GCE A Level

1113/03

DESIGN & TECHNOLOGY

Systems and Control Technology DT3

P.M. THURSDAY, 23 June 2011

2 ½ hours

ADDITIONAL MATERIALS

In addition to this examination paper you will need a 12 page answer book.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer **three** questions from Section A.

Answer **three** questions from Section B.

Answer **two** questions from Section C.

INFORMATION FOR CANDIDATES

When and where appropriate, answers should be amplified and illustrated with sketches and / or diagrams.

Section A and **Section B** answers are designed to demonstrate your **breadth** of knowledge in Systems and Control Technology.

Your **Section C** answers should be substantial and demonstrate your **depth** of knowledge in Systems and Control Technology.

Candidates are reminded of the necessity for good English and orderly presentation in their answers.

SECTION A

Answer **three** *questions from this section.*

This section is designed to demonstrate your **breadth** *of knowledge in Systems and Control Technology.*

Each question carries 8 marks.

1. Describe how *technology-push* can influence the development of control systems used in new products. [8]

2. Fully explain the process of programming a microcontroller using a named CAD software programme. [8]

3. Describe the difference between an *open loop* and a *closed loop* control system. 2 x [4]

4. Explain **four** important sustainable design issues that face designers when developing new products or rejuvenating existing products. 4 x [2]

5. Explain what you understand by the term 'standards' that are developed by BSI (British Standards Institution) for use in the manufacture of products. [8]

SECTION B

Answer **three** *questions from this section.*

This section is designed to demonstrate your **breadth** *of knowledge in Systems and Control Technology.*

Each question carries 8 marks.

6. Describe how *reverse engineering* helps designers to improve control systems used in products. [8]

7. Identify **three** important aspects of project planning and explain why they need to be in place, and monitored closely, to ensure the successful completion of a product at school level. [8]

8. Explain how standardised components impact positively on the production of products which need to be manufactured in volume. [8]

9. Identify the unique properties that piezoelectric crystals present and describe how these can be exploited by designers. [8]

10. *(a)* Explain what is meant by the term semiconductor. [2]

(b) Describe, with the use of diagrams, how a named semiconductor can be used in a control system. [6]

SECTION C

Answer **two** *questions from this section.*

Your answer should be substantial and show the **depth** *of your knowledge in Systems and Control Technology.*

Each question carries 26 marks.

11. Discuss the impact that the work of a product designer of your choice, from the early 70s to the present day, has had on the development of a product or range of products. [26]

12. Describe the effects that appropriate component selection has had on the control system of a specific product that you have made in terms of function, reliability and aesthetics. [26]

13. Evaluate how the trend of miniaturisation has impacted on the development of a particular named consumer product. [26]

14. Designers can have a significant positive impact on the future of the planet.

Discuss the ways that control systems in products can support and extend the continued existence of a balanced environment. [26]

15. Explain how a rigorous system of evaluating a prototype can lead to incremental developments that ensure the future success of a manufactured product. [26]