2 HOURS ALLOWED

Materials required for this examination:
· normal writing and drawing instruments
· a calculator
· a protractor.

Instructions to candidates:
· Use black ink or black ball-point pen. Use pencil only for drawing.
· Fill in the boxes at the top of this page.
· Answer all questions.
· You must answer the questions in the spaces provided. Do not write on blank pages.
· Do all rough work in this book. Cross through any work that you do not want to be marked.

Information
· The marks for questions are displayed.
· The maximum mark for this paper is 131.
· There are 22 marks for Section A, 37 marks for Section B and 72 marks for Section C.

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1. Which one of the following energy production systems is an alternative energy?

A. Wind Power
B. Hydraulic Fracturing
C. Crude Oil
D. Coal

2. Which type of motion does the diagram below represent?

A. Rotary
B. Reciprocating
C. Linear
D. Oscillating

3. A Foam Metal is:

A. A dense metal, starting at the core and out to the exterior layer.
B. A metal that cannot be heated, as it will melt.
C. A solid structures, usually composed of a dense outer layer, with the inner portion in the form of a matrix of pores.
D. A composite metal, made up of several layers.
4. From the list of woods, identify the natural wood.

A. Plywood
B. MDF
C. Mahogany
D. Flexiply

5. Which of the following designers, designed the ‘Juicy Salif’ - Citrus Squeezer?

A. Charles Eames.
B. Marcel Breuer
C. Philippe Starck
D. Robin Day

6. Which of the following statements describing ‘plywood’ is FALSE?

A. Plywood is a composite material.
B. Plywood is composed of several layers of thin plies / veneers.
C. Plywood is relatively weak, compared to other manufactured boards.
D. Plywood is supplied in a variety of thicknesses.

7. Which of the statements below is the definition of the physical property ‘fusability’?

A. The ability of a material to be twisted into a variety of shapes, without the need for heat.
B. The ability of a material to resist a stretching force, without cracking.
C. The ability of a material to return to its original shape, repeatedly.
D. The ability of a material to be transformed from a solid state to a liquid state, due to the application of heat.
8. Which of the following statements is representative of Iterative Design?

A. A linear design process, whereby one stage follows another.
B. A process of continual improvement, of a concept, prototype, design or product, with model making, sketching, client feedback applied when required.
C. Designing as a team, following a strict design process.
D. A systems approach - PROCESS - SYSTEM - OUTCOME.

Link to potential answer
http://www.technologystudent.com/despro_flsh/iterative1.html

9. Which of the following is the process called ‘INJECTION MOULDING’?

A. An automated painting process.
B. Plastic coating of a metal surface, to increase its resistance to temperature.
C. A process that creates a ‘reflective’ coating on a range of polymers.
D. A process involving heating ‘plastic’ granules to liquid form and forcing the solution into a mould.

Link to potential answer
http://www.technologystudent.com/equip1/inject1.htm

10. What is the name of the area of circle labelled ‘A’, seen below?

A. Sector
B. Radian
C. Triangulated Part
D. Aspect

Follow the link to a potential answer.
11. Give two reasons why Titanium is suitable for making turbine blades in jet engines. 2 marks

**Reason 1:**

**Reason 2:**

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12. Describe one potential practical application of Graphene. Include in your answer, why graphene is suitable for the practical application. 2 marks

**Practical Application:**

**Why suitable?:**

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13. Nuclear Power Stations, produce electricity from radioactive fuel sources such as uranium. Give two reasons why some people are against this method of energy production. 2 marks

**Reason 1:**

**Reason 2:**
14. Give two reasons why some people are in favour of Nuclear Power. 2 marks

Reason 1: 

Reason 2: 

15. What is the circumference of the circle seen in the diagram.

You will gain marks for each stage of the calculation, written in the space below.

4 marks

**CALCULATION:**

CIRCUMFERENCE = 2 \times \pi \times r

\pi (\pi) = 3.14
16. Select one of the materials listed above.

Name of Material

Describe your chosen material's manufacture. Include notes and a labelled sketch(s)
8 marks

TO HELP YOU ANSWER THIS QUESTION
http://www.technologystudent.com/joints_fsh/metalfoam1.html
http://www.technologystudent.com/joints/plywood1.html
17a. Why is lacquer sometimes applied to a metal surface?  

17b. Describe the process of applying lacquer to a metal surface?  

18. Select one of the products shown below. Then, give two reasons, why the product is a good example of one off / single item production.  

BESPOKE CHAIR  
HANDMADE JEWELLERY  
THE EIFFEL TOWER
19. Metals can be permanently joined in a number of ways. Using notes and sketches, describe / explain the industrial process called BRAZING.  5 marks

TO HELP YOU ANSWER THIS QUESTION
http://www.technologystudent.com/equip1/braz1.htm
http://www.technologystudent.com/joints/braz2.htm

THE INDUSTRIAL PROCESS CALLED BRAZING
INCLUDE NOTES AND A SKETCH(S)
20a. What is the Lean Manufacturing system?  

4 marks

TO HELP YOU ANSWER THIS QUESTION
Follow the links below.

20b. Name four international companies that utilise the Lean Manufacturing philosophy  

4 marks

TO HELP YOU ANSWER THIS QUESTION
Follow the links below.
21a. **What is Globalisation?** 4 marks

21b. **Select a manufactured product that is the result of globalisation, Describe the stages involved in it’s manufacture.** 4 marks

**PRODUCT:**

**DESCRIPTION:**
PACKAGING OF PERFUMED PRODUCTS

The packaging seen below, has been designed to hold / store deodorant and perfume containers.
22. The packaging should have the following design features:

TO HELP YOU ANSWER THIS QUESTION
Follow the links below.
http://www.technologystudent.com/despro2/drink7.htm

22a. Draw a typical symbol that should be found on the packaging and add a description / explanation of the symbol. 2 marks

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22b. What is the advantage of using Expanded Polypropylene (EPP)? 2 marks (Link for help http://www.technologystudent.com/prddes1/perfpk3.html)

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22c. Why is quality card also used in the manufacture of the packaging? 2 marks (Link for help - http://www.technologystudent.com/prddes1/perfpk4.html)

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22d. The printing process called lithography is used to print the detail, images and colour on to the surfaces of the packaging. Draw a labelled diagram of lithography and included a written explanation. 4 marks (Link for help http://www.technologystudent.com/designpro/prtpro5.htm)

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23a. List FOUR ways, in which the printed surfaces of packaging, helps in the promotion of a product?  

4 marks

23b. How could the packaging be improved, if the target market was specifically aimed at teenagers?  

4 marks
24a. The surface of the packaging is to finished through the process of UV varnishing? Explain this process with a diagram and notes 5 marks

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24b. The packaging is in the form of a cuboid. Give three advantages of using this common shape 3 marks

REASON 1:__________________________________________________________________________

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REASON 2:__________________________________________________________________________

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REASON 3:__________________________________________________________________________
25a. **These questions are related to Brand Identity (8 marks in total)**

**What is a brand?** 2 marks

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25b. **Name a company that you think has reached brand status. Explain why you consider it has reached this status.** 2 marks

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25c. **Describe / explain four characteristics of Brand Identity.** 4 marks

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Designers need an understanding of Market Research

26a. What is meant by the term Market Research? 4 marks

26b. How can ICT specifically contribute to market research? 4 marks
An acrylic panel for a storage unit is seen below.

27a. Calculate the area of the acrylic required, before it is cut to shape (the overall rectangle of acrylic required before it is cut into an L shape). 3 marks

27b. Calculate the area of the final L shape 5 marks
28a. Designers need an understanding of smart materials. Phosphorescent Pigments have many practical applications. What are Phosphorescent Pigments? 2 marks

28b. Describe two practical applications of Phosphorescent Pigments. 2 x 3 marks

PRACTICAL APPLICATION 1:

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PRACTICAL APPLICATION 1:

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29a. Designers make models throughout the design and development of a product? Why is model making important?  

2 marks

29b. Name two model making materials used by designers and describe the characteristics that make them suitable for model making.  

2 x 3 marks

Modelling Materials 1:

Modelling Material 2:
30. A local public bus, takes a route from Keighley to Bradford, as shown on the map below. The bus stops are indicated on the map.

Draw a topological map, in the style of London Underground, in the available space. 6 marks

TO HELP YOU ANSWER THIS QUESTION
http://www.technologystudent.com/despro_flsh/time15.html