



EXAMINATIONS SEPTEMBER /OCTOBER 2020
SUPPLEMENTARY SEMESTER / GRADE IMPROVEMENT/
RE-REGISTERED CANDIDATES

Program	: B.E. : Computer Science and Engineering	Semester	: IV
Course Name	: Data Communication	Max. Marks	: 100
Course Code	: CS44	Duration	: 3 Hrs

Instructions to the Candidates:

- Answer any one full question from each unit.

UNIT- I

- Identify the three causes of impairments during data transmission? Explain. CO1 (07)
 - We need to send 265 kbps over a noiseless channel with a bandwidth of 20KHz. How many signal levels do we need? CO1 (07)
 - What are the propagation time and transmission time for a 5Mbyte 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 2.4×10^8 m/s.
 - List the four levels of addresses in TCP/IP. Explain with an example. CO1 (06)
- What are the three criteria necessary for an effective and efficient network? Explain. CO1 (08)
 - Match the following to one or more layers of the TCP/IP protocol suite: CO1 (06)
 - Route determination
 - Connection to transmission media
 - Providing services for the end user
 - Creating user datagrams
 - Responsibility for handling frames between adjacent nodes
 - Transforming bits to electromagnetic signals.
 - What is the theoretical capacity of a channel in each of the following cases? CO1 (06)
 - Bandwidth: 20 KHz SNRdB = 40
 - Bandwidth: 1MHz SNRdB = 20.

UNIT- II

- A signal with data stream 10011001 is transmitted. Draw the graph of the following: CO2 (12)
 - NRZ-I
 - Manchester
 - Differential Manchester
 - AMI
 - Pseudoternary
 - Unipolar NRZ.
 - Draw the constellation diagram for the following cases. Find the peak amplitude value for each case and define the type of modulation (ASK, FSK, PSK, or QAM). The numbers in parentheses define the values of I and Q respectively. CO2 (08)
 - Two points at (2, 0) and (3, 0)
 - Two points at (3, 0) and (-3, 0)
 - Four points at (2, 2), (-2, 2), (-2, -2), and (2, -2)
 - Two points at (0, 2) and (0, -2).
- Define the analog hierarchy used by telephone companies and list different levels of the hierarchy. CO2 (06)
 - Justify how statistical TDM is advantageous over synchronous TDM with an example. We have 4 sources each creating 250 characters per second. If the interleaved unit is a character and one synchronizing bit is added to each frame find CO2 (06)

- i) The data range of each source
- ii) The duration of each character in each source
- iii) The frame rate
- iv) The duration of each frame
- v) The number of bits in each frame
- vi) The data rate of the link.
- c) Define the characteristics of a self-synchronizing signal and explain with block diagrams. CO2 (08)

UNIT- III

- 5. a) Explain the setup request phase and acknowledgement phase of virtual circuit network with an example and block diagrams. CO3 (12)
- b) Consider CRC-8 $x^8 + x^2 + x + 1$, answer the following questions: CO3 (08)
 - 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?
- 6. a) With a neat block diagram, explain the working of a time division switch. CO3 (06)
- b) Explain the CRC technique with block diagrams of CRC encoder and decoder. CO3 (07)
- c) We need a three-stage space-division switch with $N = 100$. 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 (100 X 100).
 - v) Find the blocking factor, the ratio of the number of connections obtained from part iii and part iv.

UNIT- IV

- 7. a) Discuss the control field format for different types of HDLC frames. CO4 (10)
- b) A slotted ALOHA network transmits 200-bit frames using a shared channel with a 200-kbps bandwidth. Find the throughput if the system (all stations together) produces
 - i. 1000 frames per second.
 - ii. 500 frames per second.
 - iii. 250 frames per second.
 CO4 (06)
- c) Using 5-bit sequence numbers, what is 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.
- 8. a) Explain PAP and CHAP authentication procedures that are used in Point to Point Protocol with block diagrams. CO4 (10)
- b) Draw the FSM for Go-Back-N protocol at sender and receiver site. CO4 (10)

UNIT- V

- 9. a) Explain a transparent switch. CO5 (04)
- b) Differentiate between point co-ordination function and distributed co-ordination function. CO5 (08)
- c) In an 802.11, give the value of the address 2 field in each of the following situations (left bit defines *To DS* and right bit defines *From DS*). i) 00 ii) 01 iii) 10 iv) 11. CO5 (08)
- 10. a) With a neat block diagram, Explain the Ethernet frame format. CO5 (08)
- b) Differentiate between piconet and scatternet Bluetooth architecture. CO5 (06)
- c) Write short note on VLAN. CO5 (06)
