



SEMESTER END EXAMINATIONS – JUNE 2019

Course & Branch : **B.E. : Computer Science and Engineering**

Semester : **IV**

Subject : **Data Communication**

Max. Marks : **100**

Subject Code : **CS44/CS1544**

Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Explain the encapsulation/decapsulation at the source host, router and destination host. CO1 (06)
b) Differentiate between mesh, star, bus and ring topologies? Show how these devices are connected in their respective topologies with neat figures. CO1 (08)
c) What is the total delay for a frame of size 10 million bits that is being sent on a link with 15 routers each having a queuing time of $2\mu s$ and a processing time of $1\mu s$. The length of the link is 3000Km. The speed of light inside the link is $2 \times 10^8 m/s$. The link has a bandwidth of 6 Mbps. Which component of the total delay is dominant? Which one is negligible? CO1 (06)
2. a) Explain layers of TCP/IP protocol suite with a neat diagram. CO1 (08)
b) Identify the three causes of impairments during data transmission? Explain. CO1 (06)
c) What is the theoretical capacity of a channel in each of the following cases? CO1 (06)
i) Bandwidth: 20 KHz $SNR_{dB} = 40$ ii) Bandwidth: 1MHz $SNR_{dB} = 20$.

UNIT- II

3. a) Explain the four pieces of information deduced for each point in the constellation diagram. Draw the constellation diagram for four points at (2, 2), (-2, 2), (-2, -2), and (2, -2). The numbers in parentheses define the values of I and Q respectively. Find the peak amplitude value for each case and define the type of modulation (ASK, FSK, PSK, or QAM). CO2 (06)
b) We need to use synchronous TDM and combine 20 digital sources, each of 100 Kbps. Each output slot carries 1 bit from each digital source, but one extra bit is added to each frame for synchronization. Answer the following questions: CO2 (06)
i) What is the size of an output frame in bits?
ii) What is the output frame rate?
iii) What is the duration of an output frame?
iv) What is the output data rate?
v) What is the efficiency of the system (ratio of useful bits to the total bits)?
c) Explain two scrambling techniques B8ZS and HDB3 with an example. CO2 (08)
4. a) Define scrambling and give its purpose. What is the result of scrambling the sequence 11100000000000 using B8ZS scrambling technique? Assume that the last non-zero signal level has been positive. CO2 (06)

CS44/CS1544

- b) Explain frequency hopping spread spectrum method. CO2 (06)
- c) Explain Delta modulation and demodulation with neat block diagram. CO2 (08)

UNIT- III

- 5. a) Given the data word 1 0 1 0 0 1 1 0 1 0 and divisor 1 0 1 1 1 CO3 (08)
 - i) Show the generation of the code word at the sender site.
 - ii) Show the checking of the code word at the receiver site (assuming error free transmission).
- b) Write sender site and receiving site algorithms for error detection using internet checksum. CO3 (06)
- c) List the advantages of cyclic codes, and illustrate by considering an example the working of cyclic codes. CO3 (06)
- 6. a) List the advantages of fiber-optic cables. CO3 (06)
- b) Write the taxonomy of switched networks. With a diagram , explain the structure of a trivial circuit-switched network. CO3 (08)
- c) Define burst error and linear block code. Find the minimum hamming distance for the following cases: CO3 (06)
 - i) Detection of 3 errors
 - ii) Correction of four errors
 - iii) Detection of 2 errors and correction of 1 error
 - iv) Detection of 8 errors and correction of 3 errors.

UNIT- IV

- 7. a) Illustrate the exchange of HDLC frames with piggy backing and no errors. CO4 (08)
- b) A pure ALOHA network transmits 200-bits frames on a shared channel of 200 kbps. Compute the throughput if the system produces (i) 1000 frames/sec (ii) 500 frames/sec. CO4 (06)
- c) Explain the different transition phases in point to point protocol. CO4 (06)
- 8. a) Write the sender site selective repeat algorithm by considering all the cases and explain. CO4 (10)
- b) Using CDMA technique, show how chip sequences are assigned to the stations, if four stations are participating on a communication link. Assume station 1 wants to send bit 0, station 2 wants to send bit 1, station 3 has bit 0 to send and station 4 is silent. Show how can station 3 retrieve the station two data sent to it. CO4 (10)

UNIT- V

- 9. a) Explain Ethernet frame format. CO5 (08)
- b) Illustrate the working of Distributed Co-ordination Function. CO5 (08)
- c) Explain virtual LAN in detail. CO5 (04)
- 10. a) Explain the three step process for finding spanning tree. CO5 (08)
- b) Differentiate between hidden station and exposed station problem. CO5 (08)
- c) Explain two types of networks used in Bluetooth. CO5 (04)
