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The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc./ B.Ed. Degree Programme

Department	**: Computer Science**
Level	**: 05**
Name of the Examination	**: Final Examination (1st Semester)**
Course Title and - Code	**: CSU5307 – Data Communication**
Academic Year	**: 2020/2021**
Date	**: 27/12/2021**
Time	**: 9.30am – 11.30am**
Duration	**: 02 hours only**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **06** questions in **03** pages.
3. Answer any **05** questions only. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. Draw fully labelled diagrams where necessary
6. Involvement in any activity that is considered as an exam offense will lead to punishment
7. Use blue or black ink to answer the questions.
8. Clearly state your index number in your answer script

THE OPEN UNIVERSITY OF SRI LANKA

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

B. SC. DEGREE PROGRAMME 2020/2021

FINAL EXAMINATION

CSU5307: DATA COMMUNICATION

DURATION: TWO HOURS (2 HOURS)

Date: 27.12.2021 **Time: 9.30 am – 11.30 am**

Answer **FIVE (05)** Questions. All questions carry equal marks.

Q1. Briefly explain the following terms.

i. Network Layer

ii. Base Station Subsystem

iii. Bearer Service

iv. GSM

Q2. Input signal of a modulation system is x(t) and the carrier signal is, $Cos2\pi f_c t$. output signal after modulation is given as, $S(t) = A.(1 + \mu.x(t)). Cos2\pi f_c t$

μ is the modulation index and A is the amplitude of the output signal. The 1 represents the dc component to prevent loss of information. Do the following clearly.

i. Identify the modulation system.

ii. Draw the time domain output signal, when x(t) is a sinusoidal signal with frequency of f1 and fc =10 x f1 with similar amplitude.

iii. Draw the frequency spectrum of the output signal.

Q3. A Music Video file of 64 MB (megabytes) is saved in a server. Transmission channel from the web server to the client PC is capable of handling 64 Mbps (megabits per second) data rate. If the transmission system uses PSK with 2 – Phases.

i. State the sinusoidal notation of the transmitted signal.

ii. Design a system of bits to signal mapping to achieve a minimum baud rate.

iii. Calculate the time taken to download the file

Q4. Explain the requirement of **TDD** and **FDD** systems in data communication.

i. Draw a diagram to explain the duplex function of one of the above using two channels (A1, A2), in a transmitter, transmission medium, de-multiplexing at the receiver (Assume the sequence being in numerical order and clearly indicate the domain according to the technique explained).

ii. Identify the differences in Frequency Division Duplex (FDD) & Frequency Division Multiplexing (FDM)

Q5. Digital data can be transferred through a transmission medium in the form of analog signals.

i. Discuss the advantages and disadvantages 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 11001101.

Q6. A musician's voice signal is sampled at a rate of 16 kHz. If the sampling is done without compression and 127 levels (positive and negative) are measured.

i. What is the bit rate of the generated PCM signal?

ii. Draw a sampling diagram in the time domain.

iii. If the bandwidth of the input (voice) is 22 kHz, what is the minimum bit rate required to transmit the voice through a PCM channel with a similar number of quantization levels?

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