SRN | | | | | | | | | | | | |

PES University, Bengaluru-85

(Established under Karnataka Act No. 16 of 2013)

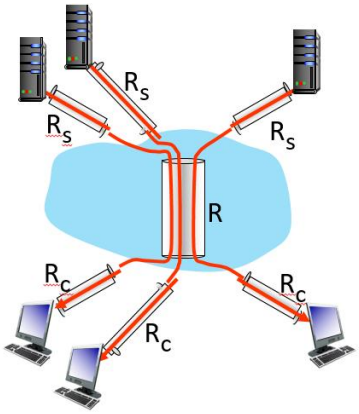
UE19CS253

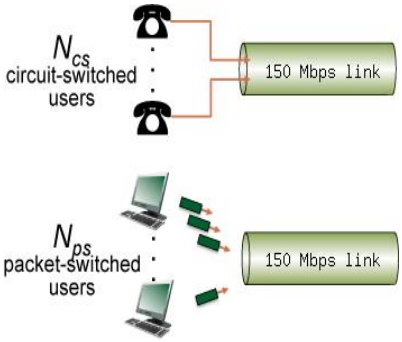
March 2021: In Semester Assessment(ISA)
B.TECH, IV-SEMESTER

UE19CS253– COMPUTER NETWORKS

Time: 02 Hours **Answer All Questions** **Max Marks: 60**

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

1	a)	What is Access network and Network core? Briefly explain the connection devices which are implemented at these networks?	4
	b)	Draw TCP/IP protocol stack and brief the responsibilities of Transport and network layers in the Internet protocol stack.	3
	c)	Consider the scenario given below: Three different servers connected to three different clients over three three-hop paths.  The three pairs share a common middle hop with a transmission capacity of R = 600 Mbps. The three links from the servers to the shared link have a transmission capacity of R_S = 80 Mbps. Each of the three links from the shared middle link to a client has a transmission capacity of R_C = 90 Mbps. Answer the following questions: (Answer as a decimal) 1. Assuming that the servers are sending at the maximum rate possible, what are the link utilizations for the server links (R_S)? 2. Assuming that the servers are sending at the maximum rate possible, what are the link utilizations for the client links (R_C)? 3. Assuming that the servers are sending at the maximum rate possible, what is the link utilizations for the shared link (R)?	3
2	a)	Consider the two scenarios below:	5

		A circuit-switching scenario in which N_{cs} users, each requiring a bandwidth of 20 Mbps, must share a link of capacity 150 Mbps.  A packet-switching scenario with N_{ps} users sharing a 150 Mbps link, where each user again requires 20 Mbps when transmitting, but only needs to transmit 20 percent of the time. **Answer the following questions:** 1. When circuit–switching is used, what is the maximum number of circuit–switched users that can be supported? Explain your answer. 2. Suppose packet switching is used. Suppose there are 13 packet–switching users, what is the probability that one user (any one among the 13 users) is transmitting, and the remaining users are not transmitting? 3. Suppose packet switching is used. Suppose there are 13 packet–switching users, what is the probability that any 4 users (of the total 13 users) are transmitting and the remaining users are not transmitting? (Hint: you will need to use the binomial distribution)	
	b)	Define Cloud Computing. What is cloud enabled networking and cloud based networking?	3
	c)	Assume that you are using Mozilla Firefox as browser in your laptop computer which provides standard Ethernet interface, USB interface and Wi-Fi interface. Suppose at the end of this year, a physical interface using new Laser technology is introduced, is it required to replace or update Mozilla Firefox? Justify your answer.	2
3	a)	Consider distributing a file of F = 15 Gbits to N peers. The server has an upload rate of us = 30 Mbps, and each peer has a download rate of di = 2 Mbps and an upload rate of u. For N = 100 and u = 300 Kbps calculate the minimum distribution time for both client-server distribution and P2P distribution. If the number of peers are gradually increasing, which one would be faster?	5
	b)	Analyze the HTTP request below, sent by a client and answer the questions **GET** /CN/ esa.html HTTP/1.1<cr><lf> **Host**: www.pes.edu<cr><lf> **User-Agent:** Mozilla/5.0 <cr><lf> **Accept:** text/html, ext/xml<cr><lf> **Accept-Language:** en-us,en;q=0.5<cr><lf> **Accept-Encoding:** zip,deflate<cr><lf> **Accept-Charset:** ISO-8859-1,utf-8;q=0.7,*;q=0.7<cr><lf>	5

Keep-Alive: 300<cr><lf>
Connection: keep-alive<cr><lf>
<cr><lf>

a) What is the URL of the document requested by the browser?
b) What version of HTTP is the browser running?
c) Does the browser request a non-persistent or a persistent connection?
d) Is it possible to fetch a jpeg image in this request?
e) If the request line contained HEAD method instead of GET, what change it will make in the response?

4	a)	With suitable diagram describe how Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects? Justify your answer.	4
	b)	State True or False for the following. i. In a DNS query chain, if a local DNS server cache the IP addresses of TLD servers, it can bypass the root DNS servers. ii. Using FTP a user can send files from local file system to remote file system but cannot send the files from remote file system to local file system. iii. A cookie file is kept on server system and managed by the user's browser. iv. The IP address of host on which process runs is suffice for identifying the process.	4
	c)	For the client-server application over TCP why must the server program be executed before the client program?	2
5	a)	Suppose Host A sends 5 data segments to Host B, and the 2nd segment (sent from A) is lost. In the end, all 5 data segments have been correctly received by Host B. i. Fill the following table for GBN and SR protocols. (no delayed acknowledgements)	5

Protocol	# segment sent by A	#acknowledgements sent by B
GBN		
SR		

ii. If the TCP is used instead of GBN and SR, what will be the acknowledgement number of the last data segment?

	b)	Describe why an application developer might choose to run an application over UDP rather than TCP.	3
	c)	If the data words sent through an UDP segment are : • 1100 1010 1010 1010 • 1011 0101 1001 1000 • 1001 1001 1001 1011	2

		And the checksum value sent is : 1110 0110 0010 0000 Whether the data delivered to the destination is correct or not?	
6	a)	Using stop and wait policy, how a reliable data transfer protocol can be built for a lossy channel with bit errors? What is the possibility of duplicate data packets in the sender to receiver channel?	4
	b)	What is TCP Connection Management? What is the role of SYN bit in TCP three way handshake? Explain with suitable diagram.	4
	c)	Suppose Host A sends two TCP segments back to back to Host B over a TCP connection. The MSS is 1000 bytes. The first segment has sequence number 80 and the second has sequence number 120. a. How much data is there in the first segment? b. Suppose that the first segment is lost but the second segment arrives at B. In the acknowledgment that Host B sends to Host A, what will be the acknowledgment number?	2