SIL – Year 12 into 13 - DESIGN ENGINEERING

There are 2 parts to your SIL:

1. Exploring the key terms below (see below)
2. Completing your 10 design ideas (see https://thomascrosland.wixsite.com/ncb-de/copy-of-11-12-sil)

1) Looking at the 9 sections we have covered this year, you need to ensure you are knowledgeable and skilled enough to succeed in your NEA **and** in your exam. To review the 9 topics you need to look through the table below and complete a paragraph of knowledge in each area. Those areas that you are unable to or struggle to make comment on are the areas you need to study further.

Ensure each of the areas are **explained,** with examples demonstrating your depth of knowledge (not those out of the textbook – use your own). Make links to other areas/ topics within the course. See the example below.

You will see this is quite a comprehensive list but it covers the entire subject content. Some of these areas you WILL include in the execution of your NEA - make note of areas you have already made reference to, but also areas that you have missed – these are the areas you will need to include.

Topic area	Explanation of topic area with examples	Links to other topics
User requirements	During the research, design and development of a product, it is key to consider the requirements of the user to ensure the outcome suits them. Their requirements are a combination of their needs and wants and can include things such as affordability, sizing, usability or aesthetics.	Ergonomics/ anthropometrics. User needs. User wants. 'Good design'
User needs		
User wants		
Economic considerations		
Market considerations		

Primary research		
Secondary research		
Stakeholders		
Qualitative observation		
Quantitative observation		
User centred design (UCD)		
Usability		
Iterative design		
SWOT analysis		
Focus groups		
Participatory design		
Feasibility analysis		
Trend forecasting		
Crowdfunding		
Venture capitalists		
Innovation		
Ergonomics		
Anthropometrics		
Percentiles		
Aesthetics		
Throwaway society		
User interface		
Software interface		
Inclusive design		
Exclusive design		
Initial concept		
Product lifecycle		
Lifecycle assessment		
Planned obsolescence		
Material properties		

Standardised components		
Printed circuit board		
One off production		
Batch Production		
Mass Production		
Continuous Production		
J-I-T production		
Lean manufacturing		
Product disassembly		
Environmental considerations		
Social considerations		
Moral issues		
Cultural issues		
Design styles		
Marketing		
Branding		
Marketing Mix (4Ps)		
SAVE marketing approach		
Inbound marketing		
Outbound marketing		
Standardised components		
Product evolution		
Artificial intelligence		
Adaptative manufacture		
Subtractive manufacture		
James Watt		
Isambard Kingdom Brunell		
James Dyson		

Product lifecycle stages		
Unique selling point (USP)		
Social Media Marketing		
eWOM		
Blue sky thinking		
Incremental innovation		
Social footprint		
Ecological footprint		
Natural materials		
Synthetic materials		
Metals (ferrous, non-ferrous and alloy)		
Timbers (hardwood and softwood)		
Manufactured boards		
Polymers (thermo and thermo setting)		
Biopolymers		
Smart materials (think xxxxxx chromic)		
Modern materials		
Composite materials		
Papers and boards		
Fabrics/ textiles		
Energy sources		
Circular economy		
Linear economy		
Internet of things (IoT)		
The EU Renewable Energy Directive		
FSC		

Deforestation		
Scales of production		
System compatibility		
Machinery maintenance		
End of life support		
Environmental impact of materials		
Greenhouse effect		
Sustainability		
Fairtrade		
Globalisation		
Optimisation		
Eco-materials		
Stock size		
Material selection		
Intellectual property		
Registered designs		
Trademarks		
Copyright		
Design rights		
Patents		
Voltage		
Current		
Annotation		
Generative design		
Flowcharts		
Opinion tree		
System diagram		
Tolerance		
CAD		
CAM		
CAE		

Project management		
Gantt Chart		
Critical path analysis		
Functional performance		
Costs		
Cost vs performance		
Material characteristics vs material properties		
The 6 R's		
Standardised tests		
Geotextiles		
Force extension graph		
Super alloys		
High performance alloys		
Nano materials		
Shape memory alloys		
Shape memory polymers		
Density		
Tensile strength		
Strength-to-weight		
Hardness		
Durability		
Thermal conductivity		
Electrical conductivity		
Corrosion resistance		
Stiffness		
Elasticity		
Plasticity		
Impact resistance (toughness)		
Brittleness		
Malleability		

Ductility		
Machinability		
Compressive strength		
Tensile strength		
Structural integrity		
Sacrificial parts		
Triangulation		
Material protection		
Shape shifting materials		
Viscosity		
Magnetorheological fluid		
Microcontroller		
Actuator		
Digital signal		
Analogue signal		
Input device		
Output device		
Basic Machine Principal		
Motion types		
Levers		
Compound levers		
Linkages		
Gears		
Compound gears		
Chain and sprocket		
Belt and pulley		
Cams		
Screw threads		
Bearings		
Efficiency		
Mass		
Weight		

Static forces		
Dynamic forces		
Youngs Modulus		
Resistors		
Inputs		
Battery capacity		
Sensors		
Outputs		
MOSFETs		
Open electronic systems		
Closed electronic systems		
Pneumatics		
Rapid prototyping		
Wastage/ subtractive manufacture		
Jig		
Template		
Additive manufacture		
Knock down fittings		
Metal Casting methods		
Sheet metal processes		
Metal joining		
Timber joining		
Polymer joining		
Tolerance		
CNC production		
Measuring instruments		
Polymer forming methods		
Design for Manufacture and Assembly (DFMA)		

Quick response manufacturing (QRM)		
Lead time		
Fully automated manufacture		
Direct digital manufacturing (DDM)		
Computerised stock control		
Repetitive flow production		
Total quality management (TQM)		
Quality Control		
Quality Assurance		
British Standards (BSI)		
European Standards (CE)		
Commercial viability		
Design fixation		
Destructive testing		
Non-destructive testing		
COSHH (2002)		
PPE		
Risk Assessment		
Health and Safety at Work act (1974)		
Consumer Rights Act (2015)		
Trade Descriptions Act (1968)		
Consumer Protection Act (1978)		