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End Semester Examination 2024

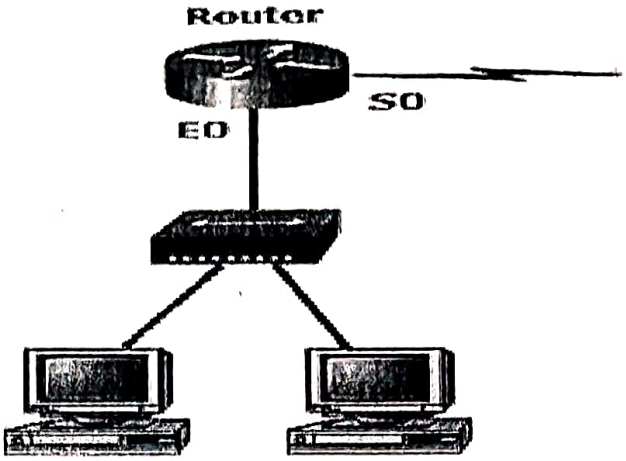
Name of the Program: B.Tech (CSE)
Name of the Course: B.Tech (CSE)
Paper Name: Computer Network-I
Time: 3 Hours

Semester: **VI**
Course Code: **TCS 604**
MM: 100

Note:

(i) All questions are compulsory.
(ii) Answer any two sub-sections among a, b, and c in each main question.
(iii) Total marks in each main question are twenty.
(iv) Each questions carry ten marks.

Q.1	**(10 × 2 = 20 Marks)**	**CO-1**
a)	What do encapsulation and De-encapsulation mean? Explain with neat diagram. Why are they needed in a layered protocol stack.	
b)	Which layers in the Internet Protocol stack does a router process? Which layers does a switch process? Which layer does a host process? Describe all the above three layers.	
c)	Consider two host **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**. **1:** Express the propagation delay, $\mathbf{d_{prop}}$, in terms of **m** and **s**. **2:** Determine the transmission time of the packet, $\mathbf{d_{trans}}$, in terms of **L** and **R**. **3:** Suppose **s= 2.5*10^8, L=100 bits**, and **R=28 Kbps**. Find the distance **m** so that $\mathbf{d_{prop}}$equals$\mathbf{d_{trans}}$	
Q.2	**(10 × 2 = 20 Marks)**	**CO-2**
a)	How does TCP protocol provide reliablility? Write down the names of services provided by the TCP? Write the name of well known ports used by TCP.	
b)	Suppose Alice, with a web based e-mail account (such as Hotmail or Gmail) sends a message to Bob, whoc accessed his mail from his mail server using IMAP. Discuss how the message gets from Alice's host to Bob's host. Be sure to list the series of application-layer protocols that are used to move the message between the two hosts.	
c)	What are the factors that influence the RTT. Why is the calculation of RTT is advantageous. Also what are the measures to reduce the RTT.	
Q.3	**(10 × 2 = 20 Marks)**	**CO-3**
a)	What are the different services provided by the Transport layer? Explain the transport layer protocol used for DNS and also state why it is suitable for DNS.	
b)	Suppose Host A and Host B use a GBN protocol with window size N=3 and a long enough range of sequence numbers. Assume Host A send 6 applications messages to Host B and that all messages are correctly received, except for the first acknowledgment and the fifth data segment. Draw the timing diagram showing the data segements and acknowledgments sent along with the corresponding sequence and acknowledge numbers respectively.	
c)	**A:** Using the following illustration, what would be the IP address of **E0** if you were using the eighth subnet? The network ID is 192.168.10.0/28 and you need to use the last available IP	

	address in the range. The zero subnet should not be considered valid for this question.  **B:** Using the illustration from the previous question, what would be the IP address of **S0** if you were using the first subnet? The network ID is 192.168.10.0/28 and you need to use the last available IP address in the range. Again, the zero subnet should not be considered valid for this question.	
Q.4	**(10 × 2 = 20 Marks)**	**CO-4**
a)	A sender wants to send 4 frames each of 8 bits to a receiver, where the frames are 11001100, 10101010, 11110000 and 11000011. Compute the checksum at sender's side. The receiver receives the data 11001100, 10101011, 11110000 and 11000011. Now Compute the checksum at receiver's side. And check whether the data received is error free or not.	
b)	How many phases are there in TCP congestion control algorithm, explain each phase in detail. What is the threshold value and how it will be decided.	
c)	What is the drawback of stop-and-wait protocol? How it can be solved and what protocols can be used to solve the problem of stop-and-wait protocol.	
Q.5	**(10 × 2 = 20 Marks)**	**CO-5**
a)	We know that a router typically consist of input ports, output ports, a switching fabric and a routing processor. Which of these are implemented in hardware and which are implemented in software? Why? Returning to the notion of the Network layer's data plane and control plane, which are implemented in hardware and which are implemented in software? Why?	
b)	**A:** Suppose, we have a big single network having IP Address 200.1.2.0. Divide this network into 4 subnets. **B:** What is the subnetwork address for a host with the IP address 200.10.5.68/28?	
c)	Explain the working functionality of the following: **1:** DHCP **2:** Network Address Translation (NAT) **3:** Internet Control Message Protocol (ICMP) **4:** IP Security in IPV4	