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PES University, Bengaluru-85

(Established under Karnataka Act No. 16 of 2013)

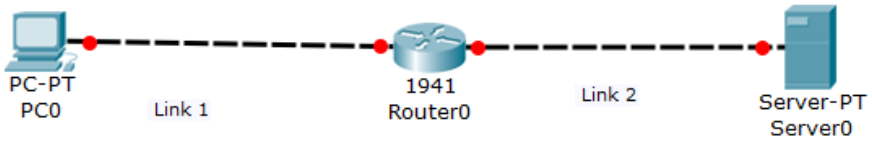
UE19CS253

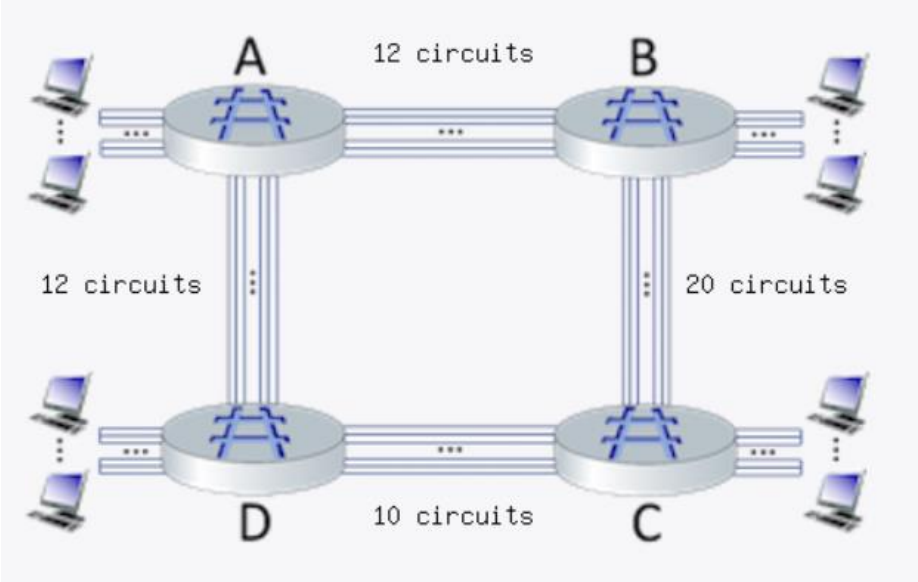
JULY 2021: END SEMESTER ASSESSMENT, B.TECH, IV-SEMESTER

UE19CS253 – COMPUTER NETWORKS

Time: 03 Hours **Answer All Questions** **Max Marks: 100**

All the questions are compulsory.
Draw the diagrams wherever necessary.
Figures to the right indicates marks.

1	a)	Consider the following scenario: Link 1 transmission rate is 10 Mbps and link length is 2 KM Link 2 transmission rate is 100 Mbps and link length is 1000 KM  Assume the length of packet is 9000 bits and the speed of light propagation delay on each link is $3x10^8$ m/sec. Assuming no other delays in the network, answer the following questions by filling the given table. Round your answer to two decimals after leading zeros. What is the transmission delay of link 1? | | What is the propagation delay of link 1? | | What is the total delay of link 1? | | What is the transmission delay of link 2? | | What is the propagation delay of link 2? | | What is the total delay of link 2? | |	6
	b)	What is Protocol? Why are the standards important for protocols? Compare a human protocol and computer network protocol with the help of suitable diagram.	4
	c)	What is network of networks? Explain the ISP and IXP terminologies in brief. Why the two ISPs at the same level of hierarchy often peer with each other? Also mention the two fundamental approaches for moving data through a network of links and switches?	6
	d)	Consider the circuit-switched network shown in the figure below, with circuit switches A, B, C, and D. Suppose there are 12 circuits between A and B, 20	4

		circuits between B and C, 10 circuits between C and D, and 12 circuits between D and A.  Answer the following questions. 1. What is the maximum number of connections that can be ongoing in the network at any one time? 2. Suppose that these maximum number of connections are all ongoing. What happens when another call connection request arrives to the network, will it be accepted? Answer Yes or No 3. Suppose that every connection requires 2 consecutive hops, and calls are connected clockwise. For example, a connection can go from A to C, from B to D, from C to A, and from D to B. With these constraints, what is the maximum number of connections that can be ongoing in the network at any one time?	
2	a)	Explain the two network application architectures with the help of suitable diagram.	4
	b)	Which are the two sockets with the TCP server process? With suitable diagram highlight the main socket related activity of the client and the server that communicate over the TCP transport service.	6
	c)	Explain with a neat diagram, the User-Server Interaction using cookies. Also mention the four components of cookie technology.	5
	d)	Explain the interaction between various DNS servers for the Recursive Query with diagram. Also draw the DNS Message format and briefly explain each field in it.	5

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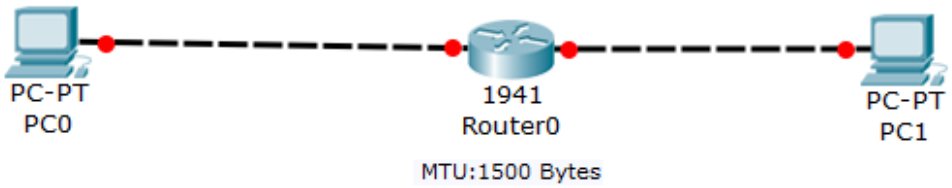
3	a)	Why is it that the video and voice traffic is often sent over TCP rather than UDP in today's Internet? Name any four popular Internet applications which uses underlying transport layer protocol as UDP.	4
	b)	Consider a TCP connection between host A and Host B. Suppose that the TCP segments travelling from Host A to host B have source port number *x* and destination port number *y*, what are the source port number and destination port number for the segments travelling from Host B to host A? Also explain the need of introducing sequence numbers and timers while building a reliable data transfer protocol.	6
	c)	State whether the following statements are true or false w.r.t TCP connection management. 1. Third stage of three way handshake may carry client-to server data in the segment payload but not more than 1 Byte. 2. The SYNACK Segment contains no application layer data but it contains SYN, ACK and Server_isn values as part of payload. 3. In order to establish the TCP connection, the client side TCP first sends a special TCP segment to the server side TCP by setting SYN bit to 1. 4. Either of the two processes, participating in a TCP connection can end the connection.	4
	d)	What is congestion window? How it helps in TCP congestion control. With the help of diagram explain the slow start state of congestion control algorithm.	6
4	a)	Draw and explain the high-level view of generic router architecture. What is HOL blocking? Does it occur in input ports or output ports?	5
	b)	Consider the exhibit below: A datagram of 5000 bytes (20 bytes of IP header) arrives at a router and must be forwarded to a link with an MTU of 1500 bytes.  Answer the following questions based on the given information. 1. How many fragments will be formed having flag value set to zero? 2. What will be the size of the last fragment? (In Bytes) 3. If the offset mentioned in one of the fragment is 370, the data will be inserted at byte----- 4. What will be the offset value in last fragment? 5. How many equal sized fragments will be formed?	5

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	c)	If the IP address of one host in the network is 125.64.12.56/16, answer the following questions. Complete the table with answers. What is the total address space in the network block? What is the network address? What is the first address in the network? What is the last assignable address in the network?	4
	d)	i. Assume the host with Ethernet address 10-A9-32-41-A7-2D has joined the network. What would be its global unicast address if the global Unicast Prefix of an organization is 3A21:2314:4123 and the subnet identifier is 1000? ii. State whether the following IPV6 addresses are valid or invalid: 1. 2001::1 2. 2000::1234::1/60 3. ::192.168.12.34 4. 1233:3456:ABCD:abcd::	6 [4M + 2 M]
5	a)	Draw the frame structure of Ethernet and mention the size of each field in bytes. Also explain in brief what is Ethernet? To which OSI Layer does Ethernet belong?	5
	b)	Why is an ARP query sent within a broadcast frame? What is the significance of TTL field in ARP table? With the help of suitable diagram explain the working of Address Resolution Protocol.	5
	c)	What are different bit level error detection techniques? Suppose the information content of a packet is a bit pattern 1110 0110 1001 1101 and an even parity scheme is being used. What would the value of the field containing the parity bits be for the case of a two dimensional parity scheme?	4
	d)	Write short notes on: i. Wireless LANs ii. Multiple access protocols	6