



Qualifications

Diploma in Packaging

Module 1

Examination Syllabus 2019

Unit 1: Packaging Theory and Materials

Topic	Candidates should understand and be able to demonstrate using detailed examples:
Theory of packaging	<ul style="list-style-type: none"> • The history and development of packaging • Packaging principles
Materials used in packaging	<ul style="list-style-type: none"> • Glass bottles: <ul style="list-style-type: none"> ○ advantages and disadvantages of glass ○ bottle manufacturing ○ bottle faults and testing • Plastic bottles: <ul style="list-style-type: none"> ○ advantages and disadvantages ○ principles of bottle manufacturing ○ bottle faults and testing • Emerging bottle formats • Crowns and caps: <ul style="list-style-type: none"> ○ types of closure ○ crown and cap manufacturing ○ sealing • Cans and ends: <ul style="list-style-type: none"> ○ advantages and disadvantages of cans ○ can and end manufacturing ○ shell and tab assembly ○ inspection and palletisation • Paper and cardboard: <ul style="list-style-type: none"> ○ advantages and disadvantages of paper and cardboard ○ principles of manufacturing ○ different types of paper and cardboard • Plastics: <ul style="list-style-type: none"> ○ plastic films and other polymers ○ plastic crates • Adhesives: <ul style="list-style-type: none"> ○ types of adhesives ○ principles of adhesion • Kegs and spears <ul style="list-style-type: none"> ○ keg components ○ keg manufacturing and materials ○ types of spear and spear safety

Unit 2: Beer Preparation

Topic	Candidates should understand and be able to demonstrate using detailed examples:
Fundamentals of brewing	<ul style="list-style-type: none"> • Definition of beer and beer types • Raw materials <ul style="list-style-type: none"> ○ malt, adjuncts, water and hops • Basic brewing process <ul style="list-style-type: none"> ○ milling, mashing, conversion, separation, wort boiling, fermentation and beer maturation • Key beer properties • Basic principles of handling beer and maintaining its key properties
Beer filtration	<ul style="list-style-type: none"> • Purposes and principles of filtration <ul style="list-style-type: none"> ○ rough, polishing and stabilising filtration ○ different methods of filtration ○ principles of filter design and operation ○ the impacts of temperature, time, pressure, and microbiological concentrations ○ filtration safety considerations
Beer dilution, carbonation and bright beer handling	<ul style="list-style-type: none"> • De-aerated liquor (water) and beer dilution <ul style="list-style-type: none"> ○ use in high gravity brewing ○ quality requirements for dilution liquor ○ the production of de-aerated liquor ○ blending procedures and calculations • Purposes and principles of carbonation <ul style="list-style-type: none"> ○ principles of gas solubility ○ carbonation equipment • Bright beer storage and release of beer for packaging • Maintaining beer quality up to the filler <ul style="list-style-type: none"> ○ design and procedural methods to control beer dilution ○ variations in CO₂ levels, O₂ pick-up and loss of foam potential ○ microbiological and chemical contamination risks
Theory and practice of sterile filtration and pasteurisation	<ul style="list-style-type: none"> • Sterile filtration theory, filter design and operation • Definition of pasteurisation and pasteurisation unit <ul style="list-style-type: none"> ○ definition and aims of pasteurisation ○ definition of pasteurisation units (PU) ○ effects of pasteurisation on different microbiological organisms • Design, operation and control of a flash pasteuriser

	<ul style="list-style-type: none"> ○ principal effects on beer quality during pasteurisation ● Design, operation and control of a tunnel pasteuriser <ul style="list-style-type: none"> ○ measurement of PUs ○ chemical treatment of pasteuriser water ○ the principal effects on beer quality during pasteurisation
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Unit 3: Planning and Line Design

Topic	Candidates should understand and be able to demonstrate using detailed examples:
Capacity planning	<ul style="list-style-type: none"> ● Forecasting demand <ul style="list-style-type: none"> ○ market and category forecasting ○ methods for forecasting demand ○ consideration of restraints such as raw materials, labour, transport, utilities and maintenance ● Strategic and tactical planning <ul style="list-style-type: none"> ○ the difference between the two and the key elements of strategic and tactical plans
Operational planning	<ul style="list-style-type: none"> ● Line planning and scheduling <ul style="list-style-type: none"> ○ translating forecasts into plans and schedules ○ measuring performance ○ the role of shift patterns in planning and scheduling ○ accommodating maintenance activities ● Planning and production constraints <ul style="list-style-type: none"> ○ Internal and external influences
Line design	<ul style="list-style-type: none"> ● Line design theory <ul style="list-style-type: none"> ○ principles of line design ○ design constraints ○ the 'V' graph ○ advantages and disadvantages of line layout formats ○ conveyor design ○ line design calculations ● Manning philosophy <ul style="list-style-type: none"> ○ line layout ○ manual and automatic operation ○ operational requirements ○ culture and skills ● Materials handling <ul style="list-style-type: none"> ○ location of warehouses ○ Just-in-Time (JIT) material deliveries ○ Forklift Truck/automated guided vehicle handling

	<ul style="list-style-type: none"> ○ storage conditions for materials and finished product ● Waste handling
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Unit 4: Small Pack Operations

Topic	Candidates should understand and be able to demonstrate using detailed examples:
Fundamental considerations	<ul style="list-style-type: none"> ● Typical small pack line layouts showing schematic designs and flow diagrams ● Influence of container design and specification (on filling performance) <ul style="list-style-type: none"> ○ container standardisation and product differentiation ○ the impact of container design on conveying and handling ○ bottle appearance and fill height control
Pre-filling operations	<ul style="list-style-type: none"> ● Container reception, de-palletising and returnable bottle handling ● Container preparation for filling <ul style="list-style-type: none"> ○ crate washing ○ bottle washing ○ bottle and can rinsing
Theory and practice of filling technology	<ul style="list-style-type: none"> ● Filling theory and principles <ul style="list-style-type: none"> ○ the filling cycle ○ types of fillers ● The design and operating principles of glass bottle fillers and the filling process ● The design and operating principles of PET bottle fillers and the filling process ● The design and operating principles of a can filler and the filling process ● The design and operating principles of a sterile/aseptic filler and the filling process ● Widget technology <ul style="list-style-type: none"> ○ the purpose and development of widgets ○ operating principles ○ types of widget and associated technology
Container closing	<ul style="list-style-type: none"> ● The design and operating principles of a bottle crowner and the crowning process ● The design and operating principles of a can seamer and the seaming process

<p>Post-filling operations</p>	<ul style="list-style-type: none"> • Drying containers <ul style="list-style-type: none"> ◦ the purpose of drying bottles and cans • The design and operation principles of a bottle labeller and the labelling process • Container sleeving and coding • The design and operating principles of a palletiser and the palletising process • Warehousing, storage conditions and stock rotation
<p>Secondary packaging</p>	<ul style="list-style-type: none"> • The design and operating principles of a secondary packaging machine and the packaging process • Types of secondary packaging