GENERAL CERTIFICATE OF EDUCATION (GCE) BOARD

General Certificate of Education Examination

JUNE 2021 **ADVANCED LEVEL**

Subject Title	**Information and Communication Technologies**
Paper No.	**Paper 2**
Subject Code No.	**0796**

Two and a Half Hours

Answer any SIX questions.

All questions carry 17 marks each. For your guidance, the approximate mark for each part of a question is indicated in brackets.

You will be marked on your ability to use good English, to organize information clearly and to use specialist vocabulary where appropriate.

In calculations, you are advised to show all the steps in your working, giving your answer at each stage.

1. (i) State and explain one major use of the Internet which is peculiar to each of the following fields.
   (a) Film industry **(2 marks)**
   (b) University **(2 marks)**
   (c) Telemedicine **(2 marks)**

   (ii) (a) Briefly explain the difference between simulation and prototyping. **(2 marks)**
   (b) Describe two domain where each of the following is used.
   - Simulation **(2 marks)**
   - Geographical Information System (GIS) **(2 marks)**

   (iii) (a) In relation to an information system, what is a stock control system? **(1 mark)**
   (b) Give two advantages of using a stock control system. **(2 marks)**
   (c) State two main features of an expert system. **(2 marks)**

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2. (i) (a) Explain how the main memory is used during the machine cycle. **(2 marks)**
   (b) State two ways of improving the performance of a CPU. **(2 marks)**
   (c) What is an embedded system? **(1 mark)**
   (d) Describe two uses of an embedded system. **(2 marks)**

   (ii) (a) Using diagrams, differentiate between bus topology and mesh topology. **(4 marks)**
   (b) What is fault tolerance of a network? **(1 mark)**
   (c) Between bus topology and mesh topology, which is more fault tolerant? Give reasons for your answer. **(2 marks)**

   (iii) Define the following data security measures.
   (a) Data integrity **(1 mark)**
   (b) Data Confidentiality **(1 mark)**
   (c) Data encryption **(1 mark)**

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3. (i) Describe the following DBMS terms:
   (a) Attribute **(1 mark)**
   (b) Entity **(1 mark)**
   (c) Redundancy **(1 mark)**

   (ii) Describe one data validation method and one data verification method. **(2 marks)**

   (iii) Briefly explain the following database structures:
   (a) Relational database **(2 marks)**
   (b) Hierarchical database **(2 marks)**

   (iv) (a) Explain the difference between synchronous and asynchronous data transmission modes **(4 marks)**
   (c) Differentiate between serial and parallel transmission. Illustrate the two transmission methods by a diagram. **(2 marks)**

4. (i) Briefly explain the following security terms. In each case, identify a method used to prevent it.
   (a) Cyber terrorism **(2 marks)**
   (b) Software piracy **(2 marks)**
   (c) Identity theft **(2 marks)**

   (ii) Computer users will often store data "in the cloud".
   (a) State three advantages of cloud storage over local storage **(3 marks)**
   (b) Give two disadvantages of using cloud storage. **(2 marks)**

   (iii) The first De Morgan's Law states that $\overline{xy} = \bar{x} + \bar{y}$.
   (a) State the second De Morgan's law. **(1 mark)**
   (b) Copy and complete the truth table below and use it to proof the above laws.

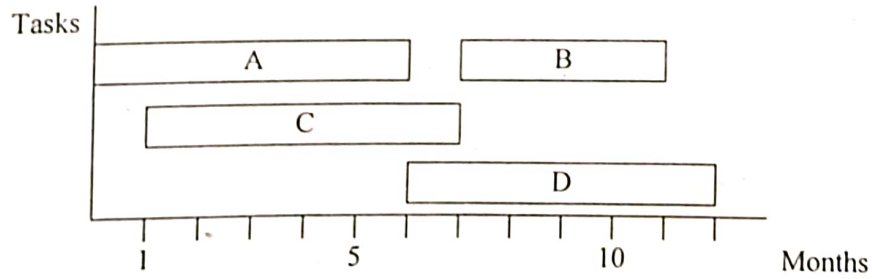
x	y	$\bar{x}$	$\bar{y}$	$\overline{xy}$	$\bar{x} + \bar{y}$
0	0				
0	1				
1	0				
1	1				

(5 marks)

5. (i) The Ministry of Finance intends to develop an information system that will enable citizens check their fiscal situation and pay taxes online.
   (a) What is the name of such an electronic service? **(1 mark)**
   (b) State two other services that can be available to citizens on this platform **(2 marks)**
   (c) Describe one advantage and one limitation of this platform **(2 marks)**

   (ii) Describe two activities carried out in each of the following E-services
   (a) E-commerce **(2 marks)**
   (b) E-banking **(2 marks)**

   (iii) The diagram below is used by a project manager to control an ICT project.



Determine:
   (a) The critical path. **(1 mark)**
   (b) Two dependent tasks. **(1 mark)**
   (c) The activities that can be carried out concurrently. **(1 mark)**
   (d) The slack time of D. **(1 mark)**
   (e) Two functions of a project manager. **(1 mark)**

   (iii) A file is specified in a computer by the file name and an extension:
   (a) What does the file name represent? **(1 mark)**
   (b) How does the extension help in file management? **(1 mark)**

6. (i) The SDLC is used to develop and implement an information system.
   (a) State three activities in the analysis phase of the SDLC. **(3 marks)**
   (b) Describe two conversion methods used to implement a system.
   For one of the methods given above, state one advantage and one disadvantage. **(4 marks)**
   (c) Explain why feedback is important in the maintenance phase of the SDLC. **(1 mark)**
   (d) Why is documentation necessary in each phase of the SDLC? **(1 mark)**

   (ii) (a) Describe three functions of an operating system. **(3 marks)**
   (b) Name and explain two types of operating system. **(2 marks)**

   (iii) Describe two advantages and one disadvantage of using UNICODE instead of using ASCII. **(3 marks)**

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7. (i) Computers in a network are linked by transmission media.
   (a) Give two advantages and one disadvantage of fiber optic cable. **(3 marks)**
   (b) Explain the concept of multiplexing. **(2 marks)**

   (ii) Consider the algorithm below

   Line 1 *start*
   Line 2 *Get three numbers a,b,*
   Line 3 *Compute a*b + c*
   Line 4 *Multiply the result of Line 3 by 10*
   Line 5 *Store the result of Line 4 in Y*
   Line 6 *Display Y*
   Line 7 *Stop*

   (a) What is an algorithm? **(2 marks)**
   (b) Give two parameters that are used to determine the efficiency an algorithm. **(2 marks)**
   (c) What is the type of algorithm used above? **(1 mark)**
   (d) Draw the flowchat for the algorithm. **(3 marks)**
   (e) Name the type of control structure used in this algorithm. **(1 mark)**

   (iii) Give one function of each of the following processor components:
   (a) ALU. **(1 mark)**
   (b) Registers. **(1 mark)**
   (c) Cache. **(1 mark)**

8.(i) Discuss the usefulness of the following in ICT:
   (a) Legislation. **(2 marks)**
   (b) Ergonomics. **(2 marks)**

   (ii) (a) Differentiate between procedural programing and non-procedural programming. **(2 marks)**
   (b) Name one procedural programming language and one non-procedural programming language. **(2 marks)**
   (c) Describe three main features of an object oriented programming language. **(1 mark)**

   (iii) (a) Identify and describe any four threats to data security. **(2 marks)**
   (b) Define the term encryption and give its relevance. **(3 marks)**
   (c) State two good password policies. **(2 marks)**
   (d) Give two ways that may affect the integrity of data stored in the computer. **(2 marks)**
