

PAAVQ-SET

Level 2 Certificate in Paper Technology (QCF)

Knowledge-based Qualification

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LEVEL 2 CERTIFICATE IN PAPER TECHNOLOGY (QCF)

Qualification Summary

This qualification will provide recognition of the knowledge of individuals working in the paper industry. It covers the history of papermaking; basic science for papermaking; fibres and chemical additives used; plant services and wet and dry end processes.

Achieving the Qualification

All 7 Mandatory Units must be completed to achieve the qualification.

Mandatory Units

Unit No.	Unit Name	Credit Value
PT2.01	The History of Papermaking	3
PT2.02	Basic Science for Papermaking	3
PT2.03	Fibres used in Papermaking	3
PT2.04	Process Water and Chemical Additives used in Papermaking	3
PT2.05	Wet End Processes in Papermaking	3
PT2.06	Dry End Processes in Papermaking	3
PT2.07	Plant Services in Papermaking	3

CONTENT OF THE QUALIFICATION

MANDATORY UNITS

UNIT PT2.01	THE HISTORY OF PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand the history of papermaking in terms of its spread across the globe and the evolution in the use of different raw materials and equipment.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand how papermaking has expanded across the globe	1.1. Describe how papermaking has spread geographically worldwide 1.2. Describe how political events have influenced papermaking developments 1.3. Describe how environmental demands have influenced and affected the papermaking industry
2. Understand how different raw materials have been used to make paper products	2.1. Explain how papermaking raw materials have changed 2.2. State how the different types of raw materials are suitable for different end use products 2.3. Describe how economy and ecology have affected the use of raw materials
3. Understand how the processing of raw materials has changed	3.1. List the different types of pulping processes used in papermaking 3.2. Describe how mechanical equipment has evolved through history 3.3. Describe how the addition of chemical additives has evolved
4. Understand how sheet formation equipment has evolved	4.1. Describe how handmade paper was invented 4.2. Explain the reasons for continuous sheet production 4.3. Describe the different machines used to form paper
5. Understand how paper based products' applications have changed	5.1. Identify the different paper sectors 5.2. Describe how paper products markets are divided 5.3. State how paper production is expanded in established and developing markets

UNIT PT2.02	BASIC SCIENCE FOR PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand basic science used in paper technology.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand the periodic table	1.1. Identify the blocks of the periodic table 1.2. Identify the rows and columns in the periodic table 1.3. Explain the relevance of group number and valence in the periodic table
2. Understand the structure of the atom	2.1. Describe the structure of the nucleus 2.2. Describe the orbitals of electrons 2.3. Describe an isotope
3. Understand valence and different types of bonding used in papermaking	3.1. Describe the relationship between atoms and ions 3.2. Explain the different electron orbitals found around an atom 3.3. Describe the different types of chemical bonding found in papermaking
4. Understand acids, bases and pH used in papermaking	4.1. Describe the difference between organic and inorganic acids 4.2. Describe the difference between base and alkali 4.3. State the common acids and bases in everyday life 4.4. Describe how pH is derived
5. Understand the construction and balancing of simple equations used in papermaking	5.1. List the formulae for some common substances used in papermaking 5.2. State the general form of acid plus base equations 5.3. Describe the concept of double decomposition reactions 5.4. List simple calculations based on equations

UNIT PT2.03	FIBRES USED IN PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand how the choice of fibres and the pulping processes used affect the papermaking process and end product.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand the fibre sources in plants	1.1. Explain the life cycle of plant growth 1.2. Describe the use of different parts of the plant for papermaking 1.3. List the structures of wood and their purpose
2. Understand the different types of fibre used in papermaking	2.1. Explain the difference between hard woods and soft woods 2.2. Describe the range of non-woods fibres and their uses 2.3. List the small range of synthetic fibres used in papermaking and the reason for using them 2.4. List the products that synthetic fibres may be used in 2.5. Describe the main differences in the processing and properties of recycled and new fibres 2.6. List the advantages and disadvantages of recycled fibres
3. Understand the physical and chemical differences of different fibre types	3.1. Describe the chemical differences in different fibre types 3.2. Describe how climatic growing conditions can influence fibre dimensions and end use properties 3.3. Describe how the effects of different pulping conditions can influence the chemical and physical properties of fibres 3.4. Describe the effects of bleaching on fibres 3.5. List the differences between bleached and unbleached fibres
4. Understand how fibres for papermaking are cultivated	4.1. Explain the need for good forestry management 4.2. Describe how wood of different ages is used to sustain a continuous income 4.3. Explain how climate can affect the growth and harvesting of wood
5. Understand the main differences between new and recycled fibres	5.1. Describe the types of Mill used in recycling of fibres 5.2. List the major grades of recycled fibre

	<ul style="list-style-type: none">5.3. Describe the types of contamination found in recycled fibres5.4. Describe how fibre density and size can be used to separate contaminants5.5. Describe the differences between recycled and new fibres
6. Understand the main pulping processes	<ul style="list-style-type: none">6.1. Explain the mechanical pulping processes and equipment used6.2. Describe the types of fibre used and expected yields6.3. Explain the chemical pulping process and equipment used6.4. Describe the economic and environmental viability of the chemical pulping process6.5. List the other types of pulping processes used in papermaking and their uses

UNIT PT2.04	PROCESS WATER AND CHEMICAL ADDITIVES USED IN PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand the processing of water and use of chemical additives in papermaking.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand the sources of water used in papermaking	1.1. Describe the types of surface and ground waters used in papermaking 1.2. Describe the contaminants that can be found in raw and process water 1.3. Explain how contaminants can influence the paper process and products 1.4. Describe how contaminants can affect final products
2. Understand how water is treated in papermaking processes	2.1. Describe the types of water treatment that can be used in papermaking 2.2. State the different designs of equipment that can be used in sedimentation 2.3. Describe the different types of filtration equipment that can be used 2.4. Explain the difference between traditional and current floatation techniques 2.5. Describe the difference between hard and soft water 2.6. Describe the difference between temporary and permanent hardness 2.7. Explain how temporary hardness can be removed
3. Understand the process aids used in papermaking	3.1. Describe how chemicals can be used to make the process easier to operate 3.2. Describe how chemicals can make the process more economical to operate 3.3. Describe how antifoams and defoamers work and their benefits 3.4. Describe the use of bactericides 3.5. Explain the strategies and the benefits for controlling problematic substances 3.6. Describe the types and purpose of retention aids
4. Understand the functional aids used in papermaking	4.1. State the reasons for the use of functional additives in papermaking

- 4.2. Describe the different types of colouring materials and their properties
 - 4.3. Explain the purpose of sizing agents
 - 4.4. Describe the effects of additives on final sheet properties
 - 4.5. Describe the different types of strength aid used in papermaking
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UNIT PT2.05	WET END PROCESSES IN PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand the wet end processes in papermaking, from fibre dispersion up to and including sheet formation.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand the dispersing of fibres in papermaking	1.1. Describe the different types of pulping consistencies and equipment used 1.2. List the advantages and disadvantages of the use of different types of pulping consistencies 1.3. Describe the techniques that can be used to improve processing time and energy reduction 1.4. State the equipment used for dispersing 'stickies' 1.5. Describe the purpose of blending in papermaking
2. Understand how fibres are worked in papermaking	2.1. Describe the development of beater and refiner design and operation 2.2. Describe the mechanism of refining 2.3. Explain how refining action can influence the papermaking process 2.4. Explain how refining action can influence final sheet properties
3. Understand how contaminants are removed from fibres in papermaking	3.1. Describe the equipment used to remove contaminants by size 3.2. Describe cleaning equipment and how it can remove contaminants 3.3. Describe the deinking process 3.4. Describe how air is removed from fibres
4. Understand the control of flow and consistency in papermaking	4.1. State the methods for measuring flow and consistency 4.2. Describe how back water is collected and reused 4.3. Describe the purpose of dilution in papermaking 4.4. Describe the equipment types used for storage and mixing
5. Understand the flowbox and sheet formation in papermaking	5.1. Describe a typical flow system from machine chest to flowbox 5.2. State the functions of a flowbox in papermaking 5.3. Describe a traditional Fourdrinier table set up

UNIT PT2.06	DRY END PROCESSES IN PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand the dry end processes in papermaking, from the press section to slitting processes.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand the purpose of the press section in papermaking	1.1. Describe how water is removed from the web in papermaking 1.2. Describe the main press designs used in papermaking 1.3. State the ways that press sections can be set up 1.4. Describe the purpose of press fabrics and how they have evolved 1.5. State the types of press rolls found in the press section
2. Understand the processes of drying the sheet in papermaking	2.1. Describe the types of drying devices that can be used 2.2. State the energy sources that can be used 2.3. Describe the importance of ventilation 2.4. Describe how tissue is dried 2.5. State ways to economise and reduce carbon footprint in the dry end processes
3. Understand the purpose of the size press in papermaking	3.1. State the advantages of surface sizing over internal sizing 3.2. Describe the chemicals that may be used 3.3. State the major variables that are associated with the size press
4. Understand the purpose of reeling the sheet in papermaking	4.1. Describe the purpose and types of reel up 4.2. State the importance of correct tension and reel hardness 4.3. Describe the purpose of different types of winder
5. Understand the on-line monitoring used in papermaking	5.1. Describe the most common on-line web measurements 5.2. Explain the principles for common measuring techniques
6. Understand the finishing processes used in papermaking	6.1. Describe how machine reels may be reduced to sizes that can be used by customers 6.2. State how sheet cutting is carried out in papermaking 6.3. Describe the reasons for guillotining in papermaking 6.4. Explain why some paper mills rewind

UNIT PT2.07	PLANT SERVICES IN PAPERMAKING
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	20

Unit Overview

This unit addresses the knowledge required to understand the plant services used in papermaking.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Understand the purpose of steam supply in papermaking	1.1. Describe the properties of steam 1.2. State the methods of steam generation 1.3. Describe where steam is used in the papermaking process 1.4. Describe how to make more efficient use of delivering steam in the papermaking process 1.5. Explain how steam and condensate can be reused
2. Understand the purpose of compressed air and vacuum in papermaking	2.1. Describe the main uses of compressed air and vacuum 2.2. Describe how compressed air is generated and distributed 2.3. Describe the implications of air leaks 2.4. State the effects of air quality on air generation and use 2.5. Describe the different ways of generating vacuum
3. Understand the use of electricity in papermaking	3.1. State the different types of electricity and how they are generated 3.2. Explain how the different types of electricity may be used in papermaking 3.3. Describe the factors that must be considered when purchasing electricity 3.4. Describe how energy usage must be managed in the papermaking process
4. Understand the use of lubrication in the papermaking process	4.1. Describe the purpose of lubrication 4.2. State the types of lubrication and methods of application 4.3. Describe the methods used for cleaning and re-using oils
5. Understand the use of pipes in the papermaking process	5.1. State the basic colours for pipes used for delivering common materials 5.2. Describe the modifications to the basic colour to reflect the type of material being delivered