Registration Number: | | | | | | | | | |

# MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
*(A constituent unit of MAHE, Manipal)*

III SEMESTER MCA INTERNAL EXAMINATIONS AUG 2022

## TEST - 1

SUBJECT: Computer Networks [MCA 5151]

Date of Exam: **02/09/2022** Time of Exam: **10:00 AM – 11:00 AM** Max. Marks: **15**

**Instructions to Candidates:**

- Answer ALL the questions & missing data may be suitably assumed

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|---|---|---|
| **1.** | What is a protocol?<br><br>**ANS**: A protocol defines what is communicated, how it is communicated, and when it is communicated. The key elements of a protocol are syntax, semantics, and timing. | **1** |
| **2.** | What is use of "limited use" RFC?<br><br>**ANS:** Experimental Uses | **1** |
| **3.** | How does LLC give service to MAC sublayer in Datalink layer?<br><br>**ANS:** LLC is responsible for handling multiple Layer3 protocols (multiplexing/de-multiplexing) and link services like reliability and flow control. | **1** |
| **4.** | Why do you need preamble and SFD in every frame?<br><br>**ANS:** It is used to synchronize receiver, sender clock rates. | **1** |
| **5.** | Assume a network has host H1 and H2. The hosts are connected through router R1 and R2. The transmission delay in each hop is 0.5s and processing delay at each router in 10ms. What would be the end-to-end delay if H1 is communicating a packet with H2?<br><br>ANS: H1 --- R1 --- R2 --- H2<br><br>Transmission delay = 500ms x 3 = 1500 ms<br>Processing delay = 10ms x 2 = 20ms<br>Total E2E Delay = 1500 + 20 = 1520 ms | **1** |
| **6.** | How does network layer provide services at source computer? Explain briefly.<br><br>**ANS**:<br>The network layer at the source computer provides 4 services:<br>• Packetizing<br>• Finding the logical address of the next hop<br>• Finding the physical (MAC) address of the next hop<br>• Fragmenting, the datagram if necessary. | **2** |
| **7.** | The first address in a range of address is 200.12.240.32. If the number of addresses in the range is 1024 and 63000, what are the last addresses in each case.<br><br>ANS:<br><br>**1024** | **2** |

| | | |
|---|---|---|
| | Convert to 256 base: 0.0.3. 255<br>Minus 1 = 0.0.3.255<br>Add<br>200.12.240.32<br>0.0.3.255<br><br>_____<br>**200.12.244.31**<br><br>**63000**<br>Convert to 256 base: 0.0.246.24<br>Minus 1 = 0.0.246.23<br>Add<br>200.12.240.32<br>0.0.246.23<br><br>_____<br>**200.13.230.55** | |
| **8.** | What are the challenges that are involved in designing layers?<br><br>ANS:<br>• **Reliability**: How safely the data reaches the destination?<br>  • Solution: Error Correction and Error Detection Techniques<br>• **Link errors**<br>  • Solution: To find an alternate path to reach the destination<br>• **Protocol Layering:** To support to the changes caused due to the evolution of network without affecting the overall system<br>• **Addressing** or **naming:** Since there are many computers on the network, every layer needs a mechanism for identifying the senders and receivers uniquely that are involved in a particular message.<br>• **Scalability:** Designs that continue to work even when the size of the network increases<br>• Necessary to support **disassembling or segmentation, transmission, and reassembling.**<br>• **Statistical Multiplexing:** Sharing network bandwidth dynamically based on the statistics of demand.<br>• **Flow control:** The sender should not overwhelm the receiver.<br>• **Congestion:** To control the flow of traffic<br>• **Security:** To keep authenticity, confidentiality, integrity of the message; to ensure that the system is not subjected to any kind of attacks like node impersonation, masquerade attack etc. | **3** |
| **9.** | A network using CSMA/CD has a bandwidth of 10 Mbps. If the maximum propagation time (including the delays in the devices and ignoring the time needed to send a jamming signal, as we see later) is 25.6 μs, what is the minimum size of the frame? What should be the minimum frame size if we increase the data rate to 100 Mbps? To 1 Gbps? To 10 Gbps?<br><br>:<br>The frame transmission time is Tfr = 2 × Tp = 51.2 μs. This means, in the worst case, a station needs to transmit for a period of 51.2 μs to detect the collision. The minimum size of the frame is 10 Mbps × 51.2 μs = 512 bits or 64 bytes. This is actually the minimum size of the frame for Standard Ethernet.<br><br>■ Let us find the relationship between the minimum frame size and the data rate. We know that-<br>**or** | **3** |

(frame size) = **[2 × (distance) / (propagation speed)]** × (data rate)]
**or**
**frame size = K** × **(data rate)**
This means that minimum frame size is proportional to the data rate (K is a constant).

- When the data rate is increased, the frame size must be increased in a network with a fixed length to continue the proper operation of the CSMA/CD.
- We calculate the minimum frame size based on the above proportionality relationship
- Data rate = 10 Mbps → minimum frame size = **512 bits**
- Data rate = 100 Mbps → minimum frame size = **5120 bits**
- Data rate = 1 Gbps → minimum frame size = **51,200 bits**
- Data rate = 10 Gbps → minimum frame size = **512,000 bits**

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