


**MAKEUP EXAMINATIONS – JUNE/JULY 2018**

Course & Branch	: <b>B.E. : Computer Science and Engineering</b>	Semester	: <b>IV</b>
Subject	: <b>Data Communication</b>	Max. Marks	: <b>100</b>
Subject Code	: <b>CS44/CS1544</b>	Duration	: <b>3 Hrs</b>

**Instructions to the Candidates:**

- Answer one full question from each unit.

**UNIT- I**

1. a) Identify the fundamental characteristics and components of a data communication? CO1 (08)
- b) Elaborate on the encapsulation in the source host, decapsulation in the destination host, and encapsulation and decapsulation in the router with neat diagram. Assume a system uses five protocol layers. If the application program creates a message of 100 bytes and each layer (including the fifth and the first) adds a header of 10 bytes to the data unit, what is the efficiency (the ratio of application layer bytes to the number of bytes transmitted) of the system? CO1 (08)
- c) A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 KHz. What is the maximum data rate supported by this line? CO1 (04)
2. a) i. We need to send 265 kbps over a noiseless channel with a bandwidth of 0KHz. Compute the signal levels required to represent the signal. CO1 (07)
- ii. Calculate the propagation time and transmission time for a 5 - Mbyte message if the bandwidth of a network is 1Mbps? Assume that the distance between sender and receiver is 12,000 km and light travels at  $2.4 \times 10^8$  m/s.
- b) Outline the criteria of distinguishing one type of network from another. Discuss the types of networks. CO1 (05)
- c) Explain the functions of each layer of TCP/IP model. CO1 (08)

**UNIT- II**

3. a) We have a digital medium with a data rate of 10 Mbps. How many 64-kbps voice channels can be carried by this medium if we use DSSS with the Barker sequence? CO2 (04)
- b) Distinguish between: CO2 (08)
  - i. A signal element and a data element and
  - ii. Data rate and signal rate.
 Draw the graph for 010011 using Manchester and differential Manchester method.
- c) Which characteristics of an analog signal are changed to represent the low pass analog signal in each of the following analog-to-analog conversions? CO2 (04)
  - i. AM ii. FM iii. PM.
- d) Compare and contrast parallel and serial data transmission modes? CO2 (04)

4. a) A low-pass signal is sampled with a bandwidth of 200 KHz using 1024 levels of quantization. Calculate the following: CO2 (06)
- i. bit rate of the digitized signal.
  - ii. SNRdB for this signal.
  - iii. PCM bandwidth of this signal.
- b) Explain two scrambling techniques B8Z5 and HDB3 with an example. CO2 (07)
- c) Two channels, one with a bit rate of 190 kbps and another with a bit rate of 180 kbps, are to be multiplexed using pulse-stuffing TDM with no synchronization bits. Answer the following questions: CO2 (07)
- i. What is the size of a frame in bits?
  - ii. What is the frame rate?
  - iii. What is the duration of a frame?
  - iv. What is the data rate?

**UNIT- III**

5. a) We need a three-stage space-division switch with  $N = 200$ . We use 10 crossbars at the first and third stages and 4 crossbars at the middle stage. CO3 (07)
- i. Draw the configuration diagram.
  - ii. Calculate the total number of crosspoints.
  - iii. Find the possible number of simultaneous connections.
  - iv. Find the possible number of simultaneous connections if we use a single crossbar.
  - v. Find the total number of crosspoints required according to CLOS criterion.
- b) Consider CRC-8  $x^8 + x^2 + x + 1$ , answer the following questions: CO3 (05)
- i. Does it detect a single error? Defend your answer.
  - ii. Does it detect a burst error of size 6? Defend your answer.
  - iii. What is the probability of detecting a burst error of size 9?
  - iv. What is the probability of detecting a burst error of size 15?
- c) Explain the chunk interleaving forwarding correction technique with an example. CO3 (08)
6. a) Explain the setup phase in Virtual circuits with an appropriate example and block diagrams. CO3 (08)
- b) Explain the structure of banyan switch for eight inputs and eight outputs and trace the path from input port 2 to output port 6. CO3 (06)
- c) Generate the CRC code for the dataword 1001110 using the divisor 1011. Also generate the CRC at the receiver side if there is no error during transmission. CO3 (06)

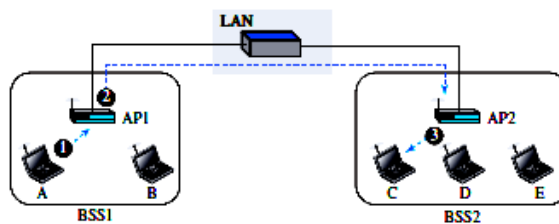
**UNIT- IV**

7. a) Explain why should be send window size less than  $2^m$  in Go-Back-N protocol. Explain with an example. CO4 (08)
- b) Assume the only computer in the residence uses PPP to communicate with the ISP. If the user sends 10 network-layer packets to ISP, how many frames are exchanged in each of the following cases: CO4 (06)
- i. Using no authentication?
  - ii. Using PAP for authentication?
  - iii. Using CHAP for authentication?
- c) Describe reservation and polling controlled access protocols used by multiple devices to share a link. CO4 (06)

8. a) Using 5-bit sequence numbers, calculate the maximum size of the send and receive windows for each of the following protocols? CO4 (04)  
i. Stop-and-Wait  
ii. Go-Back- $N$   
iii. Selective-Repeat.  
b) With a neat flow diagram explain the working of Pure ALOHA. CO4 (08)  
c) Define channelization and briefly explain FDMA. Explain how TDMA achieves channelization. CO4 (08)

## UNIT- V

9. a) List the basis for membership in a VLAN? CO5 (04)  
b) In Figure below, two wireless networks, BSS1 and BSS2, are connected through a wireless distribution system (DS). Assume station A in BSS1 needs to send a data frame to station C in BSS2. Show the value of addresses in all communication sections : from station A to AP1, from AP1 to AP2, and from AP2 to station C. CO5 (08)



- c) What is a transparent bridge? How is the problem of looping in transparent bridge solved? Explain in detail. CO5 (08)
10. a) Compare and contrast bridged Ethernet, switched Ethernet and full duplex Ethernet. CO5 (08)  
b) Explain hidden station problem? How is the hidden station problem solved? CO5 (06)  
c) A switch uses a filtering table; a router uses a routing table. Explain the differences. CO5 (06)

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