Higher Design and Manufacture – Revision Guide

The question paper is **worth 80 marks**, and lasts for **2 hours 15 minutes**.

Section 1 – 25 marks (1 question) Section 2 – 55 marks

*	Revision Topic	
Design		Marks in the exam **30-50 marks**
Brief		
	- The purpose of the design brief in the design process - Open and closed design briefs	
Research & evaluation		

	- The purpose of research and evaluation.
	  • throughout the design process
	  • of existing products
	- Information gathered through research or evaluation
	- Methods of gathering information
	  • primary and secondary research
	- The key stages of the following techniques
	  • comparisons
	  • questionnaires
	  • surveys
	  • tests and test rigs
	  • user trial
	  • user trip	

Specification		

	- The purpose of, and information specified in, the following specification types:
	  • product design
	  • performance
	  • technical	

Idea-generation techniques		

	- The use of idea-generation techniques
	- The key stages/activities of the following idea-generation techniques:
	  • analogy
	  • brainstorming
	  • lifestyle/mood board
	  • morphological analysis	

Modelling in the design process		

	- The use of modelling during the design process to:
	  • generate and explore
	  • test and refine
	  • communicate
	- The purpose of and information gained from:
	  • physical models: sketch models, block models, scale models, test rigs and prototypes
	  • computer-generated models and simulations
	- Benefits and drawbacks of rapid prototyping	

Graphics in the design process		
	- The purpose and appropriate use of graphic techniques when developing, resolving and communication ideas throughout the design process - The advantages of using manual and computer-generated graphics in the design process	
Function		
	- The influence of function on the design of products - Primary and secondary functions	
Performance		
	- The influence of performance on the design of products - Fitness for purpose of products - The influence of planned obsolescence on the manufacturer, consumer and the environment - Maintenance issues associated with products - Value for money	
Safety		
	- The influence of safety on the design of products - How to ensure safety in products	
Market		
	- The influence of the target market on the design and marketing of products - Technology push - Market pull - Economics - Product lifecycles: introduction, maturity, growth and decline - The influence of fashion, market trends and style - Marketing techniques to influence sales - Niche marketing - Branding	
Aesthetics		
	- The aesthetics of products - Influences on the aesthetics of products	
Ergonomics		
	- The influence of ergonomics on the design of products - Anthropometrics - Psychology - Physiology	

*	Revision Topic	
Materials and Manufacture		Marks in the exam **26-42 marks**
Materials used in the commercial manufacture of:		

	- Thermoplastics
	  • ABS, acrylic, nylon, polypropylene, polystyrene, polythene, polyvinyl chloride
	- Thermosetting plastics
	  • melamine formaldehyde, urea formaldehyde
	- Elastomers
	- Ferrous metals/alloys
	  • cast iron, mild steel, high-speed steel, stainless steel
	- Non-ferrous metals/alloys
	  • aluminium, brass, copper, tin, zinc
	- Hardwoods
	  • ash, beech, mahogany, oak
	- Softwoods
	  • spruce, pine
	- Manufactured boards
	  • plywood, blockboard, chipboard, hardboard, MDF, flexi ply, veneered boards
	- Composite materials
	  • carbon-fibre plastics, glass-reinforced plastic
	- The influence materials have on the design and manufacture of products
	- Methods used to identify materials in commercially manufactured products
	- Developments in new materials and their impact on products	

<u>Processes used in the commercial manufacture of products</u>		

	- Appropriate uses and identifying features of
	  • bending, blow moulding, compression moulding, die casting, forging, extrusion, injection moulding, piercing and blanking, press forming, rotational moulding, sand casting, vacuum forming, 3D printing, laser cutting
	- Appropriate used and identifying features of:
	  • chrome plating, galvanising, plastic dip coating
	- Manufacturing features of component parts
	  • complexity, cross section along its length, draft angles, ejection marks, flashing, injection points, shear marks, split lines, surface finish, symbols and labels, thinning of sheet material, wall thickness
	- The purpose of bosses, location pins, ribs and webs
	- The issues that influence the processes used in commercially manufactured products	

Assembly methods used in the commercial manufacture of products		
	- Methods use to join material • adhesive, carcase and frame joints, knock-down fittings, nuts, bolts, screws, snap and press fit, riveting, spot welding, arc welding, thermal bonding - Methods used to identify assembly methods in commercially manufactured products - Issues that influence the assembly of commercially manufactured products	
Production and planning systems		
	- One-off production, batch production, mass production - Methods used to improve production • automation, CAD/CAM, CNC machining, Gantt and flow charts, jigs, just-in-time production, standard components	
People who influence design		
	- The roles and responsibilities of people who influence the design of products • designers, ergonomists, lawyers, production engineers, project manager, market researchers, materials technologists - Communication between members of design team - Advantages and disadvantages of in-house design team and sub-contracting	
Intellectual property rights		

	- The purpose of intellectual property rights
	- Methods of protecting intellectual property rights
	  • copyright
	  • design rights
	  • patents
	  • trademarks	

*	Revision Topic	
Impact of Design and Manufacturing Technologies on Society, the Environment and the World of Work		Marks in the exam **4-8 marks**
Impact of design and manufacture on society, the environment and the world of work		
	- Methods designers and manufacturers can use to limit a product's impact on the environment • design for recyclability, design for re-use, efficiency - The impact traditional and new manufacturing technologies have on society, the environment and the workforce - The impact of materials on the environment and society - Methods to support sustainability - Investigation of a product's sustainability and its impact on the environment	