

**National Exams December 2002**

**98-Comp-B5 Computer Communications**

**Note:**

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. Candidates may use one of two calculators, the Casio or Sharp approved models. This is a Closed Book exam.
3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
4. All questions are of equal value (20% each).

**Question 1 (20 marks)**

An analog signal (sine wave) of 200 Hz with a peak-to-peak amplitude of 2 Volt is sampled at the sampling frequency of 800 Hz. Find another two analog sinusoids (other than 200 Hz) which, when sampled at 800 Hz, will yield the same sample values (as the 200 Hz sine wave).

**Question 2 (20 marks)**

A communication channel is known to have a loss of 20 dB. If the input signal power is measured as 0.8 Watt, and the output noise level is measured as 3  $\mu$  Watt, what is the output signal-to-noise ratio in dB?

**Question 3 (20 marks)**

What are the network number, subnet number, and host number for the address 192.228.17.57 and the mask 255.255.255.224?

**Question 4 (20 marks)**

Consider a baseband bus with a number of equally spaced stations with a data rate of 20 Mbps and a bus length of 4 km. Assume that the propagation speed is 200 m/ $\mu$ s. Determine the mean time to send a frame of 1000 bits to another station, measured from the beginning of transmission and the end of reception.

**Question 5 (20 marks)**

In a Cyclic Redundancy Check (CRC) scheme, if P= 110011 and M=11100011, determine the corresponding CRC.

**Question 6 (20 marks)**

Assume that you are to design a TDM (Time Division Multiplexing) carrier to support 30 voice channels using 6-bit samples and a structure similar to DS-1. If the bandwidth of per voice channel is assumed to be 4 kHz, determine the required bit rate.

**Question 7 (20 marks)**

Consider the use of 1000-bit frames on a 1-Mbps satellite channel with a 270-ms delay. What is the maximum link utilization for

- (a) Stop-and-wait flow control?
- (b) Continuous flow control with a window size of 127?