UNIVERSITY OF GHANA

B.SC COMPUTER SCIENCE, SECOND SEMESTER EXAMINATIONS:

2015/2016

CSIT 302: DATA COMMUNICATION (3 CREDITS)

INSTRUCTION:

ANSWER ALL Questions in Section A

Answer Question B1 and Any Other Two (2)

TIME ALLOWED:

TWO AND A HALF (2½) HOURS

SECTION A (40 Marks)

A1.

a) Explain the concept of Channel Capacity. **[2 Marks]**

b) Given a channel with an intended capacity of 20Mbps, the bandwidth is 3MHz. Assuming White normal noise, what signal-to-noise ratio (in decibels) is required to achieve this? **[4 Marks]**

c) List and explain the three most significant impairments to signal transmission. **[6 Marks]**

A2.

a) Explain the following concepts

I. Circuit Switching

II. Packet Switching **[6 Marks]**

a) What is the channel capacity for a teleprinter channel with a 300Hz bandwidth and a signal-to-noise ratio of 3 dB, where the noise is white thermal noise? **[4 Marks]**

A1.

a) Explain the four key routing strategies used in dealing with routing requirements in packet switching networks. **[8 Marks]**

b) What is a White Noise? **[2 Marks]**

A1.

a) What is piggybacking? **[2 Marks]**

b) With the aid of a diagram, explain how both a transmitter and a receiver achieve error detection. **[4 Marks]**

c) List and explain the two performance criteria used in routing? **[2 Marks]**

SECTION B (60 Marks)

Answer **Question B1** and Any Other Two (2)

B1.

a) What is the essential difference between Dijkstra's algorithm and Bellman Ford's algorithm? **[6 Marks]**

b) From Figure 1.1 below, generate a least cost route to all other nodes from **N1** to **N 6** using;

I. Dijkstra's Algorithm **[5 Marks]**

II. Bellman Ford's Algorithm **[5 Marks]**

III. What is the shortest path from **N2** to **N5** and at what least cost, for both algorithms **[4 Marks]**

a) Define flow control. **[2 Marks]**

b) Describe stop-and-wait flow control **[5 Marks]**

c) What is the advantage of sliding-window flow control compared to stop-and-wait flow control? **[2 Marks]**

B1.

a) What is Multiplexing? **[3 Marks]**

b) Write short notes on the following

I. Frequency Division Multiplexing **[3 Marks]**

II. Wavelength Division Multiplexing **[3 Marks]**

III. Time Division Multiplexing **[3 Marks]**

IV. Statistical TDM **[3 Marks]**

B2.

a) Explain the following switching techniques used to handle packets in packet switching.

I. Datagrams Approach **[3 Marks]**

II. Virtual Circuit Approach **[3 Marks]**

a) What are the station types supported by HDLC? Describe each. **[9 Marks]**

B1.

a) What are the transfer modes supported by HDLC? Describe each. **[9 Marks]**

b) List and briefly define two versions of ARQ **[6 Marks]**