

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
B. SC. DEGREE PROGRAMME 2015/2016
FINAL EXAMINATION



CPU3152: DATA COMMUNICATION

DURATION: TWO HOURS (2 HOURS)

Date: 17.01.2016

Time: 9.30 am to 11.30 am

Answer **FOUR** Questions **ONLY**. All questions carry equal marks.

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. Briefly explain the following terms. (5 Marks each)

- a. Line configuration.
- b. Protocol.
- c. CDMA.
- d. Bipolar.
- e. Sliding window.

Q2. Digital data can be transferred over a transmission medium through digital encoding systems.

- (i) Briefly discuss the **advantages and disadvantages** of using **Manchester encoding** systems in data transmission. (10 Marks)
- (ii) Draw a diagram to represent the bit stream 10010 in **Manchester** and **Bipolar – AMI**. (10 Marks)
- (iii) What is **synchronization** in encoding schemes? (5 Marks)

Q3. Digital data can be transferred in the form of analog signals.

- (i) Explain the **advantage** of the use of analog signals in data transmission. (5 Marks)
- (ii) State **two** analog encoding schemes and identify them in the form of sinusoidal waveform notation. (10 Marks)
- (iii) State the sinusoidal notation for **FSK** and draw the signal diagram, if the transmitted digital data stream is 1011. (10-Marks)

- Q4.** Explain the requirement of multiplexing systems in data communication.
- (i) Distinguish the basic multiplexing techniques with aid of diagrams.
(15 Marks)
 - (ii) Draw a diagram to explain the multiplexing function of **one of the above** using four inputs (A, B, C, D), in transmission medium, de-multiplexing at the receiver (Assume the sequence being in alphabetical order and clearly indicate the domain according to the technique). (10 Marks)
- Q5.** A picture file of 2 MB (megabytes) is saved in a personal computer. Transmission channel is capable of handling 32 kbps (kilobits per second) data rate. If the transmission system uses a combination of FSK & PSK with 2 - Phases and 2 - frequencies.
- (i) Draw a constellation diagram for the signals. (10 Marks)
 - (ii) Represent the bits to signal mapping. (10 Marks)
 - (iii) What is the minimum "**baud rate**" required to support the 32 kbps data rate?
(5 Marks)
- Q6.** Human voice has a bandwidth of 22 kHz. Voice bandwidth of 4 kHz is adequate to regenerate with recognition at the receiving end. Sampling is done without compression and the 127 levels (positive and negative) are measured.
- (i) What is the **minimum bit rate** of the generated PCM signal? (15 Marks)
 - (ii) If the channel bandwidth is 108 kbps, what is the maximum possible sampling frequency? (10 Marks)

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