic tool skills
- b mixing and laying concrete
- c mixing mortar and laying bricks or blocks.

Practical competences

The candidate must be able to do the following:

- 3.1 Batch and mix mortar and concrete by hand and small rotary mixer.
Mortar: bricklaying
Concrete: floor slab (75mm thick x 1m²), smooth trowelled finish
- 3.2 Clean and store a small rotary mixer.
Clean/store: wash, dry, oil reservoir checked, cable care
- 3.3 Select, use, clean and store a bricklaying trowel or masons trowel to build a straight length of single skin wall.
Use: pick up/spread mortar for bricklaying/block laying
Wall: stretcher bond, 6 bricks or blocks long, 6 bricks or 3 blocks high, joints left clean from the trowel
- 3.4 Select, use, clean and store tools to pick up mortar and render prepared vertical surface in two coats.
Tools: hand hawk, trowel, scratcher (comb), wooden float, spirit level/plumb bob
Use: fix/plumb screeding battens, apply scratch coat, apply second coat to a true face plane, finish surface with wooden float

Knowledge requirements

The instructor must ensure the candidate is able to:

- 3.1 State the required ratios by volume for mixing mortar and concrete.
Mortar: for laying medium strength facing brick
Concrete: medium density for floor slab
- 3.2 Identify the basic materials used to produce mortar and concrete.
Materials: fine/coarse aggregates, cements
- 3.3 State the method of cleaning and storing a small rotary mixer.
Clean/store: wash, dry, oil reservoir checked, cable care
- 3.4 Identify and explain the use of bricklaying and masonry walling tools.
Tools: bricklaying/masons trowel, hand hawk, line and pins, spirit level/plumb bob, jointers, hammers, chisels
- 3.5 State the method of cleaning and storing bricklaying and masonry walling tools.
Method: wash, dry, oil steel tools
- 3.6 Identify and explain the use of tools and equipment required for laying and finishing a concrete floor slab.
Tools: shovel, tamper, screeding rule, steel trowel, steel float, wooden float, brush
- 3.7 State the method of cleaning and storing tools and equipment required for laying and finishing a concrete floor slab.
Method: wash, dry, oil steel tools
- 3.8 Identify and explain the use of tools and equipment required for rendering a vertical wall surface.
Tools: hand hawk, trowel, scratcher (comb), wooden float, spirit level/plumb bob
- 3.9 State the method of cleaning and storing tools and equipment required for rendering a vertical wall surface.
Method: wash, dry, oil steel tools

03 Trowel Vocations: Basic Skills

Practical competences

The candidate must be able to do the following:

- 3.1 Batch and mix mortar and concrete by hand and small rotary mixer.
- 3.2 Clean and store a small rotary mixer.
- 3.3 Select, use, clean and store a bricklaying trowel or masons trowel to build a straight length of single skin wall.
- 3.4 Select, use, clean and store tools to pick up mortar and render prepared vertical surface in two coats.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

04 Painting and Decorating: Basic Skills

Introduction

The aim of this module is to introduce the candidate to:

- a basic tool skills
- b surface preparation
- c applying oil and water based paints.

Practical competences

The candidate must be able to do the following:

- 4.1 Select, use, clean and store basic hand tools for the preparation of surfaces.
Tools: scraper, putty knife, dust brush, shave hook, chisel knife, nail punch, filling knife/spatula
Use: eg new/painted surfaces (timber, board, plaster)
- 4.2 Select, use, clean, store and maintain brushes and rollers.
Brushes: bristle, nylon
Rollers: lambs wool, synthetic
Clean/store: brushes (white spirit/turpentine substitute then hot soapy water), rollers (cold water)
Use: brushes (oil based paint, timber surfaces), rollers (water based paint)
- 4.3 Select, use, clean and store wet paint containers and trays.
Cleaning: oil based paint (white spirit/turpentine substitute), water based paint (cold water)
- 4.4 Select, operate safely, clean, store and maintain portable power tools for surface preparation.
Equipment: electric sander, pneumatic sander
- 4.5 Select, use, clean, store and maintain liquid petroleum gas (LPG) burning-off equipment.
Select: propane, butane
Use: remove previously painted surface
Store: store (dedicated, ventilated), no naked flame, external light switch, vapour proof light fittings

Knowledge requirements

The instructor must ensure the candidate is able to:

- 4.1 Identify a selection of basic surface preparation hand tools and explain their use.
Tools: scraper, putty knife, dust brush, shave hook, chisel knife, nail punch, filling knife/spatula
Use: new/painted timber surfaces, wall paper/painted surface removal, filler/putty/sealant removal, filler application

- 4.2 State the method for cleaning and storing basic surface preparation hand tools.
Cleaning: oil based paint (white spirit/turpentine substitute), water based paint (cold water)
Storage: wipe clean/dry, secure
- 4.3 Identify the basic types of paints used for surface coatings.
Materials: oil based, water based
- 4.4 State the method for cleaning and storing dry brushes, dry rollers, pads, mittens.
Cleaning: oil based paint (white spirit/ turpentine substitute then hot soapy water), water based paint (cold water), dry
Store: dry, ventilated
- 4.5 State the method for storing brushes wetted with paint.
Store: vapour box (keep), immerse in water
- 4.6 Name the parts and materials used in the construction of brushes.
Parts/materials: handle (wood, plastic), ferrule (stainless steel, copper), filling (bristle, synthetic)
- 4.7 Name the parts and materials used in the construction of rollers.
Parts/materials: handle (plastic), covering (lambs wool, synthetic)
- 4.8 Describe the methods of cleaning wet paint from containers and trays.
Method: oil based paint (white spirit/turpentine substitute), water based paint (cold water)
- 4.9 Identify portable power tools suitable for surface preparation and describe their use.
Equipment: electric sander, pneumatic sander, needle gun
- 4.10 State the method for storing portable power tools.
Method: clean, dry, lubricated, cable care, secure
- 4.11 State the method for storing liquid petroleum gas (LPG) burning-off equipment.
Method: store (dedicated, ventilated), no naked flame, external light switch, vapour proof light fittings

04 Painting and Decorating: Basic Skills

Practical competences

The candidate must be able to do the following:

- 4.1 Select, use, clean and store basic hand tools for the preparation of surfaces.
- 4.2 Select, use, clean, store and maintain brushes and rollers.
- 4.3 Select, use, clean and store wet paint containers and trays.
- 4.4 Select, operate safely, clean, store and maintain portable power tools for surface preparation.
- 4.5 Select, use, clean, store and maintain liquid petroleum gas (LPG) burning-off equipment.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature _____

Candidate name (please print) _____

Instructor signature _____

Instructor name (please print) _____

Completion date _____

05 Plumbing: Basic Skills

Introduction

The aim of this module is to introduce the candidate to:

- a basic tool skills
- b cutting and bending pipe
- c making pipe joints.

Practical competences

The candidate must be able to do the following:

- 5.1 Select, use, clean and store basic hand tools to install a domestic cold water supply to a tap.
Tools: hacksaw, hammers, tape measure, spirit level, reamer, jointing equipment (eg spanners, portable heating equipment), benders (eg hand bender, spring)
- 5.2 Select, use, clean and store portable power tools.
Use: drilling walls for screw fixings/pipe access
Tools: electric drill
- 5.3 Set out pipe runs and install pipework for a domestic cold water supply to a tap.
Pipework: pipe (eg steel, copper), jointing system (eg compression, solder, screw), pipe clips
- 5.4 Hand bend pipework to fit pipe run.
Bending: eg spring, hand bender, sand
- 5.5 Fix plumbing accessories to walls.
Accessories: tap
- 5.6 Terminate pipework into accessories.
Accessories: tap
- 5.7 Select, use, clean, store and maintain portable heating equipment.
Equipment: eg oxy-acetylene, propane, butane
Use: solder joints, bending
Store: store (dedicated, ventilated), no naked flame, external light switch, vapour proof light fittings

Knowledge requirements

The instructor must ensure the candidate is able to:

- 5.1 Identify a selection of basic hand tools and explain their use.
Tools: hacksaw, hammers, tape measure, spirit level, reamer, jointing equipment (spanners, portable heating equipment), benders (hand bender, spring)
- 5.2 State the method of cleaning and storing basic hand tools.
Method: wipe clean/dry, secure storage
- 5.3 Identify portable power tools suitable for drilling walls for screw fixings and pipe access.
Equipment: electric drill, hammer drill, rechargeable battery operated drill, transformer
- 5.4 Identify the different types of twist drills suitable for various applications.
Applications: walls, thin metal plate
Twist drills: masonry, high speed steel
- 5.5 State the method for storing portable power tools.
Method: clean, dry, lubricated, cable care, secure
- 5.6 Identify the basic types of pipe and clips used for domestic water services.
Pipes: steel, copper, plastic
- 5.7 Identify the basic types of jointing system used for domestic water services.
Jointing system: solder, compression, push fit, threaded
- 5.8 Identify the basic types of pipework accessories used for domestic water services.
Accessories: taps, fittings (bend, elbow, tee, connectors, valves)
- 5.9 State the method for storing portable heating equipment.
Method: store (dedicated, ventilated), no naked flame, external light switch, vapour proof light fittings

05 Plumbing: Basic Skills

Practical competences

The candidate must be able to do the following:

- 5.1 Select, use, clean and store basic hand tools to install a domestic cold water supply to a tap.
- 5.2 Select, use, clean and store portable power tools.
- 5.3 Set out pipe runs and install pipework for a domestic cold water supply to a tap.
- 5.4 Hand bend pipework to fit pipe run.
- 5.5 Fix plumbing accessories to walls.
- 5.6 Terminate pipework into accessories.
- 5.7 Select, use, clean, store and maintain portable heating equipment.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature _____

Candidate name (please print) _____

Instructor signature _____

Instructor name (please print) _____

Completion date _____

06 Refrigeration and Air Conditioning: Basic Skills

Introduction

The aim of this module is to introduce the candidate to:

- a basic tool skills
- b cutting and bending refrigeration quality pipe
- c making pipe joints.

Practical competences

The candidate must be able to do the following:

- 6.1 Select, use, clean and store basic hand tools to install components of a refrigeration system.
Tools: tape measure, spirit level, tube cutter, pipe reamer, screw drivers, spanners, jointing equipment (eg pipe flaring tools, swaging tools, portable heating equipment), benders (eg spring, hand bender)
- 6.2 Select, use, clean and store portable power tools.
Use: drilling walls for screw fixing/pipe access, drilling thin metal plate for component/accessory fixing
Tools: electric drill
- 6.3 Set out pipe runs and install pipework from a liquid receiver to an evaporator.
Pipework: copper pipe, jointing system (compression, braze), pipe clips, drain lines (eg plastic, copper)
- 6.4 Hand bend pipework to fit pipe runs and link accessories.
Bending: eg spring, hand bender
- 6.5 Fix refrigeration accessories to walls or framework.
Accessories: evaporator, heat exchanger
- 6.6 Terminate pipework into accessories.
Accessories: evaporator, heat exchanger
- 6.7 Select, use, clean, store and maintain portable heating equipment.
Equipment: eg oxy-acetylene, propane, butane, inert gas (eg oxygen free nitrogen)
Use: brazed joints
Store: store (dedicated, ventilated), no naked flames, external light switches, vapour proof light fittings

Knowledge requirements

The instructor must ensure the candidate is able to:

- 6.1 Identify a selection of basic hand tools and explain their use.
Tools: tape measure, spirit level, tube cutter, pipe reamer, screw drivers, jointing equipment (pipe flaring tools, swaging tools, portable heating equipment), benders (spring, hand bender)
- 6.2 State the method of cleaning and storing basic hand tools.
Method: wipe clean/dry, secure storage
- 6.3 Identify portable power tools suitable for drilling.
Drilling: walls for screw fixing/pipe access, thin metal plate
Equipment: electric drill, hammer drill, cordless drill, site transformer
- 6.4 Identify the different types of twist drills suitable for various applications.
Applications: walls, thin metal plate
Twist drills: masonry, high speed steel
- 6.5 State the method for storing portable power tools.
Method: clean, dry, lubricated, cable care, secure
- 6.6 Identify the basic types of pipe used for refrigeration and air conditioning.
Pipes: thick walled, soft drawn annealed copper coils, half hard straight tube, plastic, pipe clips, pipe clamps
- 6.7 Identify the basic types of jointing systems used for refrigeration and air conditioning.
Jointing system: braze, compression (copper), push fit, threaded, solvent welded (plastic)
- 6.8 Identify the basic types of pipework accessories used for refrigeration and air conditioning.
Accessories: filter driers, heat exchangers, fittings (long/short radius bends, tee pieces, flare nuts, unions, capillary fittings)
- 6.9 State the method for storing portable heating equipment.
Method: store (dedicated, ventilated), no naked flames, external light switch, vapour proof light fittings

06 Refrigeration and Air Conditioning: Basic Skills

Practical competences

The candidate must be able to do the following:

- 6.1 Select, use, clean and store basic hand tools to install components of a refrigeration system.
- 6.2 Select, use, clean and store portable power tools.
- 6.3 Set out pipe runs and install pipework from a liquid receiver to an evaporator.
- 6.4 Hand bend pipework to fit pipe runs and link accessories.
- 6.5 Fix refrigeration accessories to walls or framework.
- 6.6 Terminate pipework into accessories.
- 6.7 Select, use, clean, store and maintain portable heating equipment.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

07 Electrical Installation: Basic Skills

Introduction

The aim of this module is to introduce the candidate to:

- a basic tool skills
- b setting out and installing domestic single phase circuits
- c installing accessories and terminating cables.

Practical competences

The candidate must be able to do the following:

- 7.1 Select, use, clean and store basic hand tools to install and terminate domestic single phase circuits.
Tools: screw drivers (flat blade, Philips, star), pliers, wire cutters, wire strippers, hammers, tape measure
- 7.2 Select, use, clean and store portable power tools.
Use: drilling walls for screw fixings/cable access
Tools: electric drill
- 7.3 Set out cable runs and install cable for domestic single phase lighting circuits.
Cable: insulated and sheathed multi-core, cable clips
- 7.4 Fix electrical accessories to walls and ceilings.
Accessories: mounting boxes, switches, ceiling rose, joint box
- 7.5 Terminate electrical conductors into accessories.
Accessories: switches, ceiling rose, joint box

Knowledge requirements

The instructor must ensure the candidate is able to:

- 7.1 Identify a selection of basic hand tools and explain their use.
Tools: screw drivers (flat blade, Philips, star), pliers, wire cutters, wire strippers, hammers, tape measure
- 7.2 State the method of cleaning and storing basic hand tools.
Method: wipe clean/dry, secure storage
- 7.3 Identify portable power tools suitable for drilling walls for screw fixings and cable access.
Equipment: electric drill, hammer drill, rechargeable battery operated drill, transformer
- 7.4 State the method for storing portable power tools.
Method: clean, dry, lubricated, cable care, secure
- 7.5 Identify the different types of twist drills suitable for various applications.
Applications: walls, thin metal plate
Twist drills: masonry, high speed steel

- 7.6 Identify the basic types of cables and materials used for domestic single phase circuits.
Cables/materials: insulated and sheathed multi-core, cable insulation colour coding, cable clips, single core insulated cable within PVC conduit/mini-trunking
- 7.7 Identify the basic types of electrical accessories used for domestic single phase circuits.
Accessories: mounting blocks, socket outlets, switches (single pole, double pole), ceiling rose, consumer unit

07 Electrical Installation: Basic Skills

Practical competences

The candidate must be able to do the following:

- 7.1 Select, use, clean and store basic hand tools to install and terminate domestic single phase circuits.
- 7.2 Select, use, clean and store portable power tools.
- 7.3 Set out cable runs and install cable for domestic single phase lighting circuits.
- 7.4 Fix electrical accessories to walls and ceilings.
- 7.5 Terminate electrical conductors into accessories.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature _____

Candidate name (please print) _____

Instructor signature _____

Instructor name (please print) _____

Completion date _____

11a Construction Mathematics 1

Introduction

The aim of this module is to give the candidate an understanding of mathematical principles.

Practical competences

The candidate must be able to do the following:

- 11.1a Perform calculations involving the four arithmetic operations.
Calculations: positive numbers, negative numbers, decimal numbers, simple fractions, mixed numbers
Arithmetic operations: addition, subtraction, multiplication, division
- 11.2a Calculate percentages, express information as a percentage and convert between common fractions, decimal fractions and percentages as appropriate in common usage.
- 11.3a Perform calculations involving ratio and proportion.
- 11.4a Deduce estimated solution to arithmetic calculations, expressing the results to both a given number of significant figures and to a given number of decimal places.
- 11.5a Express denary numbers in binary form and binary numbers in denary form and perform calculations involving addition and subtraction of binary numbers.
- 11.6a Represent quantities by symbols and translate phrases involving associated quantities into algebraic expressions.
- 11.7a Simplify algebraic expressions involving symbols and numbers.
- 11.8a Factorise expressions and expand brackets.
- 11.9a Construct and solve simple linear equations using given data.
- 11.10a Evaluate formulae by substituting given data.
- 11.11a Measure an angle to the nearest degree and use the properties of angles on a straight line and at a point to find the size of an angle.
- 11.12a Identify a range of common plane figures and calculate the perimeters and areas of these figures.
- 11.13a Construct triangles from given information.
- 11.14a Identify the Theorem of Pythagoras and apply it to find the length of the unknown side of a right-angled triangle.

- 11.15a Recognise, sketch and calculate the surface areas and volumes of regular solids.
Solids: cubes, cuboids and cylinders
- 11.16a Define the three basic trigonometrical ratios and apply these to calculate the angles and the lengths of the sides of given right-angled triangles.
- 11.17a Plot graphs from experimental or given data, interpret these and interpolate intermediate values between the points on the graphs.
- 11.18a Construct and interpret bar charts.

Knowledge requirements

The instructor must ensure the candidate is able to:

Numeracy

- 11.1a Perform calculations involving the four arithmetic operations applied to whole and decimal numbers.
Arithmetic operations: addition, subtraction, multiplication, division
- 11.2a Perform calculations involving the four arithmetic operations applied to positive and negative whole numbers, using the rules relating to directed numbers.
Arithmetic operations: addition, subtraction, multiplication, division
- 11.3a Perform the four arithmetic operations involving simple fractions.
Arithmetic operations: addition, subtraction, multiplication, division
- 11.4a Perform calculations involving the four arithmetic operations applied to proper fractions and mixed numbers.
Arithmetic operations: addition, subtraction, multiplication, division
- 11.5a Express simple numerical information as a percentage.
- 11.6a Calculate 1%, 5%, 10%, 20%, 25%, 50% and 75% of a number.
- 11.7a Perform calculations to convert a fraction to a percentage and a percentage to a fraction.
- 11.8a Perform calculations to express one quantity as a percentage of another.
- 11.9a Use percentages for comparisons.
- 11.10a Perform calculations to divide various amounts into given ratios.

- 11.11a Perform calculations involving two quantities in direct proportion to each other.
- 11.12a Perform calculations involving two quantities in inverse proportion to each other.
- 11.13a Use the unitary method to solve simple ratio and proportion problems.
- 11.14a Deduce estimated solutions to arithmetic calculations, expressing the results to both a given number of significant figures and to a given number of decimal places.
- 11.15a Express denary numbers in binary form and binary numbers in denary form.
- 11.16a Perform calculations involving the addition and subtraction of binary numbers.

Algebra

- 11.17a Represent quantities by symbols.
- 11.18a Translate phrases involving associated quantities into algebraic expressions.
- 11.19a Simplify algebraic expressions involving symbols and numbers.
Simplify expressions: collect 'like terms' using addition and subtraction, multiply and divide using the rules for directed numbers where applicable, remove brackets where applicable, apply the priority order precedence rules relating to arithmetic operations
- 11.20a Factorise expressions by extraction of a common factor, $ax + ay = a(x+y)$, and grouping $ax - ay + bx - by = (a+b)(x-y)$.
- 11.21a Expand brackets,
 $a(x + y) = ax + ay$, $(a+b)(x-y) = ax - ay + bx - by$.
- 11.22a Construct simple formulae and equations using given data.
- 11.23a Solve simple linear equations.
- 11.24a Evaluate formulae by substituting given data.
Formulae: $V = IR$, $D = d(l + at)$, $A = b^2c + d^2$, $T = 2\pi\sqrt{l/g}$

Geometry and trigonometry

- 11.25a Measure an angle to the nearest degree.
- 11.26a Use the properties of angles on a straight line and at a point to find the size of an angle.
- 11.27a Identify a range of common plane figures.
Plane figures: square, rectangle, trapezium, triangle, circle and polygon

- 11.28a Calculate the perimeters of plane figures.
Plane figures: squares, rectangles, trapeziums, triangles and polygons
- 11.29a Calculate the areas of plane figures.
- 11.30a Construct triangles from given information.
Information: lengths of the three sides, lengths of two sides and the size of included angle, length of one side and the size of two angles
- 11.31a Identify the Theorem of Pythagoras and apply it to find the length of the unknown side of a right-angled triangle, given the lengths of the other two sides.
- 11.32a Recognise and sketch regular solids.
Solids: cubes, cuboids, and cylinders
- 11.33a Calculate the surface areas of regular solids.
Solids: cubes, cuboids and cylinders
- 11.34a Calculate the volumes of regular solids.
- 11.35a Define sine, cosine and tangent in terms of the three sides of a right-angled triangle.
- 11.36a Calculate the angles and lengths of sides of given right-angled triangles by the application of sine, cosine and tangent.

Graphs

- 11.37a Identify the point of origin for horizontal and vertical axes including positive and negative co-ordinates.
- 11.38a Determine suitable scales to be applied to the axes to enable given data to be plotted.
- 11.39a Plot graphs from experimental or given data.
- 11.40a Interpret information from the graphs.
- 11.41a Read values of y for given values of x and values of x for given values of y from the graph and interpolate intermediate values between points.
- 11.42a Construct bar charts involving two variables.
Variables: eg time, population
- 11.43a Interpret information from bar charts.

Introduction

The aim of this module is to give the candidate an understanding of basic scientific principles and to relate them to the selection of construction materials.

Practical competences

The candidate must be able to do the following:

- 11.1b Measure a range of construction materials and express their properties.
Properties: length, area, volume, mass
Materials: brick, block, concrete, timber, steel
- 11.2b Find and record the density and the relative density of a range of construction materials.
Materials: brick, block, concrete, timber, steel
- 11.3b Calculate the weight of building materials given the mass.
Materials: brick, block, concrete, timber, steel
- 11.4b By experiment find the mechanical advantage, velocity ratio and efficiency of simple machines.
Experiment: eg pulley system
- 11.5b Calculate the pressure produced by various loads.
Pressures: under walls, under columns
- 11.6b By experiment show that the physical state of a particular substance depends upon temperature and pressure.
Physical state: solid, liquid, gas
- 11.7 By experiment calculate the coefficient of linear expansion of a steel rod.
- 11.8b Demonstrate by experiment thermal conductivity and thermal convection.
- 11.9b Demonstrate by experiment the refraction of light.
- 11.10b Using test equipment demonstrate Ohm's law.
Test equipment: ammeter, voltmeter, variable resistors
- 11.11b Prepare a report describing how the properties of construction materials dictate their use.
Properties: appearance, durability, strength, thermal properties, sound insulation properties
Materials: natural, manufactured

Knowledge requirements

The instructor must ensure the candidate is able to:

Measurement

- 11.1b Explain that all measurements in physical science are related to the three fundamental quantities of length, mass and time.
Measurements: area, volume, density, velocity, acceleration

Density

- 11.2b Describe the relationship between mass and volume for a substance, and define the term density.
- 11.3b Explain the non-dimensional term relative density and convert values of relative density to the actual density.
Materials: brick, block, concrete, timber, steel

Force momentum, work, energy, power

- 11.4b Define momentum and explain Newton's law of motion.
- 11.5b State the relationship between force (f), mass (m) and acceleration (a).
- 11.6b Define the unit of force as the Newton (N) and explain the relationship between weight and mass.
- 11.7b Identify calculations involving Newton's law of motion.
- 11.8b Define the terms work, joule (J), power and watt (W).
- 11.9b Explain the relationship between work and energy.
- 11.10b Explain the term efficiency in relationship to work and energy.
- 11.11b Identify calculations involving work done by a constant force, power and efficiency.
- 11.12b Define the term force per unit area.
- 11.13b Identify calculations involving force per unit area.

Buoyancy, states of matter and transmission of heat

- 11.14b Explain Archimedes' principle.
- 11.15b Describe the forces between molecules and explain their effect on the expansion of solids, liquids and gases.
- 11.16b Explain the terms conduction, convection and radiation.

Electricity and light

- 11.17b Describe the basic concept of a flow of electric current.
- 11.18b Define the coulomb, ampere, ohm and volt.
- 11.19b State Ohm's law.

- 11.20b Identify calculations involving Ohm's law to solve simple electrical circuit problems.
- 11.21b Identify the formula for power in a resistive electric circuit.
- 11.22b Identify the formula for energy in a resistive electric circuit.
- 11.23b Explain the terms deflection, refraction and lenses in relationship to light.
Deflection: plain mirror
Refraction: glass prism
Lenses: images (virtual, real)

Building materials and their properties

- 11.24b Identify natural and manufactured construction materials.
Materials: clay, stone, bricks, blocks, concrete, timber, plywood, chipboard, medium density fibreboard (MDF), insulation materials, iron, steel, aluminium, copper, glass
- 11.25b Define the terms solid and bulk densities.
- 11.26b Explain the relationship between voids in materials and their strength.
- 11.27b Explain the relationship between voids and absorption in materials.
Relationship: porosity, condensation
- 11.28b Illustrate where materials are used in the construction process.
Materials: clay, stone, bricks, blocks, concrete, timber, plywood, chipboard, medium density fibreboard (MDF), insulation materials, iron, steel, aluminium, copper, glass

11c Communications 1

Introduction

The aim of this module is to enable the candidate to use communication skills in the construction industry.

Practical competences

The candidate must be able to do the following:

- 11.1c Use language in written and oral forms to communicate needs clearly.
Oral: telephone, work instructions, group, one to one
Written: technical/commercial letters (eg internal memos, technical reports, job applications, curriculum vitae/résumé), summarise (documents/reports)
Systems: word processor, fax
- 11.2c Interpret, use and draw diagrams in a routine work environment.
Interpret: graphical to written, written to graphical, graphical (bar charts, histograms, graphs)
- 11.3c Collect and select information on the use of international standards.
Standards: eg British Standards, International Standards Organization (ISO), South African Standards, American Standards Mechanical Engineering
- 11.4c Collect and select technical information from different sources.
Information: eg technical drawings, schedules, data sheets/charts, manufacturers information sheets/brochures, microfilm, micro fiche, libraries, library systems (index, classification), video tape, CD ROM, computer systems (eg Internet)
- 11.5c Use information technology systems for communication.
Systems: word processor, fax

Knowledge requirements

The instructor must ensure the candidate is able to:

- 11.1c Explain the use of language in written and oral forms to communicate needs clearly.
Oral: telephone, work instructions, group, one to one
Written: technical/commercial letters (internal memos, technical reports, job applications, curriculum vitae/résumé), summarise (documents/reports)
- 11.2c Identify the use of international standards in the construction industry.
Standards: eg British Standards, International Standards Organization (ISO), South African Standards, American Standards Mechanical Engineering

- 11.3c Identify the various sources of technical information.
Information: technical drawings, schedules, data sheets/charts, manufacturers information sheets/brochures, microfilm, micro fiche, libraries, library systems (index, classification), video tape, CD ROM, computer systems (eg Internet)
- 11.4c Explain the use of various information technology systems for communication.
Systems: word processor, fax, Internet, E-mail

11d Information Technology 1

Introduction

The aim of this module is to introduce the candidate to the commonly used computer applications of:

- a word processing
- b databases
- c spreadsheets.

Practical competences

The candidate must be able to do the following:

Load, save and print

- 11.1d Select a suitable software application for a given task.
Software: word processing, database, spreadsheet
- 11.2d Load applications software.
- 11.3d Load a data file.
- 11.4d Save a data file with an appropriate filename.
- 11.5d Save a file with a different file name.
- 11.6d Print out all or part of a data file.
- 11.7d Exit application software to return to the operating system or GUI.

Word processing

- 11.8d Open a new file and enter text.
- 11.9d Edit the contents of a document.
Edit: correct errors, insert words, delete words, insert paragraph breaks, delete paragraph breaks, sections of text (copy, cut, paste)
- 11.10d Use the spell check function to check the document.
- 11.11d Enhance the appearance of a document.
Enhancement: font (size, bold, italics) text (centre, underline)

Editing a database

- 11.12d Edit data into an existing database file.
Edit: add, delete, amend
- 11.13d Define and execute a single condition search using appropriate operators.
Numerical operators: less than (<), greater than (>), equal to (=)
- 11.14d Sort a data file into numerical or alphabetical order.

Editing a spreadsheet

- 11.15d Identify and move the cell pointer to any row, column and cell within a spreadsheet using cursor keys or mouse control.
Cursor keys: up, down, left, right
Mouse control: point and click, use of scroll bars
- 11.16d Edit the contents of a cell in an existing spreadsheet file.
Edit: amend, replace, delete
- 11.17d Insert and delete columns and rows in a spreadsheet.
- 11.18d Insert formula containing cell addresses and numbers, to add, subtract, multiply and divide.
- 11.19d Use the sum function in spreadsheets to sum rows and columns.
- 11.20d Replicate a formula in a row or a column.

Knowledge requirements

The instructor must ensure the candidate is able to:

Hardware and software

- 11.1d Identify the four main components of a computer system.
Main components: main processor, input, output, storage
- 11.2d Describe the components of a microcomputer system.
Components: keyboard, mouse, CPU, monitor (VDU), disk drive, printer
- 11.3d Explain that software is a set of instructions that enables the computer to carry out operations.
- 11.4d Identify the main functions of commonly used software applications packages.
Functions: spreadsheet (numerical analysis, manipulation), word processing (document production), database (file creation, updating, searching, sorting), computer aided design (line drawings used for architecture/engineering)

Data input and output

- 11.5d Describe different methods for inputting data and their applications.
Methods: direct entry (keyboard), OCR, OMR, scanner, bar code reader, electronic file, remote data logger, electronic sensor (transducer)
- 11.6d Describe devices used to output data.
Devices: screen, printer, control devices, audio systems
- 11.7d Compare printers for output in terms of speed and cost.
Printers: ink-jet printer, laser printer, impact (dot matrix, daisy wheel)

Data storage

- 11.8d Describe typical media for storing data and programmes.
Media: floppy disk, hard disk, CD-ROM, tape streamers, cassettes
- 11.9d State that computer memory (RAM) is volatile and that any data not stored will be lost.
- 11.10d State why floppy disk must be formatted before use and the effect on previously recorded data of formatting a disk.

11e Technical Drawing 1

Introduction

The aim of this module is to introduce the candidate to:

- a drawing equipment
- b methods and terminology in current use.

Practical competences

The candidate must be able to do the following:

- 11.1e Select, fold and store standard sizes of drawing paper.
Paper sizes: A0, A1, A2, A3, A4
- 11.2e Investigate and prepare a short report identifying the various methods used to produce drawings.
Method: CAD, drawing boards/tables, types of drawing paper
- 11.3e Select and identify drawing equipment used in producing drawings.
Drawing equipment: adjustable drawing board, tee square, set square, scale rule, compasses, drawing pens/pencils, flexible curves, French curve, templates
- 11.4e Set out a drawing sheet to required standards with borders and title blocks.
Standards: national/local standards
- 11.5e Investigate and prepare a short report on the health and safety considerations to be taken into account when producing construction drawings.
Considerations: light (natural, artificial), storage/use (inks, reprographic chemicals), CAD (computer screens, electrical protection devices)
- 11.6e Prepare a report identifying the various methods of reproducing drawings.
Reproducing: dye line process, photocopying, tracing
- 11.7e Draw symbols which identify building materials.
Materials: earth, hard core, concrete, brickwork, blockwork, stone, timber, sheet material, steel, metal
- 11.8e Draw symbols which identify fixtures, fittings and equipment used in the construction industry.
Fixtures and fittings: eg windows, doors, sinks, wash basins, water closets/bidets, wardrobes, kitchen/bedroom units, socket outlets, light fittings, fans, stop valves, pumps
Equipment: eg air conditioning, electrical, plumbing, heating
- 11.9e Prepare a report explaining the use of scales to enable large objects or buildings to be drawn to a convenient size whilst maintaining accurate proportions.
Scale: 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:2500, 1:5000, 1:10000

- 11.10e Produce, read and work from scale drawings.
Scale: eg 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:2500, 1:5000, 1:10000
- 11.11e Draw different types of lines and arrowheads used in construction drawings.
Lines: basic construction line, main object outline, broken line, chain line, section line, grid line
- 11.12e Identify common shorthand abbreviations used as notes on drawings.
Abbreviations: eg rainwater pipe (rwp), vent pipe (vp), inspection chamber (ic)
- 11.13e Produce an example of each of the various methods of graphical representation in common use.
Methods: orthographic projections (first angle), perspective, isometric, axonometric, oblique (cabinet, cavalier)
- 11.14e Label the component parts of a drawing.
Parts: plan views, elevations, vertical sections, details
- 11.15e Collect examples of the various drawings used in the construction industry.
Drawings: working drawings (constructions drawings), detailed sketches, site plans, location drawings.

Knowledge requirements

The instructor must ensure the candidate is able to:

- 11.1e Identify standard paper sizes.
Sizes: A0, A1, A2, A3, A4
- 11.2e Identify and state the use of the various types of drawing equipment.
Drawing equipment: adjustable drawing board, tee square, set square, scale rule, compasses, drawing pens/pencils, flexible curves, French curve, templates
- 11.3e Identify the various types of drawing medium available and describe their use.
Drawing medium: cartridge paper, tracing paper, tracing film
- 11.4e State the various methods available for reproducing drawings.
Reproducing: dye line process, photocopying, tracing
- 11.5e Describe the health and safety considerations involved in the production of construction drawings.
Considerations: light (natural, artificial), storage/use (inks, reprographic chemicals), CAD (computer screens, electrical protection devices)

- 11.6e Identify symbols used to illustrate materials.
Materials: earth, hard core, concrete, brickwork, blockwork, stone, timber, sheet material, steel, metal.
- 11.7e Identify symbols which identify fixtures, fittings and equipment used in the construction industry.
Fixtures and fittings: windows, doors, sinks, wash basins, water closets/bidets, wardrobes, kitchen/ bedroom units, socket outlets, light fittings, fans, stop valves, pumps
Equipment: eg air conditioning, electrical, plumbing, heating
- 11.8e State the use of the scale ratios used in construction drawings.
Scale: 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:2500, 1:5000, 1:10000
- 11.9e Explain the different types of lines and arrowheads used in drawings.
Line types: basic construction line, main object outline, broken line, chain line, section line, grid line
- 11.10e Identify the various methods of graphical representation and state their use.
Methods: orthographic projections (first angle), perspective, isometric, axonometric, oblique (cabinet, cavalier)
- 11.11e Identify the component parts of drawings.
Parts: plan views, elevations, vertical sections, details
- 11.12e Identify examples of the various drawings used in the construction industry.
Drawings: working drawings (construction drawings), detailed sketches, site plans, location drawings

11f Construction Technology 1

Introduction

The aim of this module is to enable the candidate to investigate, understand and report on the range of elements, sub-elements and component parts which unite to form the general order in which construction takes place.

Note

This is applied to low-rise buildings not exceeding two storeys with minimum floor area of 65m². Low-rise buildings may include domestic, storage and business premises.

Practical competences

The candidate must be able to do the following:

- 11.1f Investigate and prepare a short report on the relationship between the design and function of low-rise buildings.
- 11.2f Investigate and prepare a short report on the main design considerations for structural and non-structural elements to meet the needs of established laws, regulations and standards in relation to building work.
- 11.3f Compare the uses and limitations of a range of basic building materials and components and make a recommendation for a low-rise domestic building.
- 11.4f Investigate and produce evidence of the general safety, health and welfare considerations for site operatives, the general public and surrounding properties.
- 11.5f Investigate and prepare a short report on the alternative forms of construction which present economic solutions for a design.
- 11.6f Determine and present a systematic and logical approach to the sequence of construction operations for a low-rise building.
- 11.7f Produce annotated sketches illustrating the common forms and structural elements of a low-rise building.
Forms/elements: foundations, floors, walls, roof, staircase, services
- 11.8f Prepare lists of materials and components for the construction of a low-rise building.
- 11.9f Produce an annotated site layout drawing showing the main factors to be considered.
Site layout: protection of site and public, storage and protection, security, spoil heaps, location of plant
- 11.10f Prepare a typical ironmongery schedule for a standard door.
Door: internal, external
- 11.11f Prepare a typical schedule of finishes for a low-rise building.
Finishes: walls, floors, ceilings

Knowledge requirements

The instructor must ensure the candidate is able to:

Design and function of low-rise buildings

- 11.1f Interpret annotated sketches illustrating the common forms and structural elements of dwelling house construction.
Common forms: monolithic, cellular, cross wall, timber frame
Structural elements: foundations, walls, floors, roofs
- 11.2f State the factors to be considered in the design of buildings.
Factors: building users (safety, health, welfare), human comfort, movement (people, goods), environmental control, access (horizontal, vertical), accommodation of business functions, adaptability
- 11.3f Describe the types of material used for the elements of buildings.
Materials: brick, block, concrete, reinforcing steel, steel (beams, columns), timber sheet materials, plastics

Site preliminaries

- 11.4f Identify the temporary services normally provided to site.
Services: water, gas, electricity, telephone
- 11.5f Describe the main factors to be considered when laying out a new site.
Factors: access, welfare facilities, materials (storage, protection), site clearance, location of plant, protection (site, public), trail holes (location, purpose)

Foundations

- 11.6f Describe basic types of subsoil and their properties including average bearing capacities.
Basic types: cohesive, non-cohesive
- 11.7f Outline the influences different types of structural form will have on the choice of foundations.
Influences: evenly spread load, point loads
Structural form: monolithic, cellular, cross-wall, timber frame
- 11.8f Describe methods of excavating trenches and pits for foundations up to 1.5 m deep.
Methods: hand, machine
- 11.9f Describe the conditions in which the different types of foundation are likely to be used.
Types of foundation: plain concrete strip, deep strip, reinforced wide strip stepped concrete strip

- 11.10f Describe types of foundations including the location of any reinforcing.
Types of foundations: plain concrete strip, deep strip, reinforced wide strip, stepped concrete strip

Walls

- 11.11f Explain the design and functions of walls.
Design and functions: strength, stability, weather exclusion, insulation, fire resistance, durability, aesthetics
- 11.12f Explain the purpose of bonding and the use of mortar for brick and block walls.
- 11.13f Describe the types of bonding used in walls of half-brick, one brick and one and a half brick thick.
Bonding: stretcher, header, garden wall, English, Flemish
- 11.14f Describe forms of construction of brick and block walls.
Walls: solid, cavity
- 11.15f Describe the location and types of cavity ties.
Location: walls, openings
Types: plastic, steel
- 11.16f Describe the purpose of horizontal and vertical damp proof courses and identify their location and design.
Locations: above ground level, beneath solid floors, around window/door openings, at intersections between one/two storey construction
- 11.17f Describe the basic methods and details of forming openings in walls for doors and windows.
Details: thresholds, cills, jambs, head, provision for damp proofing
- 11.18f Describe the fixing of sheet materials to small steel framed buildings.
Sheet materials: galvanised steel, coated/steel mineralite, composite sheets
- 11.19f Describe simple non-load bearing internal partitions.
Partitions: brick, blocks, studding and plasterboard, composite plasterboard
- 11.20f Identify common structural elements in skeletal frames.
Structural elements: columns, main beams, secondary beams, bracing
Frames: steel, reinforced concrete

Floors

- 11.21f State the factors determining the level of ground floors.
Factors: relationship to ground level, damp proofing, slope of ground

- 11.22f Describe the various locations within a ground floor structure where the damp proof membrane may be located.
Locations: between sub-floor and hard core, between sub-floor and floor finish, as part of floor surface
Ground floor: cast in-situ

- 11.23f Describe typical details of suspended timber ground and upper floors.
Details: trimming, strutting, damp proofing, dimensions, lateral restraint

Roofs

- 11.24f Explain the factors influencing the choice of roof systems and coverings.
Factors: prevailing weather, clear span, service siting, insulation
- 11.25f Describe the terms used in roof construction.
Common: ceiling joists, eaves, ridge, verge, fascia, soffit, wind brace, lateral restraint hip, valley, gable, pitch, wall plate, rafter, purlin, roof truss, trussed rafter, barge board, water proofing, ventilation
- 11.26f Identify from line diagrams various types of roof construction.
Roof construction: lean to, single, double, verandah, trussed, mono pitch, flat
- 11.27f Describe the common finishes applied to flat and pitched roofs showing means of achieving water resistance.
Finishes: asphalt, bonded felt, profile sheet, coated steel and mineralite, slate, tiles (clay, concrete), aluminium

Doors, windows and stairs

- 11.28f Describe the general construction of internal and external doors.
Doors: ledged, braced and battened, panelled, flush
- 11.29f Describe the construction and fixing of door frames and linings for internal and external doors.
- 11.30f Describe the differences between, and function of common window types.
Window types: casement, sash, sliding sash, storm proof casement
Function: waterproofing, windproofing, opening and closing ironmongery
- 11.31f Describe the component parts of a straight flight stairway.
Component parts: rise/riser, going/tread, string, handrail, guardrail, balusters, balustrades

Finishes

11.32f Describe a range of wall finishes.

Wall: internal, external

Finishes: cement rendering, roughcast, Tyrolean (spatter dash), lightweight plaster, drylining

11.33f Describe a range of floor finishes.

Floor: internal, external

Finishes: screeds, timber (strip, block), ceramic tiles, plastic tiles

11.34f Explain the functions of paint.

Functions: aesthetics, waterproofing, fireproofing

Primary services/external works

11.35f Identify the primary services installed in a domestic building.

Primary services: water systems (hot, cold), electric (light, power)

11.36f Describe types of boundary walls and fences.

Types: timber, brick, concrete.

Assessment

Test specification for written paper Technician Principles 1 (6165-10-011)

This is a written multiple choice examination paper lasting two and a half hours with 100 questions. Candidates must answer ALL questions.

Topic	Approximate % examination weighting
11a Mathematics	20
11b Technical Science	20
11c Communications	10
11d Information Technology	10
11e Technical Drawing	20
11f Construction Technology	20

11a Construction Mathematics 1

Practical competences

The candidate must be able to do the following:

- | | | | | | |
|--------|---|--------------------------|--------|---|--------------------------|
| 11.1a | Perform calculation involving the four arithmetic operations. | <input type="checkbox"/> | 11.12a | Identify a range of common plane figures and calculate the perimeters and areas of these figures. | <input type="checkbox"/> |
| 11.2a | Calculate percentages, express information as a percentage and convert between common fractions, decimal fractions and percentages as appropriate in common usage. | <input type="checkbox"/> | 11.13a | Construct triangles from given information. | <input type="checkbox"/> |
| 11.3a | Perform calculations involving ratio and proportion. | <input type="checkbox"/> | 11.14a | Identify the Theorem of Pythagoras and apply it to find the length of the unknown side of a right-angled triangle. | <input type="checkbox"/> |
| 11.4a | Deduce estimated solution to arithmetic calculations, expressing the results to both a given number of significant figures and to a given number of decimal places. | <input type="checkbox"/> | 11.15a | Recognise, sketch and calculate the surface areas and volumes of regular solids. | <input type="checkbox"/> |
| 11.5a | Express denary numbers in binary form and binary numbers in denary form and perform calculations involving addition and subtraction of binary numbers. | <input type="checkbox"/> | 11.16a | Define the three basic trigonometrical ratios and apply these to calculate the angles and the lengths of the sides of given right-angled triangles. | <input type="checkbox"/> |
| 11.6a | Represent quantities by symbols and translate phrases involving associated quantities into algebraic expressions. | <input type="checkbox"/> | 11.17a | Plot graphs from experimental or given data, interpret these and interpolate intermediate values between the points on the graphs. | <input type="checkbox"/> |
| 11.7a | Simplify algebraic expressions involving symbols and numbers. | <input type="checkbox"/> | 11.18a | Construct and interpret bar charts. | <input type="checkbox"/> |
| 11.9a | Construct and solve simple linear equations using given data. | <input type="checkbox"/> | | | |
| 11.8a | Factorise expressions and expand brackets. | <input type="checkbox"/> | | | |
| 11.10a | Evaluate formulae by substituting given data. | <input type="checkbox"/> | | | |
| 11.11a | Measure an angle to the nearest degree and use the properties of angles on a straight line and at a point to find the size of an angle. | <input type="checkbox"/> | | | |

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

11b Technical Science 1

Practical competences

The candidate must be able to do the following:

- | | | |
|--------|---|--------------------------|
| 11.1b | Measure a range of construction materials and express their properties. | <input type="checkbox"/> |
| 11.2b | Find and record the density and the relative density of a range of construction materials. | <input type="checkbox"/> |
| 11.3b | Calculate the weight of building materials given the mass. | <input type="checkbox"/> |
| 11.4b | Demonstrate by experiment the relationship between force, mass and acceleration. | <input type="checkbox"/> |
| 11.5b | Calculate the pressure produced by various loads. | <input type="checkbox"/> |
| 11.6b | By experiment show that the physical state of a particular substance depends upon temperature and pressure. | <input type="checkbox"/> |
| 11.7b | By experiment calculate the coefficient of linear expansion of a steel rod. | <input type="checkbox"/> |
| 11.8b | Demonstrate by experiment thermal conductivity and thermal convection. | <input type="checkbox"/> |
| 11.9b | Demonstrate by experiment the refraction of light. | <input type="checkbox"/> |
| 11.10b | Using test equipment demonstrate Ohm's law. | <input type="checkbox"/> |
| 11.11b | Prepare a report describing how the properties of construction materials dictate their use. | <input type="checkbox"/> |

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

11c Communications 1

Practical competences

The candidate must be able to do the following:

- 11.1c Use language in written and oral forms to communicate needs clearly.
- 11.2c Interpret, use and draw diagrams in a routine work environment.
- 11.3c Collect and select information on the use of international standards.
- 11.4c Collect and select technical information from different sources.
- 11.5c Use information technology systems for communication.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

11d Information Technology 1

Practical competences

The candidate must be able to do the following:

Load, save and print

11.1d Select a suitable software application for a given task.

11.2d Load applications software.

11.3d Load a data file.

11.4d Save a data file with an appropriate filename.

11.5d Save a file with a different file name.

11.6d Print out all or part of a data file.

11.7d Exit application software to return to the operating system or GUI.

Word processing

11.8d Open a new file and enter text.

11.9d Edit the contents of a document.

11.10d Use the spell-check function to check the document.

11.11d Enhance the appearance of a document.

Editing a database

11.12d Edit data into an existing database file.

11.13d Define and execute a single condition search using appropriate operators.

11.14d Sort a data file into numerical or alphabetical order.

Editing a spreadsheet

11.15d Identify and move the cell pointer to any row, column and cell within a spreadsheet using cursor keys or mouse control.

11.16d Edit the contents of a cell in an existing spreadsheet.

11.17d Insert and delete columns and rows in a spreadsheet.

11.18d Insert formula containing cell addresses and numbers, to add, subtract, multiply and divide.

11.19d Use the sum function in spreadsheets to sum rows and columns.

11.20d Replicate a formula in a row or a column.

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature _____

Candidate name (please print) _____

Instructor signature _____

Instructor name (please print) _____

Completion date _____

11e Technical Drawing 1

Practical competences

The candidate must be able to do the following:

- | | | | | | |
|--------|--|--------------------------|--------|--|--------------------------|
| 11.1e | Select, fold and store standard sizes of drawing paper. | <input type="checkbox"/> | 11.13e | Produce an example of each of the various methods of graphical representation in common use. | <input type="checkbox"/> |
| 11.2e | Investigate and prepare a short report identifying the various methods used to produce drawings. | <input type="checkbox"/> | 11.14e | Label the component parts of a drawing. | <input type="checkbox"/> |
| 11.3e | Select and identify drawing equipment used in producing drawings. | <input type="checkbox"/> | 11.15e | Collect examples of the various drawings used in the construction industry. | <input type="checkbox"/> |
| 11.4e | Set out a drawing sheet to required standards with borders and title blocks. | <input type="checkbox"/> | | | |
| 11.5e | Investigate and prepare a short report on the health and safety considerations to be taking into account when producing construction drawings. | <input type="checkbox"/> | | | |
| 11.6e | Prepare a report identifying the various methods of reproducing drawings. | <input type="checkbox"/> | | | |
| 11.7e | Draw symbols which identify building materials. | <input type="checkbox"/> | | | |
| 11.8e | Draw symbols which identify fixtures, fittings and equipment used in the construction industry. | <input type="checkbox"/> | | | |
| 11.9e | Prepare a report explaining the use of scales to enable large objects or buildings to be drawn to a convenient size whilst maintaining accurate proportions. | <input type="checkbox"/> | | | |
| 11.10e | Produce, read and work from scale drawings. | <input type="checkbox"/> | | | |
| 11.11e | Draw different types of lines and arrowheads used in construction drawings. | <input type="checkbox"/> | | | |
| 11.12e | Identify common shorthand abbreviations used as notes on drawings. | <input type="checkbox"/> | | | |

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

11f Construction Technology 1

Practical competences

The candidate must be able to do the following:

- | | | | | | |
|-------|--|--------------------------|--------|---|--------------------------|
| 11.1f | Investigate and prepare a short report on the relationship between the design and function of low-rise buildings. | <input type="checkbox"/> | 11.10f | Prepare a typical ironmongery schedule for a standard door. | <input type="checkbox"/> |
| 11.2f | Investigate and prepare a short report on the main design considerations for structural and non-structural elements to meet the needs of established laws, regulations and standards in relation to building work. | <input type="checkbox"/> | 11.11f | Prepare a typical schedule of finishes for a low-rise building. | <input type="checkbox"/> |
| 11.3f | Compare the uses and limitations of a range of basic building materials and components and make a recommendation for a low-rise domestic building. | <input type="checkbox"/> | | | |
| 11.4f | Investigate and produce evidence of the general safety, health and welfare considerations for site operatives, the general public and surrounding properties. | <input type="checkbox"/> | | | |
| 11.5f | Investigate and prepare a short report on the alternative forms of construction which present economic solutions for a design. | <input type="checkbox"/> | | | |
| 11.6f | Determine and present a systematic and logical approach to the sequence of construction operations for a low-rise building. | <input type="checkbox"/> | | | |
| 11.7f | Produce annotated sketches illustrating the common forms and structural elements of a low-rise building. | <input type="checkbox"/> | | | |
| 11.8f | Prepare lists of materials and components for the construction of a low-rise building. | <input type="checkbox"/> | | | |
| 11.9f | Produce an annotated site layout drawing showing the main factors to be considered. | <input type="checkbox"/> | | | |

This is to confirm that the candidate has successfully completed the above tasks:

Candidate signature

Candidate name (please print)

Instructor signature

Instructor name (please print)

Completion date

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Appendix A

Assessments

Two assessment methods are used in the 6165 Technician Certificate in Construction programme – written questions and practical assessment.

Practical assessment

Each unit (assessment component) in this programme has one or more practical assessments which are derived from the practical competences that make up the first part of each syllabus module. The competence checklists (tick boxes), given at the end of each unit, serve as the marking criteria for these assessments and should be used to record the outcome of each candidate's performance. The use of local materials, tools, equipment or practice is allowed within the specifications of the 'range' supporting each competence statement. The results of the assessments must be documented and available for audit by the visiting verifier. **All** assessments must be successfully completed.

The assessments may be carried out at any time agreed by the instructor and the candidate.

The competence checklists in this publication are intended to be photocopied so that each candidate has a personal record of his/her practical assessments.

Preparation, supervision and marking

It is essential that the instructor ensures all necessary preparations are carried out. This will involve ensuring:

- the candidate is ready to demonstrate his or her practical skills
- every candidate understands what is involved
- any necessary materials, tools or equipment are present.

Marking of the practical performance is determined on outcomes as defined by the practical competences. Each tick box will show either 'yes – the candidate achieved this' or 'no – the candidate did not achieve this'. Candidates must be successful in all competences included in the checklist before it can be 'signed off' and its results transferred to the summative record.

All assessments require supervision to ensure that the results reflect only the work of the individual candidate concerned. All assessment documentation and material must be kept in a file for each candidate until the results have been agreed by the visiting verifier and until confirmation of result has been received from City & Guilds.

Records, results and certification

As the practical assessments for each component are successfully completed, the achievement must be recorded. A model of a summative record is given at the end of this section. When all components for an award have been recorded, the result must be sent to City & Guilds. Each candidate's achievements should be transferred from the summative assessment record to the entry form.

Practical components are entered onto Form S which must be countersigned by the visiting verifier and then sent to City & Guilds. The visiting verifier will want to see evidence to support the results being entered. Actual forms are supplied by City & Guilds.

Question paper assessments

The knowledge requirements in the modules of each unit are tested by question papers which are set and marked by City & Guilds. At the Certificate and first year Diploma levels of this programme, candidates will sit multiple choice question papers. There on, all question papers will require short written answers.

Entries for these examinations must be made in accordance with the timetable for entries given in the 'Directory' and must be sent in on Form S.

General information

An advantage of this programme is that candidates who successfully complete a component of assessment for a single unit may, if they wish, claim a Certificate of Unit Credit. This may be beneficial for those candidates who only wish to complete part of this programme.

Candidates wishing to gain the full award (Certificate, Diploma or Advanced Diploma) must successfully complete all components. We recommend that their practical results are sent at the time of, or shortly before the date of the written examinations.

Visiting verifier

The operation of this programme requires the appointment of a visiting verifier. The visiting verifier must countersign the results of the practical assessments on Form S. The visiting verifier should also be able to inspect records and candidates' work to verify the results before submission.

6165-10 Technician Certificate in Construction Candidate practical competence assessment record

Candidate's name and number _____

Centre name and number _____

Assessment reference	Date completed	Instructor signature	Instructor name
101 Core Skills Practice			
And any ONE of			
102 Timber Vocations Basic Skills Practice			
103 Trowel Vocations Basic Skills Practice			
104 Painting and Decorating Basic Skills Practice			
105 Plumbing Basic Skills Practice			
106 Refrigeration and Air Conditioning Basic Skills Practice			
107 Electrical Installation Basic Skills			
Plus			
111 Construction Technician Practice			

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