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| **DIT UNIVERSITY, DEHRADUN**   |  |  | | --- | --- | | **BCA** | **: END TERM EXAMINATION, EVEN SEM 2023-24 (SEM IV)** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: Computer Networks** | | | | | | | | | | | | |

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| **Time: 3 Hours** | **Total Marks: 100** |
| **Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the exam.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  | | --- | --- | --- | | **Q.1)** | **Attempt all Parts :** | | |  | (a) | Using CRC as an error detection technique, what is the FCS obtained if message M(x) is 1001, and generator polynomial G(x) is x3+x+1. Show all steps. | |  | (b) | Define throughput. A network with bandwidth of 10 Mbps can pass 12000 frames per minute. Calculate the throughput of this network. Assume 1 frame contains 10000 bits. | |  | (c) | Define noise as a transmission impairment. The power of a signal is 10 mW and the power of noise is 1 µW. Calculate the value of SNRdB. | |  | (d) | The distance between source and destination is 9 \* 1010 m. Calculate the channel utilization if a stop-and-wait protocol is used for transmission on a 64 Mbps channel. Assume frame size to be 32 KB and speed of light is 3 \* 108 m/s. | |  |  | **[4 x 5= 20]** | |  | | | | **Q.2)** | **Attempt all Parts :** | | |  | (a) | Draw and explain the working of virtual circuit networks. | |  | (b) | A server has an IP address of 160.36.30.110 and subnet mask of 255.255.254.0. Find directed broadcast address and subnet address. Show all calculations. | |  | (c) | Explain the need for Classless Interdomain Routing (CIDR). List the rules for forming CIDR blocks. | |  | (d) | Answer the following for IPv4 header:   1. An IPv4 header contains 0100 0101 as its first 8 bits. Calculate the size of this IP header (in bytes). 2. In an IPv4 header, MF bit is set to 1 and Fragment Offset is set to 0. Explain what does it signify. | |  |  | **[4 x 5= 20]** | |  | | | | **Q.3)** | **Attempt any two parts :** | | |  | (a) | Explain the need for layered network architecture. Discuss the main functions of physical layer, data link layer, and transport layer. | |  | (b) | Explain error control in data link layer. What does the number on the ACK frame and NAK frame mean for the following ARQ schemes?   1. Stop and wait ARQ 2. Go-Back-N ARQ 3. Selective repeat ARQ | |  | (c) | Draw and explain the frame format of Classic Ethernet. Explain the advantages of switched ethernet over classic ethernet. | |  |  | **[2 x 10= 20]** | |  | | | | **Q.4)** | **Attempt any two parts :** | | |  | (a) | Explain iterative DNS query and recursive DNS query. Draw suitable diagrams for both type of queries. Consider a situation in which all the DNS servers in the world crash simultaneously. Explain how does this change one’s ability to use the Internet? | |  | (b) | Explain and draw the process of TCP connection establishment and TCP connection release. Name and explain the purpose of each of the six flags in the TCP header. | |  | (c) | Explain and draw the architecture of an email system. Discuss the functions of all involved protocols. | |  |  | **[2 x 10= 20]** | |  | | | | **Q.5)** | **Attempt any two parts :** | | |  | (a) | Consider a network with 6 routers: A, B, C, D, E, & F. Router F has three neighbors, B, D, & E. Distance vector routing is used. The following distance vectors have just arrived at router F (in the same order): from router B: (5,0,8,12,6,2); from router D: (16,12,6,0,9,10), & from router E: (7,6,3,9,0,4). The measured distances from F to B, D, & E, are 9, 6, and 3, respectively. What is the new routing table of router F? Give both the outgoing line to use (next hop) and the cost. Show calculations for each incoming vector. | |  | (b) | Assume two routers R1 and R2 are connected by a point-to-point link. The link supports an MTU of 1000 bytes. An IP datagram of size 4400 bytes (assume identification as 100) arrives at R1, and must be forwarded to R2. Find the number of fragments that this IP datagram will be divided into for transmission between R1 and R2. Also, specify the Total Length (in bytes), Identification, MF, and Fragment offset fields of the IP header for each transmitted packet (fragment). Show all calculations. | |  | (c) | Suppose an organization buys a network having IP Address 200.1.2.0. This network needs to be divided into 5 subnets such that Subnet 1 must support 120 hosts, Subnet 2 must support 60 hosts, Subnet 3 must support 30 hosts, Subnet 4 and Subnet 5 must support 10 hosts each. Find the Subnet ID and Subnet Mask for each of these 5 subnets. | |  |  | **[2 x 10= 20]** | | -----END OF PAPER ---- | | | | |