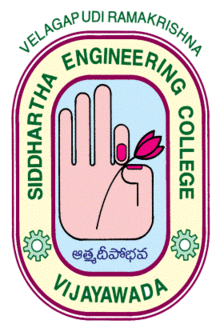
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**20IT5301: COMPUTER NETWORKS HOME ASSIGNMENT-4 QUESTIONS**

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| S.No | Question | CO | BTL |
| 1. |  | CO2 | Apply |
| 2. |  | CO2 | Apply |
| 3. |  | CO2 | Apply |
| 4. |  | CO2 | Apply |
| 5. | (a) What is Internet audio-on-demand? Describe some of the existing products for Internet audio-on demand. Find some of the Web sites of companies that are in the Internet audio-on-demand business. Find some Web sites which provide audio-on-demand content.  (b) Describe in brief the design issues for the layers | CO1 | Understand |
| 6. | (a) What is Internet video conferencing? Describe some of the existing products for Internet videoconferencing. Find some of the Web sites of companies that are in the Internet video-conferencing business.  (b) Explain in detail about OSI Reference Model with neat sketch | CO1 | Understand |
| 7. | (a) Consider sending a file of *F = M \*L* bits over a path of *Q* links. Each link transmits at *R* bps. The network is lightly loaded so that there are no queueing delays. When a form of packet switching is used, the *M \* L* bits are broken up into *M* packets, each packet with *L* bits. Propagation delay is negligible.  a) Suppose the network is a packet-switched virtual-circuit network.  Denote the VC set-up time by ts seconds. Suppose to each packet the  sending layers add a total of *h* bits of header. How long does it take to  send the file from source to destination?  b) Suppose the network is a packet-switched datagram network, and a  connectionless service is used. Now suppose each packet has *2h* bits of  header. How long does it take to send the file?  c) Repeat (b), but assume message switching is used (i.e., *2h*bits are added  to the message, and the message is not segmented).  d) Finally, suppose that the network is a circuit switched network. Further  suppose that the transmission rate of the circuit between source and  destination is *R* bps. Assuming *ts* set-up time and *h* bits of header  appended to the entire file, how long does it take to send the file?  (b) Differentiate a circuit-switched network with a packet-switched network with an example | CO1 | Understand |
| 8. | (a) Consider an application which transmits data at a steady rate (e.g., the sender generates a N bit unit of data every k time units, where k is small and fixed). Also, when such an application starts, it will stay on for relatively long period of time. Answer the following questions, briefly justifying your answer:  a. Would a packet-switched network or a circuit-switched network be more appropriate for thisapplication? Why?  b. Suppose that a packet-switching network is used and the only traffic  in this network comes from such applications as described  above. Furthermore, assume that the sum of the application data rates  is less that the capacities of each and every link. Is some form of  congestion control needed? Why?  (b) **. (a)** Compare OSI and TCP/IP reference models  **b.**“The primitives tell the service to perform some action or report on an  action taken by a peer entity”. Explain this statement with a simple  client-server scenario in a connection oriented service  **c.** Two networks each provide reliable connection oriented service .One  of them offers a reliable byte stream and the other offers a reliable  message stream .Are these identical? If so why is the distinction made? If  not give an example of how they differ | CO1 | Understand |
| 9. | (a) Consider sending a series of packets from a sending host to a receiving host over a fixed route. List the delay components in the end-to-end delay for a single packet. Which of these delays are constant and which are fixed?  (b) Explain Circuit Switching Networks in detail. | CO1 | Understand |
| 10. | (a) How long does it take a packet of length 1,000 bytes to propagate over a link of distance 2,500 km, propagation speed 2.5 · 108 m/s, and transmission rate 2 Mbps? More generally, how long does it take a packet of length *L* to propagate over a link of distance *d*, propagation speed *s*, and transmission rate *R* bps? Does this delay depend on packet length? Does this delay depend on transmission rate?  (b) Explain Packet Switching Networks in detail | CO1 | Understand |
| 11. | (a) Suppose end system A wants to send a large file to end system B. At a very high level, describe how end system A creates packets from the file. When one of these packets arrives to a packet switch, what information in the packet does the switch use to determine the link onto which the packet is forwarded? Why is packet switching in the Internet analogous to driving from one city to another and asking directions along the way?  (b) List and explain different types of networks based upon scale | CO1 | Understand |
| 12. | .(a) Consider the circuit-switched network in Figure below. Recall that there are 4 circuits on each link. Label the four switches A, B, C and D, going in the clockwise direction.   1. What is the maximum number of simultaneous connections that can be   in progress at any one time in this network?   1. Suppose that all connections are between switches A and C. What is the maximum number of simultaneous connections that can be in progress? 2. Suppose we want to make four connections between switches A and C,and another four connections between switches B and D. Can we routen these calls through the four links to accommodate all eight connections?     (b) . List and explain different types of networks based upon transmission technology with example for each. | CO1 | Understand |
| 13. | (a)Suppose users share a 3 Mbps link. Also suppose each user requires 150 kbps when transmitting, but each user transmits only 10 percent of the time. (See the discussion of packet switching versus circuit switching in  a. When circuit switching is used, how many users can be supported?  b. For the remainder of this problem, suppose packet switching is used.  Find the probability that a given user is transmitting.  c. Suppose there are 120 users. Find the probability that at any given  time, exactly *n* users are transmitting simultaneously. (*Hint*: Use the  binomial distribution.)  d. Find the probability that there are 21 or more users transmitting simultaneously.  (b) Define Topology. Explain various topologies with advantages and disadvantages | CO1 | Understand |
| 14. | (a) Suppose there is a 10 Mbps microwave link between a geostationary satellite and its base station on Earth. Every minute the satellite takes a digital photo and sends it to the base station. Assume a propagation speed of 2.4 \_ 108 meters/sec.  a. What is the propagation delay of the link?  b. What is the bandwidth-delay product, *R* · *d*prop?  c. Let *x* denote the size of the photo. What is the minimum value of *x*  for the microwave link to be continuously transmitting?  (b) Describe the critiques of the OSI reference model and its protocols. | CO1 | Understand |
| 15. | (a) Consider sending a large file of *F* bits from Host Ato Host B. There are three links (and two switches) between A and B, and the links are uncongested (that is, no queuing delays). Host A segments the file into segments of *S* bits each and adds 80 bits of header to each segment, forming packets of *L* = 80 + *S* bits. Each link has a transmission rate of *R* bps. Find the value of *S* that minimizes the delay of moving the file from Host A to Host B. Disregard propagation delay.  (b) Describe the critiques of the TCP/IP reference model and its protocols | CO1 | Understand |
| 16. | (a) Skype offers a service that allows you to make a phone call from a PC to an ordinary phone. This means that the voice call must pass through both the Internet and through a telephone network. Discuss how this might be done.  ( b) . Explain the architecture of the internet with a neat sketch | CO1 | Understand |
| 17. | (a) Suppose there is a 10 Mbps microwave link between a geostationary satellite and its base station on Earth. Every minute the satellite takes a digital photo and sends it to the base station. Assume a propagation speed of 2.4 \_ 108 meters/sec.  a. What is the propagation delay of the link?  b. What is the bandwidth-delay product, *R* · *d*prop?  c. Let *x* denote the size of the photo. What is the minimum value of *x* for the microwave link to be continuously transmitting?  (b) What do you mean by Mobile phone Generation? How many Generations are there? What are the time-periods they cover? What technologies were/are used? | CO1 | Understand |
| 18. | (a) Suppose two hosts, A and B, are separated by 20,000 kilometers and are connected by a direct link of *R* = 2 Mbps. Suppose the propagation speed over the link is 2.5 \_ 108 meters/sec.  a. Calculate the bandwidth-delay product, *R* \_ *d*prop.  b. Consider sending a file of 800,000 bits from Host A to Host B. Suppose the file is sent continuously as one large message. What is the maximum number of bits that will be in the link at any given time?  c. Provide an interpretation of the bandwidth-delay product.  d. What is the width (in meters) of a bit in the link? Is it longer  than a football field?  e. Derive a general expression for the width of a bit in terms of the propagation speed *s,* the transmission rate *R,* and the length of the link *m*.  (b) Describe Second generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 19. | (a) Consider problem P62 but now with a link of *R* = 1 Gbps.  a. Calculate the bandwidth-delay product, *R* \_ *d*prop.  b. Consider sending a file of 800,000 bits from Host A to Host B. Suppose the file is sent continuously as one big message. What is the maximum number of bits that will be in the link at any given time?  c. What is the width (in meters) of a bit in the link?  (b) Describe Third generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 20. | (a) Refer again to problem P62.  a. How long does it take to send the file, assuming it is sent continuously?  b. Suppose now the file is broken up into 20 packets with each packet  containing 40,000 bits. Suppose that each packet is acknowledged by  the receiver and the transmission time of an acknowledgment packet is  negligible. Finally, assume that the sender cannot send a packet until  the preceding one is acknowledged. How long does it take to send the file?  c. Compare the results from (a) and (b).  (b) Describe Fourth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 21. | (a) Referring to problem P62, suppose we can modify *R*. For what value of *R* is the width of a bit as long as the length of the link?  (b) Describe fifth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 22. | (a) Suppose you would like to urgently deliver 40 terabytes data from Boston to Los Angeles. You have available a 00 Mbps dedicated link for data transfer. Would you prefer to transmit the data via this link or instead use FedEx overnight delivery? Explain  (b) Differentiate between the following with the help of diagrams   1. Hubs and switches 2. Transparent and spanning tree bridge   c. Gateway and Router | CO1 | Understand |
| 23. | (a) Consider Figure 1.19(b). Now suppose that there are *M* paths between the server and the client. No two paths share any link. Path *k* (*k* = 1, . . ., *M* ) consists of *N* links with transmission rates *Rk1*, *Rk2*, . . ., *RkN* . If the server can only use one path to send data to the client, what is the maximum throughput that the server can achieve? If the server can use all *M* paths to send data, what is the maximum throughput that the server can achieve?    (b) Describe the critiques of the OSI reference model and its protocols | CO1 | Understand |
| 24. | (a) Consider Figure below, Suppose that each link between the server and the client has a packet loss probability *p,* and the packet loss probabilities for these links are independent. What is the probability that a packet (sent by the server) is successfully received by the receiver? If a packet is lost in the path from the server to the client, then the server will re-transmit the packet. On average, how many times will the server re-transmit the packet in order for the client to successfully receive the packet?    (b) Describe the critiques of the TCP/IP reference model and its protocols | CO1 | Understand |
| 25. | . (a) Consider Figure below, Assume that we know the bottleneck link along the path from the server to the client is the first link with rate *Rs* bits/sec. Suppose we send a pair of packets back to back from the server to the client, and there is no other traffic on this path. Assume each packet of size *L* bits, and both links have the same propagation delay *dprop.*  a. What is the packet inter-arrival time at the destination? That is, how much time elapses from when the last bit of the first packet arrives until the last bit of the second packet arrives?  b. Now assume that the second link is the bottleneck link (i.e., *Rc* < *Rs*). Is it possible that the second packet queues at the input queue of the second link? Explain. Now suppose that the server sends the second packet *T* seconds after sending the first packet. How large must *T* be to ensure no queuing before the second link? Explain.    (b) Explain the architecture of the internet with a neat sketch | CO1 | Understand |

Solve the problems as per the following :

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| Regd  No | Question No | Regd No | Question No | Regd No | Question No | Regd No | Question No | Regd No | Question No |
| 266 | 1 | 280 | 15 | 294 | 4 | 2A8 | 18 | 2C2 | 7 |
| 267 | 2 | 281 | 16 | 295 | 5 | 2A9 | 19 | 2C3 | 8 |
| 268 | 3 | 282 | 17 | 296 | 6 | 2B0 | 20 | 2C4 | 9 |
| 269 | 4 | 283 | 18 | 297 | 7 | 2B1 | 21 | 2C5 | 10 |
| 270 | 5 | 284 | 19 | 298 | 8 | 2B2 | 22 | 2C6 | 11 |
| 271 | 6 | 285 | 20 | 299 | 9 | 2B3 | 23 | 2C7 | 12 |
| 272 | 7 | 286 | 21 | 2A0 | 10 | 2B4 | 24 | 2C8 | 13 |
| 273 | 8 | 287 | 22 | 2A1 | 11 | 2B5 | 25 | Le-7 | 14 |
| 274 | 9 | 288 | 23 | 2A2 | 12 | 2B6 | 1 | Le-8 | 15 |
| 275 | 10 | 289 | 24 | 2A3 | 13 | 2B7 | 2 | Le-9 | 16 |
| 276 | 11 | 290 | 25 | 2A4 | 14 | 2B8 | 3 | Le-10 | 17 |
| 277 | 12 | 291 | 1 | 2A5 | 15 | 2B9 | 4 | Le-11 | 18 |
| 278 | 13 | 292 | 2 | 2A6 | 16 | 2C0 | 5 | Le-12 | 19 |
| 279 | 14 | 293 | 3 | 2A8 | 17 | 2C1 | 6 |  |  |