National Exams May 2012

98-Comp-B5 Computer Communications

Note

- 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.
- Candidates may use one of two calculators, the Casio or Sharp approved models. This is a Closed Book exam.
- Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
- All questions are of equal value (20% each).

Question 1 (20 marks)

Given a discrete data sequence of x(n) = [x(0), x(1), x(2)] = [5, -3, 4], (1) calculate its Discrete Fourier Transform (DFT); and (2) if the sampling interval is 1 sec, determine the resolution of the Discrete Fourier Transform in frequency.

Question 2 (20 marks)

Assume that a binary signal is transmitted over a noisy channel with a signal-to-noise ratio of 30 dB, the maximal transmission rate is 30Kbps. (1) Determine the bandwidth of the channel; and (2) Determine the maximal transmission rate, if the channel is noise-free.

Question 3 (20 marks)

Suppose that a digital message to be transmitted is given by M=11010001010, draw corresponding diagrams for (1) Amplitude-shift keying; (2) Frequency-shift keying; and (3) Phase-shift keying.

Question 4 (20 marks)

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

Question 5 (20 marks)

Using appropriate block diagram representations to show the similarities and differences between 'Frequency Hopping' and 'Direct Sequence' Spread Spectrum modulations. Comment on the advantages and disadvantages of each approach.

Question 6 (20 marks)

Support that there are six computers in an office, (1) How many different network topologies one can use; and (2) what would be the 'best' topology that you select? Clearly defend your answers.

Question 7 (20 marks)

Explain the following technical terms: (1) Router; (2) Time-division multiplexing; (3) microwave; (4) Data link layer; (5) Checksum; (6) CSMA/CD; (7) Decibel; (8) B-ISDN; (9) ATM; and (10) Baud.