The Open University of Sri Lanka
Department of Electrical & Computer Engineering

ECX3233 Communications & Information Technology
Final Examination 2007/2008

(Closed book)

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Date: April 26th, 2008   Time: 1330-1630

This question paper consists of seven (7) questions in three sections. First two questions are compulsory. These carry 0 marks and 30 marks respectively. Answer any **three** questions including **at least one** from sections B and C. These questions each carry 20 marks each.

Section A – Compulsory

1. The Microprocessor is at the heart of the IT revolution. Describe the architecture of a simple hypothetical microprocessor, and how a program is executed within this architecture.

2. You are invited to propose an online registration system for the upcoming Engineering Faculty Registration. *A good registration is one that offers the student a combination of courses matching his/her needs and dreams.* You are to provide a set of interfaces to enable any student to register in a flexible manner, providing all necessary information, and minimising the need for visiting an OUSL centre. Construct a student friendly user centred registration package as suggested below:

    a)   Describe all constraints that effects a student's selection of courses
       i.   of academic/administrative nature
       ii. Other, more personal issues
    b)   Describe issues and challenges faced by the Open University when registering a student. Give your solutions to such issues, such as verification of information, payments etc.

Decide on a scheme that overcomes the above problems, but still minimise the need for face-to-face contact. Answer the following questions based on **your** scheme.

    c)   Justify the activities that may need to take place offline before the online registration. State clearly if no offline activity is needed.
    d)   Describe the process of registering a **new student** with the help of a **flow chart**. Describe any important components separately.
    e)   Consider the registration of a **continuing student**. Describe all main factors to be considered when deciding on courses for a continuing student.
    f)   Describe how your proposed interfaces are going to address these factors. The student should be able to access all necessary information.
    g)   What are the activities that may need to take place offline after the online registration? State clearly if no offline activity is needed.

You only need to describe each interface, types of questions, links provided, etc., not sketch them. The interfaces should be as user-friendly, and individualised as much as possible, so that the student finds the necessary information easily. Original solutions to the challenges will be allocated higher marks.

Section B

3. ***Shortwave broadcasting*** is the method of choice when it comes to cheap international broadcasting.

   a) Why are short-waves most suited for long-distance broadcasting? Explain briefly how these long distances are achieved.

   b) Shortwave broadcasting uses AM techniques. Describe briefly (without mathematics) this modulation.

   c) Derive the mathematical equation describing the modulation.

   d) What about the quality of the received signal? How suitable is it for High Fidelity quality broadcasting? Explain.

   e) How can we improve the reception quality? Explain briefly.

4. Today most people listen to broadcasted music through radios, music players, mobile phones etc., from FM channels.

   a) What is FM? Why is it most suited for music broadcasting? Explain.

   b) Describe the FM process briefly without mathematics. What is the structure of the mathematical expression representing FM?

   c) Music today is broadcast in Stereo format. Describe briefly the stereo format.

   d) Can we listen to a stereo broadcast through a receiver with only mono capability? Do we hear all the information there? Explain.

Section C

5. You have become an IT consultant to the recently established **Ivy league** International School. You are starting out with 5 computers and a printer. You are to advice on the setting up of the computer laboratory.

   a. List the advantages and disadvantages of connecting the computers together.

   b. Propose a suitable topology for the network. Justify briefly.

   c. What are the main additional software and hardware that you may need? Explain briefly.

   Now the **Ivy league** International School has become very popular, and the number of computers has also grown, reaching twenty-five.

   d. You are requested to upgrade the computer network. What are the changes that you propose? Explain.

   The **Ivy league** International School has expanded rapidly, with high intake at grade 1. The primary has now moved over to a new building complex 2km from the (now) senior school. You now have to network the 25 new computers acquired for the primary section with the 25 original computers.

   e. You may assume an expanded budget, and propose suitable changes to the network. What is the topology you choose? Justify.

   f. There is a request for offering **internet access** through these computers
      i. State briefly the advantages for students
      ii. What are the disadvantages? Propose some solutions to overcome these.

6. When a large number of computers are linked together, a common problem that occurs is the collision of data.

   a. Name the two most popular access methods in use.

   b. Compare advantage and disadvantages of the each method.

   c. Describe how the collision problem is solved **in each method separately**.

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