Masters of Computer Applications
MCAC 202: Data Communication and Computer Networks
Unique Paper Code; 223421202
Semester II
May-June 2024
Year of Admission: 2023
(Including ER/Imp./Ex-Students)

Time: 3 Hours **Max. Marks: 70**

1. i) Consider a coding scheme with two legal codewords: 01010 and 10101. 3+3+4
   a) Calculate its Hamming distance.
   b) How many bit errors can be **detected** by this code ?
   c) How many bit errors can be **corrected** by this code ?

   ii) For each of the following three networks, discuss the consequences if a connection fails.
   a) Seven devices arranged in a Mesh Topology
   b) Seven devices arranged in a Bus Topology
   c) Seven devices arranged in a ring Topology

   iii) What is SNR? What type of signal is desired: one with high SNR or one with low SNR? Justify your answer.

2. i) Give one difference between Port address, Physical Address and Logical Address. 3+3+4

   ii) "A good line coding scheme needs to prevent baseline wandering." Justify this statement.

   iii) Draw the waveform generated for transmitting the bits 1011001 using:
   a) Amplitude Shift Keying
   b) Frequency Shift Keying

3. i) A signal is carrying data in which one data element is encoded as one signal element (r=1). If the bit rate is 1000 Kbps. What is the average value of baud rate if the case factor (c) is 0.5. 2+4+4

   ii) Explain the working of Fiber Optic cable with the help of a diagram.

   iii) Compare and contrast circuit switched and packet switched networks.

4. i) What is a guard band? Five Channels each with a 50 KHz bandwidth are to be multiplexed together. What is the minimum bandwidth of the link if 3+3+4

there is a need for a guard band of 5 KHz between the channels to prevent interference.

ii) Describe a URL and its components with the help of an example.

iii) "In Selective-Repeat, the size of the sender and the receiver window can be at most one-half of 2^m, where m is the number of bits used for sequence number." Justify the statement.

5. i) A message M(x) 1101101101 is transmitted using the CRC method. The generator polynomial is 1001. 5+3+2
   a) Compute the transmitted bit string which includes the message and CRC.
   b) Suppose that the fifth bit from the left is inverted during transmission. Show that this error is detected at the receiver's end.

   ii) Explain the three CSMA methods used to minimize the chances of collision.

   iii) What are the advantages of IPv6 over IPv4?

6. i) What is the difference between 6+3+1
   a) piconet and scatternet
   b) a hub and a switch
   c) Noise and Distortion

   ii) A classless address is given as 167.199.170.82/27. Find
   a) The number of addresses in this network.
   b) The first address in this network.
   c) The last address in this network.

   iii) Decompress the following IPv6 address and show the complete unabbreviated address:
   ::2222

7. i) Can the value of the header length field in an IPv4 packet be less than 5? When is it exactly 5? 2+2+4+2

   ii) Determine if a datagram with following information is a first fragment, middle fragment, a last fragment or the only fragment:
   1) M bit is set to 1 and the value of offset field is zero.
   2) M bit is set to 1 and the value of offset field is nonzero.

   iii) Draw and explain the purpose of various fields in a UDP header.

   iv) Briefly describe the two types of connections possible with HTTP.