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**UNIVERSITY OF GHANA**

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**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)

* 1. Explain the concept of Channel Capacity. **[2 Marks]**
  2. 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]**
  3. List and explain the three most significant impairments to signal transmission. **[6 Marks]**
  4. Explain the following concepts
     1. Circuit Switching
     2. Packet Switching **[6 Marks]**
  5. 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]**

1. 1. Explain the four key routing strategies used in dealing with routing requirements in packet switching networks. **[8 Marks]**
   2. What is a White Noise? **[2 Marks]**
2. 1. What is piggybacking? **[2 Marks]**
   2. With the aid of a diagram, explain how both a transmitter and a receiver achieve error detection. **[4 Marks]**
   3. List and explain the two performance criteria used in routing? **[2 Marks]**

**SECTION B** (60 Marks)

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

1. 1. What is the essential difference between Dijkstra’s algorithm and Bellman Ford’s algorithm? **[6 Marks]**
   2. From Figure 1.1 below, generate a least cost route to all other nodes from **N1** to **N6** using;

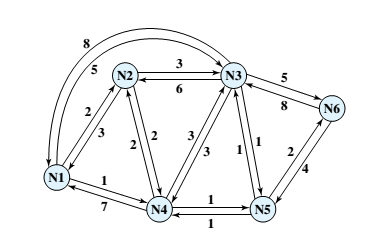


Figure 1.1 Routing paths

1. Dijkstra’s Algorithm **[5 Marks]**
2. Bellman Ford’s Algorithm **[5 Marks]**
3. What is the shortest path from **N2** to **N5** and at what least cost, for both algorithms **[4 Marks]**
   1. Define flow control. **[2 Marks]**
   2. Describe stop-and-wait flow control **[5 Marks]**
   3. What is the advantage of sliding-window flow control compared to stop-and-wait flow control? **[2 Marks]**
4. 1. What is Multiplexing? **[3 Marks]**
   2. Write short notes on the following
      1. Frequency Division Multiplexing **[3 Marks]**
      2. Wavelength Division Multiplexing **[3 Marks]**
      3. Time Division Multiplexing **[3 Marks]**
      4. Statistical TDM **[3 Marks]**
5. 1. Explain the following switching techniques used to handle packets in packet switching.
      1. Datagrams Approach **[3 Marks]**
      2. Virtual Circuit Approach **[3 Marks]**
   2. What are the station types supported by HDLC? Describe each. **[9 Marks]**

1. 1. What are the transfer modes supported by HDLC? Describe each. **[9 Marks]**
   2. List and briefly define two versions of ARQ **[6 Marks]**