COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)

END Semester Examination

(CT-16014) **Data Communication**

Course: B.Tech , Semester IV | Branch: Computer Engineering & Information Technology

Academic Year: 2018-2019 | Max.Marks:60

Duration: 3 Hours | Date: 02/05/2019

Instructions: **Student MIS No.** | | | | | | | | | | |

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your MIS Number on Question Paper

Q.1 [A] Answer the following questions: [2x10]

a) Define and differentiate between Bit rate and Baud rate. State the relation between them.

b) Assuming there is no noise in a communication medium of bandwidth (B) = 4KHz, determine channel capacity (C) for the encoding level 4?

c) For n devices in a network, what is the number of cable links required for a mesh and ring topology? Assume 6 devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

d) List three different techniques in serial transmission and explain the differences.

e) Which of the three multiplexing techniques is (are) used to combine analog signals? Which of the three multiplexing techniques is (are) used to combine digital signals?

f) Name the advantages of optical fiber over twisted-pair and coaxial cable.

g) Compare and contrast a circuit-switched network and a packet-switched network.

h) Distinguish between forward error correction versus error correction by retransmission.

i) Compare and contrast byte-stuffing and bit-stuffing. Which technique is used in byte-oriented protocols? Which technique is used in bit-oriented protocols?

j) Mention the advantage and disadvantage of stop and wait flow control. Define ARQ.

Q.2 [A] Encode the bit stream 01001100011 using. (Note, that the previous signal levels are indicated when appropriate) [5]

1) NRZ-L
2) NRZ-I (initially signal level encoded with a negative polarity)
3) Bipolar-AMI (previous bit "1" encoded with a negative polarity)
4) Pseudoternary (previous bit "0" encoded with a negative polarity)
5) Manchester
6) Differential Manchester (initially signal level encoded with a positive polarity)
7) Polar-RZ

[B] What is ISO-OSI reference model? Compare it with TCP/IP reference model. Why TCP/IP reference model is more popular than OSI model? Which layer is used for the following : [5]

i) to route packets
ii) to convert packets to frame
iii) to detect and correct errors
iv) to run services like FTP, Telnet etc.

Q.3 [A] A non – periodic composite signal contains frequencies from 10 to 40 KHz. The peak amplitude is 12 volt for the lowest and the highest signals and is 30 volt for the 20 KHz signal. Assuming that the amplitudes change gradually from the minimum to the maximum, draw the frequency spectrum. [3]

[B] Briefly describe the significance of the Shannon limit for information capacity. For a standard telephone circuit with a signal-to-noise power ratio of 30dB and a bandwidth of 2.7 kHz, determine the Shannon limit for information capacity. [2]

[C] Given the dataword 1010011110 and the divisor 10111 [5]

a) Show the generation of the codeword at the sender site using binary division
b) Show the checking of the codeword at the receiver site assuming no error has occurred.
c) What is the syndrome at the receiver end if the dataword has an error in the 5^{th} bit position counting from the right? Namely: dataword 1010001110 is received.

Q.4 [A] Four channels, two with a bit rate of 300 kbps and two with a bit rate of 250 kbps, are to be multiplexed using multiple slot TDM with no synchronization bits. [4]

1) What is the size of a frame in bits?
2) What is the frame rate?
3) What is the duration of a frame?
4) What is the data rate?

[B] What are the three phases in Virtual circuit switching? Explain with the help of diagram. [6]

Q.5 [A] Explain the mechanism of Stop-and-Wait ARQ. Distinguish between Go-back-N ARQ and Stop-and-Wait ARQ. [4]

[B] Why there are more than one types of frames used in HDLC? Explain I-Frame and S-Frame format. How Piggybacking is incorporated in HDLC. [4]

[C] Explain pure ALOHA and slotted ALOHA systems. Give the expression for throughput for each systems. [2]