Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV (New) EXAMINATION – WINTER 2019

Subject Code: 2140709 Date: 10/12/2019

Subject Name: Computer Networks

Time: 10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Suppose users share a 3 Mbps link and each user requires 150 kbps when transmitting, but each user transmits only 10 percent of the time. When circuit switching is used, how many users can be supported?	**03**
	(b)	In Manchester encoding, what is the relation between the bitrate and the baud rate. How many bits are there in the ethernet address? Which of the following items is not used in Local Area Networks (L A Ns)? A) Interfaced card B) Cable C) Computer D) Modem	**04**
	(c)	Consider two hosts, A and B, connected by a single link of rate R bps. Suppose that the two hosts are separated by m meters, and suppose the propagation speed along the link is s meters/sec. Host A is to send a packet of size L bits to Host B. a). Express the propagation delay. b). Determine the transmission time of the packet. c). Ignoring processing and queuing delays, obtain an expression for the end-to-end delay. d). Suppose Host A begins to transmit the packet at time t= 0. At time t=dtrans, where is the last bit of the packet?	**07**
Q.2	**(a)**	Describe how a botnet can be created, and how it can be used for a DDoS attack.	**03**
	(b)	Why do HTTP, FTP, SMTP, and POP3 run on top of TCP rather than on UDP? Name one application that uses UDP and why?	**04**
	(c)	Demonstrate socket programming flow for a simple client-server application using TCP. why must the server program be executed before the client program? For the client- server application over UDP, why may the client program be executed before the server program?	**07**
		OR	
	(c)	How do the TCP senders determine their sending rates such that they don't congest the network but at the same time make use of all the available bandwidth?	**07**
Q.3	**(a)**	Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?	**03**
	(b)	Which transport layer protocols (TCP or UDP) are used for real time multimedia, file transfer, DNS and email?	**04**
	(c)	How end-to-end congestion control is provided by TCP.	**07**
		OR	
Q.3	**(a)**	Why is it that voice and video traffic is often sent over TCP rather than UDP in today's Internet?	**03**

	(b)	Explain in brief socket, multiplexing and demultiplexing.	**04**
	(c)	What are various reliable data transfer mechanisms and for what purpose are they used?	**07**
Q.4	**(a)**	How big is the MAC address space? The IPv4 address space? The IPv6 address space?	**03**
	(b)	Why is an ARP query sent within a broadcast frame? Why is an ARP response sent within a frame with a specific destination MAC address?	**04**
	(c)	Consider a router that interconnects three subnets: Subnet 1, Subnet 2 and Subnet 3. Suppose all the interfaces in each of these three subnets are required to have the prefix 172.168.15/24. Also suppose that Subnet 1 is required to support up to 62 interfaces, Subnet 2 is required to support up to 110 interfaces and Subnet 3 is required to support up to 15 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints.	**07**

OR

Q.4	**(a)**	Briefly explain the Ethernet frame structure.	**03**
	(b)	What are some of the possible services that a link-layer protocol can offer to the network layer? Which of these link-layer services have corresponding services in IP?	**04**
	(c)	Consider the 7-bit generator, G=10011, and suppose that D has the value 1010101010. What is the value of R?	**07**
Q.5	**(a)**	Why are different inter-AS and intra-AS protocols used in the Internet?	**03**
	(b)	List and briefly describe three types of switching fabrics used in Routers. Which, if any, can send multiple packets across the fabric in parallel?	**04**
	(c)	Consider a datagram network using 8-bit host addresses. Suppose a router uses longest prefix matching and has the following forwarding table:	**07**

Prefix Match	Interface
00	0
010	1
011	2
10	2
11	3

For each of the four interfaces, give the associated range of destination host addresses and the number of addresses in the range.

OR

Q.5	**(a)**	How does BGP use the NEXT-HOP attribute? How does it use the AS-PATH attribute?	**03**
	(b)	What are the two most important network-layer functions in a datagram network? What are the three most important network-layer functions in a virtual-circuit network?	**04**
	(c)	Compare and contrast the IPv4 and the IPv6 header fields. Do they have any fields in common?	**07**

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