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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations –JANUARY 2025** |
| **Date:** 15 – 01- 2025 **Time:**01:00 pm – 04:00 pm |

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| **School:** SOCSE | **Program:** B. Tech – COM/CEI/CAI/CCS/CSN/CSI  /CIT/CSG/CST/CDV/CBC/CSD/CBD/ISE/ISR/IST/ISD | |
| **Course Code :**CSE3155 | **Course Name :** Data Communication and Computer Networks | |
| **Semester**: III | **Max Marks**:100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **24** | **24** | **26** | **26** |  |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10Q x2M=20M** | | | | |
| **1** | Define latency. List the four components that contribute to latency? | **2 Marks** | **L1** | **CO1** |
| **2** | Define mesh topology and compute many links are required to directly connect 5 nodes in this topology? | **2 Marks** | **L2** | **CO1** |
| **3** | Explain the difference between single-bit errors and burst errors in data transmission with example. | **2 Marks** | **L2** | **CO2** |
| **4** | Define the term "media access control" and explain its significance in the data link layer. | **2 Marks** | **L1** | **CO2** |
| **5** | Describe two primary functions of the network layer in the OSI model? | **2 Marks** | **L1** | **CO3** |
| **6** | Explain BGP Protocol in brief. | **2 Marks** | **L2** | **CO3** |
| **7** | Differentiate between connectionless and connection-oriented services of transport layer. | **2 Marks** | **L4** | **CO4** |
| **8** | State any two differences between an IP address and a port address*.* | **2 Marks** | **L1** | **CO4** |
| **9** | Identify the protocols associated with Distance Vector and Link State routing algorithms. | **2 Marks** | **L1** | **CO4** |
| **10** | Identify the error, if any, in the following IPv4 addresses  a. 111.56.054.78  b. 222.34 .7 .8 .20  c. 75.45.301.14  d. 11100101.23.14.67 | **2 Marks** | **L4** | **CO3** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | | | | |
| **11.** | **a.** | Compare and contrast the TCP/IP model with the OSI model, highlighting their similarities and differences. | **10 Marks** | **L4** | | | | **CO1** |
| **b.** | Define multiplexing and explain the three main types of multiplexing, illustrating each with a diagram. | **10 Marks** | **L2** | | | | **CO1** |
| **Or** | | | | | | | | |
| **12.** | **a.** | Explain the different types of network topologies and list their advantages and disadvantages. | **10 Marks** | | **L2** | **CO1** | | |
|  | **b.** | Illustrate the causes for transmission impairment with appropriate diagrams. | **10 Marks** | | **L3** | **CO1** | | |
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| **13.** | **a.** | Draw and explain the flow diagram of the CSMA/CD (Carrier Sense Multiple Access with Collision Detection) protocol. Provide a detailed explanation of each step in the process. | **10 Marks** | | **L2** | **CO2** | | |
|  | **b.** | A bit stream 11010101 is transmitted using the CRC method with the generator polynomial x3+x2+1   1. Compute the codeword to be transmitted. 2. If the second bit from the left changes during transmission, explain how the receiver can identify this error. | **10 Marks** | | **L2** | **CO2** | | |
| **Or** | | | | | | | | |
| **14.** | **a.** | Draw and explain the flow diagram of the CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) protocol. Provide a detailed explanation of each step in the process. | **10 Marks** | | **L2** | | **CO2** | |
|  | **b.** | Compute and predict if there are any transmission errors in the received data using CRC.  i) A receiver receives the data sequence **110101101**. The generator polynomial used is x4+x+1.  ii) A receiver receives the data sequence **101010100**. The generator polynomial used is x4+x+1. | **10 Marks** | | **L2** | | **CO2** | |

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| **15.** | **a.** | Explain the rules for creating CIDR Block. Given the CIDR representation 30.20.30.35 / 27. Identify the range of IP Addresses in the CIDR block. | **10 Marks** | **L4** | **CO3** |
| **b** | Using a suitable example, apply Dijkstra's algorithm to find the shortest path from a given source vertex to all other vertices in a weighted graph. After applying the algorithm, analyse the advantages and disadvantages of Dijkstra’s algorithm. | **10 Marks** | **L3** | **CO3** |
| **Or** | | | | | |
| **16.** | **a.** | A block of addresses is allocated to an organization starting with the address 192.168.1.0. The organization is divided into 4 subnets. Determine the class of the address, and calculate the starting address, last address, and total number of addresses for each subnet. | **10 Marks** | **L3** | **CO3** |
| **b** | Illustrate and explain the format of an IPv4 header. | **10 Marks** | **L2** | **CO3** |

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| **17.** | **a.** | Draw and explain the format of a TCP segment, highlighting its key fields and their functions. | **10 Marks** | **L2** | | **CO4** |
| **b.** | State the use of the Sliding Window Protocol in computer networks. Explain the working principles of Go-Back-N (GBN) and Selective Repeat (SR) protocols. Describe their advantages, disadvantages. | **10 Marks** | **L2** | | **CO4** |
| **Or** | | | | | | |
| **18.** | **a.** | Draw and explain the format of a User Datagram Protocol (UDP) packet. Given the following binary data, calculate the checksum for the UDP packet and explain how the receiver will verify the checksum:  0011000000110001 (data 1)  0000000001010000 (data 2)  0000000000001000 (data 3) | **10 Marks** | **L4** | **CO4** | |
| **b** | Describe any 3 key functions of the transport layer and differentiate between TCP and UDP with example for each. | **10 Marks** | **L2** | **CO4** | |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***