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

ECX3233 Communications & Information Technology
Final Examination 2008/2009 (Closed book)

Date: March 24th, 2009 Time: 1400-1700

This question paper consists of three (3) questions in two sections. The first question is compulsory. This carries 75 marks. Answer one other question from section B. Both questions carry twenty-five marks each.
Please write your answers legibly, and indicate the relevant question number clearly. You may lose your marks otherwise!

Section A

Q1. Ibbanwila Maha Vidyalaya is a rural school, with around 1500 motivated students. A charity organisation, UNICARE, has decided to provide the school with 25 computers to enhance the IT knowledge of the students.

a) What are the preparations needed at the school by the time the computers arrive, so that they can be put to use immediately? (Think of all initial problems that may be faced by the school. Write clearly any assumptions you make)
b) What is/are the hardware configuration(s) that you recommend for the computers? Describe each item briefly, and justify your choices (one sentence each for each justification, all items to be chosen to suit school's requirements cost effectively)
c) Taking needs of the students, as well as long-term sustainability into consideration, what are the software you recommend for the computers? Justify your selections.

Impressed by the progress made by the students, and the dedication of some staff members, UNICARE decides to give them a chance to connect to the internet.

d) What are the advantages for the students and school in connecting to the internet?
e) What are its dangers? What precautions do you suggest to overcome theses dangers?
f) What is the networking type, and the topology you recommend to connect theses computers together? Justify your choices.
g) What additional hardware and software do you need, and what specific changes do you need to make, to implement the above network?

Now Ibbanwila Maha Vidyalaya has a website of its own, and has connected to the global village, and the Ibbanwila village is also warming-up to information super-highway. UNICARE announces that its funding will cease after three years, and the school needs to find funds and/or generate its own income so as to continue using computers and internet.

h) What are the costs involved in using computers and internet?
i) Describe briefly some suitable methods that can be used to generate funds for the computer lab.

Section B

Q2 Radio is used very commonly for broadcasting purposes.

a) Describe briefly how radio transmission functions (without mathematical derivations) how the voice of the announcer reaches your ear, when listening to the radio at home.

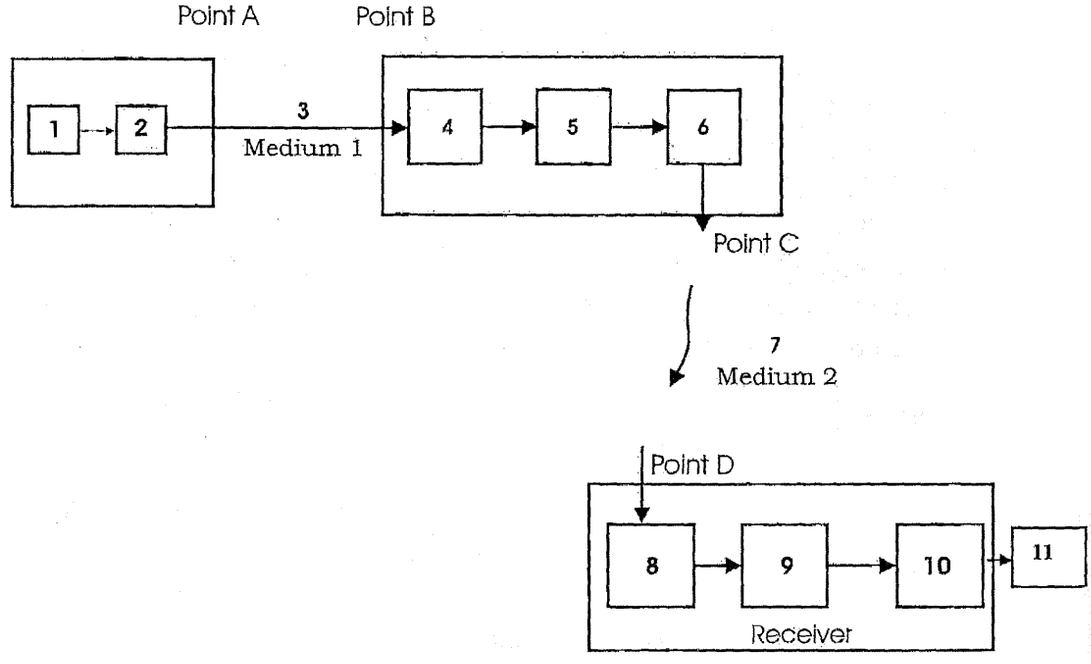
b) List advantage(s)/disadvantage(s) of using a radio link for communication purposes.

c) Derive an expression to the received power density P (W/m^2) at d (m) distance away from a transmitting antenna that radiating P_t (W) amount of power.

d) If the gain of the receiving antenna is 36 dB, determine the minimum transmitting power level to ensure 2 mW power reception at a receiver connected to the antenna and located 1.5 km distance from the transmitter.

e) State two ways of reducing transmitting power while ensuring minimum receiver power.

Q3



a) Identify the equipment related to each block from the list of equipments given below. Write relevant equipment for each block. (More than one block may use the same equipment)

i Amplifier	ii Microphone	iii Speaker	iv Modulator
iv Demodulator	v Antenna	vi Cable	vii Free space

b) Device number 4 receives 2 dBm power when the output of device number 2 is 30 dBm. Determine per unit length attenuation of the medium 1 if the distance between points A and B is 4 km.

c) If the output of the device number 5 is given by

$$e(t) = 5\left(1 + 0.25\cos 2000\pi\, t\right)\cos 10\pi \times 10^5 t \quad \text{Volts;}$$

Sketch the following waveforms :

1. Output voltage of device number 5 with important values
2. Output of the device number 4

d) Blocks number 6 and 8 represent a type device used for conversion between electrical and electromagnetic signals. Briefly explain the operation of such a device and its important characteristics.