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| **DIT UNIVERSITY DEHRADUN**   |  |  | | --- | --- | | **B. TECH (CSE/IT)** | **MID TERM EXAM, EVEN SEM 2025 (Back) Sem-V** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: Computer Networks** | | | | | | | | | | | | |

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| **Time: 2 Hours** | **Total Marks: 50** |
| Note: No student is allowed to leave the examination hall before the completion of the exam. Answers from a section must be written together and must not be mixed with answers from other section.  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  | | --- | --- | --- | | **SECTION 1 : Attempt any four questions from Section 1: [4 x 5= 20]** | | | |  | |  | | **Q.1.1)** | What are the different components of a data communication system and how data communication takes place between two devices in a network? |  | | **Q.1.2)** | (a) Define Bit Rate and Baud Rate. A digital communication system transmits data at a bit rate of 2400 bps using a signal with 4 different levels. Calculate the baud rate.  (b) Explain different types of Controlled access protocols. | | **Q.1.3)** | (a) Discuss four types of delays in Computer Networks along with their mathematical formula.  (b) The one-way propagation delay between two devices is 10 ms whereas the transmission delay is 15 ms for the sender and 20 ms for the receiver. Calculate the round-trip time (RTT) for sending a packet from the sender to the receiver and back. | | **Q.1.4)** | Calculate the Checksum value of 1001001110010011 and 1001100001001101(16-bit segment). | | **Q.1.5)** | Define the following:   1. Client Server Model 2. ARP Protocol 3. ICMP Protocol 4. UDP Protocol | | **SECTION 2 : Attempt any three questions from Section 2 : [3 x 10= 30]** | | | |  | |  | | **Q.2.1)** | (a) Explain the layered architecture of the OSI model and discuss the functions performed by each layer.  (b) How does multiplexing improve bandwidth utilization? Explain Frequency Division Multiplexing with an example. |  | | **Q.2.2)** | (a) Consider the following scenarios of network topologies and answer them accordingly:   * In a bus topology, there is a single cable running across all devices. Suppose the cable is broken in the middle of the network, what would be the impact on the network? * In a ring topology with 8 devices, a token is passed around the ring for data transmission. How many steps does it take for a token to travel from Device 1 to Device 5?   (b) Design a hybrid topology for a university campus network, combining star and tree topologies where the campus has 5 departments, each with approximately 50 computers. Outline the structure, advantages, and disadvantages of your design. |  | | **Q.2.3)** | (a) Explain different types of Random access protocols. In a Slotted ALOHA system, if the total available bandwidth is 100 kbps and each frame size is 1,000 bits, how many frames can be transmitted per second?  (b) A Slotted ALOHA system has a transmission rate of 50,000 frames per second. If the system operates at maximum efficiency, how many frames are successfully transmitted per second? |  | |  |  | | **Q.2.4)** | A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x3+1.   1. What is the actual bit string transmitted? 2. Suppose the third bit from the left is inverted during transmission, how will receiver detect this error? |  | |  |  | | **-----END OF PAPER ----** | | | |