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| **DIT UNIVERSITY DEHRADUN**   |  |  | | --- | --- | | **B.TECH (CSE/IT)** | **MID TERM EXAMINATION, ODD SEM 2024-25 (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.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  |  | | --- | --- | --- | --- | | **SECTION A: Attempt any four questions from the following: [4 x 5= 20]** | | | | |  | | **BTL** | **CO** | | **Q.1)** | Discuss five distinct differences between circuit switching and packet switching. Answer must be written in tabular form. | **2** | **1** | | **Q.2)** | Explain different types of delays in computer networks.  The moon is at a distance of 240,000 miles from the earth. If we put an optic fiber to the moon from the earth, calculate the delay before the first bit could reach the moon. Assume that the maximum bandwidth for optic fiber cable is 1000 Gbps and signal travels at a speed of 200000 km/sec. [Take 1 mile = 1609 m] | **2** | **1** | | **Q.3)** | Explain the three services provided by the data link layer to the network layer. Give suitable example for each category of service. | **2** | **2** | | **Q.4)** | A sender needs to send the following four message blocks:  Block 1: 10101011  Block 2: 00000010  Block 3: 11101110  Block 4: 11011100   1. Calculate the 8-bit checksum at the sender site. 2. Now assume that, due to transmission errors, Block 3 is changed to 11101111. Calculate the new checksum at the receiver’s site. | **3** | **2** | | **Q.5)** | A 12-bit hamming code 111001001111 arrives at the receiver. Check if the received message is correct or not. What was the original bit pattern sent on the medium? Assume single bit error and even parity. Show all steps in detail. | **3** | **2** | | **SECTION B: Attempt any three questions from the following: [3 x 10= 30]** | | | | |  | | **BTL** | **CO** | | **Q.6)** | 1. Discuss the relative advantages and disadvantages of persistent and non-persistent CSMA protocols. Explain what makes you select one over the other. **[6 marks]** 2. Compute the length of contention slot for CSMA/CD for the following parameters: Maximum transmission medium span is 250 meters and data rate is 10 Gbps. Assume signal propagation delay to be 5 nanoseconds / meter. **[4 marks]** | **4** | **2** | | **Q.7)** | 1. Draw the timing diagram for Stop and Wait (SAW) approach for both error free and error prone channels (all cases). **[2 marks]** 2. Define each of the delay components of SAW for error free channels. Using these delay components, derive the formula for SAW Link Utilization. **[4 marks]** 3. Consider the use of 1000 bit frames on a 1 Mbps satellite channel with a 540 ms round trip propagation delay. Calculate the link utilization for Go Back N error control technique with a window size of 541.   Assume Probability [bit error] = 10-3. **[4 marks]** | **4** | **4** | | **Q.8)** | 1. Consider the use of 1000 bytes frame size for a sliding window protocol with window size 5. The transmission delay and propagation delay are given as 50 µs and 200 µs, respectively. Calculate maximum link utilization and achievable throughput. **[4 marks]** 2. A large population of ALOHA users manages to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 ms. **[6 marks]**    1. Compute the chance of success on the first attempt.    2. Compute the probability of exactly 4 collisions followed by successful transmission.    3. Compute the expected number of transmission attempts needed per frame. | **4** | **2** | | **Q.9)** | 1. A group of N stations is sharing a 1000 Kbps pure ALOHA channel. Each of the stations sends 500 bits per second. Compute the maximum value of N. **[3 marks]** 2. Frames of size 1000 bits are sent over a 106 bps duplex link between two hosts. The propagation time is 25 ms. Frames are to be transmitted into this link to fully pack them in transit (within the link). Let ‘*n’* be the minimum number of bits that will be required to represent the sequence numbers distinctly assuming that no time gap needs to be given between transmission of two frames. Suppose that the sliding window protocol is used with the sender window size of 2n, where ‘*n’* is the number of bits as mentioned earlier, and acknowledgements are always piggy backed. After sending 2n frames, calculate the minimum time the sender will have to wait before starting transmission of the next frame. Ignore the frame processing time. **[7 marks]** | **4** | **2** | | **-----END OF PAPER ----** | |  |  | | |