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(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
Accredited by NBA & NAAC with 'A+' Grade

SUPPLEMENTARY SEMESTER EXAMINATIONS – JULY 2023

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

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

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|----|----|---|-----|------|
| 1. | a) | Assume five devices are arranged in a mesh topology. How many cables are required? Draw the mesh topology for 5 nodes. Compare it with star topology. | CO1 | (08) |
| | b) | What are the types of addresses (identifiers) used in each of the following layers?
i. Application layer ii. Network layer iii. Transport Layer iv. Data-link layer. | CO1 | (04) |
| | c) | Explain persistent and Non-persistent TCP connections. | CO1 | (08) |
| 2. | a) | Compare SMTP, FTP, and HTTP Protocols. | CO1 | (06) |
| | b) | Explain the DNS Message format for both query and reply. | CO1 | (06) |
| | c) | With a neat sketch Explain how SMTP operates when A send mail to B, where the mail server of A and B are different. Show the sequence of events. | CO1 | (08) |

UNIT – II

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| 3. | a) | Explain the transport-layer segment with a neat diagram. | CO2 | (06) |
| | b) | With suitable formulas illustrate estimation of round trip time and timeout interval. | CO2 | (08) |
| | c) | Justify the statement: TCP congestion control is referred to as Additive-increase, multiplicative-decrease congestion control. | CO2 | (06) |
| 4. | a) | Discuss the operation of selective repeat protocol with neat figure. | CO2 | (06) |
| | b) | Explain the 3-way handshake TCP connection. | CO2 | (06) |
| | c) | Draw a sequence diagram for the Go Back N protocol and explain the same. | CO2 | (08) |

UNIT – III

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| 5. | a) | Illustrate classful addressing with a block allocation diagram | CO3 | (08) |
| | b) | Outline the Count to infinity problem and discuss the solution. | CO3 | (06) |
| | c) | A packet has arrived in which the offset value is 100, the value of HLEN is 5, and the value of the total length field is 100. What are the numbers of the first byte and the last byte? | CO3 | (06) |

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6. a) An organization is granted a block of addresses with the beginning address 14.24.74.0/24. The organization needs to have three subblocks of addresses to use in its three subnets: one subblock of 10 addresses, one subblock of 60 addresses, and one subblock of 120 addresses. Design the sub-blocks CO3 (08)
- b) Discuss how the inter-autonomous system routing is done using BGP. CO3 (06)
- c) Explain the Link state routing algorithm with an example. CO3 (06)

UNIT – IV

7. a) Consider CRC-8 $x^8 + x^2 + x + 1$, and answer the following questions: CO4 (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?
- b) What is the need for Byte stuffing and unstuffing? CO4 (06)
- c) Discuss the different persistent methods of CSMA. CO4 (06)
8. a) What is the Hamming distance for each of the following code words? CO4 (08)
- i) d (10000, 00000)
- ii) d (10101, 10000)
- iii) d (00000, 11111)
- iv) d (00000, 00000)
- b) Describe CSM/CD in detail. CO4 (06)
- c) Explain the Process of error detection in block coding. CO4 (06)

UNIT- V

9. a) Explain three types of Analog to digital conversion. CO5 (06)
- b) A telephone line normally has a bandwidth of 3000 Hz (300 to 3300 Hz) assigned for data communications. The signal-to-noise ratio is usually 3162. For this channel calculate the capacity of the channel. CO5 (06)
- c) Discuss Nyquist bit rate and Shannon Capacity with suitable formula. CO5 (08)
10. a) We have a channel with a 1 MHz bandwidth. The SNR for this channel is 63. What are appropriate bit rate and signal levels. CO5 (06)
- b) Illustrate the causes of transmission impairment in signal transmission. CO5 (08)
- c) What is Exposed-Station Problem? Explain in detail. CO5 (06)
