

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE
OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COSC 260: DATA COMMUNICATION

STREAMS: BSC (COMP. SCI) Y2S2

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 10/4/2019

8.30 A.M. – 10.30 P.M.

INSTRUCTIONS

1. Answer question 1 in section A and any other **TWO** from section B
2. Marks are awarded for clear and concise answers
3. Note that only Question **ONE** (Section A) and the first **TWO** attempted questions in section B will be marked.

SECTION A-COMPULSORY

Question ONE

- (a) While using diagrams to illustrate, explain the following concepts as applied in data communication [8 Marks]
- (i) Duplex communication
 - (ii) Synchronous communication
 - (iii) Point to Point communication
 - (iv) Serial communication
- (b) Under what circumstances is the use of the following error control techniques appropriate?
- (i) Cyclic redundancy checks (CRC) [3 Marks]
 - (ii) Parity [3 Marks]

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- (c) The ISO Reference Model defines seven protocol layers, each of which is responsible for a specific range of functions. By considering this model, mention two main functions performed by a protocol operating at the data link layer [4 Marks]
- (d) Differentiate between digital data and digital signal [2 Marks]
- (e) Using a diagram, illustrate the operation of sliding window flow control protocol. Show the tasks on the sender side and those on the receiver side [6 Marks]
- (f) Differentiate between flow control and congestion control [4 Marks]

SECTION B-Answer any TWO questions from this section

Question TWO-20 Marks

- (a) Differentiate between analogue and digital signals while giving an example in each [4 Marks]
- (b) Compare and contrast channels using electrical cables and those using optic cables [6 Marks]
- (c) Give **TWO** applications of satellite communication and **TWO** applications of broadcast radio communication [4 Marks]
- (d) Using checksum error detection mechanism, illustrate how the following data is transmitted and received: **01101100, 10001101, 11101101 and 10110100** [6 Marks]

Question THREE-20 Marks

- (a) A fibre optic transmission system uses wave division multiplexing with 16 different wavelengths of light. Each of these wavelengths is able to operate at 2.5 Gbps. What is the maximum data carrying capacity of this transmission system? If you require 4Mbps to stream one high definition video, determine how many such videos could be transmitted at the same time using this fibre optic transmission system [10 Marks]
- (b) Illustrate how data is transmitted along a fibre optic cable [4 marks]
- (c) Identify three physical characteristics of fibre optic cables that make them more suitable for high speed digital data transmission than copper cables [6 Marks]

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Question FOUR-20 Marks

- (a) Give the names of the seven layers of the ISO Reference Model and the names of the **FOUR** corresponding layers in the TCP/IP protocol stack, showing the correspondence Explicitly [11 marks]
- (b) Show by means of a diagram how the bit sequence, 11001001 would be transmitted using NRZ-L encoding [4 Marks]
- (c) Describe the operation of stop and wait flow control protocol [5 points]

Question FIVE-20 Marks

- (a) Transmission systems are prone to various types of errors including that due to noise. Suppose a noise event causes a burst error to occur that lasts for 0.1 ms (millisecond). How many data bits will be affected if:
- (i) Data is being transmitted in 10 Mbps [5 Mbps]
- (ii) Data is being transmitted in 100 Mbps [3 Mbps]
- (b) Difference between data encryption and data compression [4 Marks]
- (c) Briefly outline how the CRC method functions [8 Marks]
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