THE OPEN UNIVERSITY OF SRI LANKA

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

B. SC. DEGREE PROGRAMME 2014/2015

FINAL EXAMINATION

CPU3152: DATA COMMUNICATION

DURATION: TWO HOURS (2 HOURS)

Date: 29.10.2015 **Time: 9.30 am – 11.30 am**

Answer FOUR (04) Questions ONLY.

Q1.

Data communication in a simpler form of a definition is the transfer of data from a source to a destination through a transmission medium.

(i) Briefly explain the following terms.

a. Line configuration.

b. Multiple Access.

c. GSM.

(ii) Considering the **ISO/OSI model**, explain the function of the **physical** layer.

(iii) Briefly explain the **error detection** function.

Q2.

Digital data can be transferred over a transmission medium through digital encoding systems. Clearly state the **polarity** and **voltage level** including the **axis** names.

(i) Briefly discuss the **advantages and disadvantages** of using **NRZ-L** and **Manchester encoding** systems in data transmission.

(ii) Draw a diagram to represent the bit stream 100110011 in **NRZ-L**, **NRZ-I** and **Bipolar – AMI.**

(iii) What is meant by **synchronization** in encoding schemes?

Q3.

Digital data can be transferred through transmission medium in the form of analog signals.

(i) Briefly explain the requirement of analog signals to transmit digital data.

(ii) State three analog encoding schemes and identify them in the form of sinusoidal waveform notation.

(iii) Draw the signal diagram for each of the above, if the transmitted digital data stream is 101101.

Q4.

A picture file of 5 MB (megabytes) is saved in a personal computer. Transmission channel is capable of handling 1 mbps (megabits per second) data rate. If the transmission system uses QPSK with 4 – Amplitudes, 8-Phases and 4 – frequencies.

(i) Represent the bits to signal mapping.

(ii) Draw a constellation diagram for the signals.

(iii) What is the minimum "**baud rate**" required to support the 1 mbps data rate?

Q5.

A Radio broadcast is sampled at a rate of 40 kHz. If the sampling is done without compression and the 127 levels (positive and negative) are measured.

(i) What is the **bit rate** of the generated PCM signal?

(ii) If the bandwidth of the radio input (voice) is 20 kHz and $\mathbf{f_c = 800}$ kHz draw the frequency spectrum of the transmitted signal through **Amplitude modulation.**

(iii) If a guard band of **10** kHz is required to avoid the interferences, calculate the adjacent (next or nearby) **carrier frequency.**