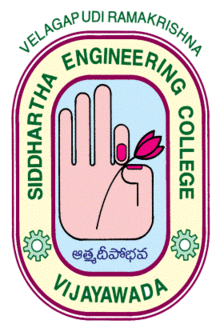
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**20IT5301: COMPUTER NETWORKS HOME ASSIGNMENT-1 QUESTIONS**

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| S.No | Question | CO | BTL |
| 1. | (a) Imagine that you have trained your St. Bernard, Bernie, to carry a box of three 8-mm tapes instead of a flask of brandy. (When your disk fills up, you consider that an emergency.) These tapes each contain 7 gigabytes. The dog can travel to your side, wherever you may be, at 18 km/hour. For what range of distances does Bernie have a higher data rate than a transmission line whose data rate (excluding overhead) is 150 Mbps? How does your answer change if (i) Bernie’s speed is doubled; (ii) each tape capacity is doubled; (iii) the data rate of the transmission line is doubled.  (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 |
| 2. | (a) An alternative to a LAN is simply a big timesharing system with terminals for all users. Give two advantages of a client-server system using a LAN.  (b) Describe Second generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 3. | (a) The performance of a client-server system is strongly influenced by two major network characteristics: the and width of the network (that is, how many bits/sec it can transport) and the latency (that is, how many seconds it takes for the first bit to get from the client to the server). Give an example of a network that exhibits high bandwidth but also high latency. Then give an example of one that has both low bandwidth and low latency.  (b) Describe Third generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 4. | (a) Besides bandwidth and latency, what other parameter is needed to give a good characterization of the quality of service offered by a network used for (i) digitized voice traffic? (ii) video traffic? (iii) financial transaction traffic?  (b) Describe Fourth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 5. | (a) A factor in the delay of a store-and-forward packet-switching system is how long it takes to store and forward a packet through a switch. If switching time is 10 μsec, is this likely to be a major factor in the response of a client-server system where the client is in New York and the server is in California? Assume the propagation speed in copper and fiber to be 2/3 the speed of light in vacuum.  (b) Describe fifth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 6. | **(a)** A client-server system uses a satellite network, with the satellite at a height of 40,000 km. What is the best-case delay in response to a request?  **(b)** Differentiate between the following with the help of diagrams   1. Hubs and switches 2. Transparent and spanning tree bridge 3. Gateway and Router | CO1 | Understand |
| 7. | (a) In the future, when everyone has a home terminal connected to a computer network, instant public referendums on important pending legislation will become possible. Ultimately, existing legislatures could be eliminated, to let the will of the people be expressed directly. The positive aspects of such a direct democracy are fairly obvious; discuss some of the negative aspects.  (b) Explain TCP/IP reference model with functions of each layer. | CO3 | Understand |
| 8. | (a) Five routers are to be connected in a point-to-point subnet. Between each pair of routers, the designers may put a high-speed line, a medium-speed line, a low-speed line, or no line. If it takes 100 ms of computer time to generate and inspect each topology, how long will it take to inspect all of them?  (b) “Computer networks are useful for real time applications”, Justify | CO1 | Understand |
| 9. | (a) A disadvantage of a broadcast subnet is the capacity wasted when multiple hosts attempt to access the channel at the same time. As a simplistic example, suppose that time is divided into discrete slots, with each of the *n* hosts attempting to use the channel with probability *p* during each slot. What fraction of the slots will be wasted due to collisions?  (b) Describe in brief the design issues for the layers | CO1 | Understand |
| 10. | (a) What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols?  (b) Explain in detail about OSI Reference Model with neat sketch | CO1 | Understand |
| 11. | (a)The president of the Specialty Paint Corp. gets the idea to work with a local beer brewer to produce an invisible beer can (as an anti-litter measure). The president tells her legal department to look into it, and they in turn ask engineering for help. As a result, the chief engineer calls his counterpart at the brewery to discuss the technical aspects of the project. The engineers then report back to their respective legal departments, which then confer by telephone to arrange the legal aspects. Finally, the two corporate presidents discuss the financial side of the deal. What principle of a multilayer protocol in the sense of the OSI model does this communication mechanism violate?  (b) Differentiate a circuit-switched network with a packet-switched network with an example | CO1 | Understand |
| 12. | (a) 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.  (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 |
| 13. | (a) What does ‘‘negotiation’’ mean when discussing network protocols? Give an example.  (b) . Explain Circuit Switching Networks in detail. | CO1 | Understand |
| 14. | (a) In Fig. below, a service is shown. Are any other services implicit in this figure? If so, where? If not, why not?    (b) Explain Packet Switching Networks in detail. | CO1 | Understand |
| 15. | (a) In some networks, the data link layer handles transmission errors by requesting that damaged frames be retransmitted. If the probability of a frame’s being damaged is *p*,what is the mean number of transmissions required to send a frame? Assume that acknowledgements are never lost.  (b) List and explain different types of networks based upon scale | CO1 | Understand |
| 16. | (a)A system has an *n*-layer protocol hierarchy. Applications generate messages of length *M* bytes. At each of the layers, an *h*-byte header is added. What fraction of the network bandwidth is filled with headers?  (b) List and explain different types of networks based upon transmission technology with example for each | CO1 | Understand |
| 17. | (a) What is the main difference between TCP and UDP?  (b) Define Topology. Explain various topologies with advantages and disadvantages | CO1 | Understand |
| 18. | (a) The subnet of Fig. below was designed to withstand a nuclear war. How many bombs would it take to partition the nodes into two disconnected sets? Assume that any bomb wipes out a node and all of the links connected to it.    (b)Describe the critiques of the OSI reference model and its protocols | CO1 | Understand |
| 19. | (a)The Internet is roughly doubling in size every 18 months. Although no one really knows for sure, one estimate put the number of hosts on it at 600 million in 2009. Use these data to compute the expected number of Internet hosts in the year 2018. Do you believe this? Explain why or why not.  (b) Describe the critiques of the TCP/IP reference model and its protocols | CO1 | Understand |
| 20. | (a)When a file is transferred between two computers, two acknowledgement strategies are possible. In the first one, the file is chopped up into packets, which are individually acknowledged by the receiver, but the file transfer as a whole is not acknowledged. In the second one, the packets are not acknowledged individually, but the entire file is acknowledged when it arrives. Discuss these two approaches.  (b) . Explain the architecture of the internet with a neat sketch | CO1 | Understand |
| 21. | (a) Mobile phone network operators need to know where their subscribers’ mobile phones (hence their users) are located. Explain why this is bad for users. Now give reasons why this is good for users.  (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 |
| 22. | (a) How long was a bit in the original 802.3 standard in meters? Use a transmission speed of 10 Mbps and assume the propagation speed in coax is 2/3 the speed of light in vacuum.  (b) Describe Second generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 23. | (a) An image is 1600 × 1200 pixels with 3 bytes/pixel. Assume the image is uncompressed. How long does it take to transmit it over a 56-kbps modem channel? Over a 1-Mbps cable modem? Over a 10-Mbps Ethernet? Over 100-Mbps Ethernet? Over gigabit Ethernet?  (b) Describe Third generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 24. | (a) Ethernet and wireless networks have some similarities and some differences. One property of Ethernet is that only one frame at a time can be transmitted on an Ethernet. Does 802.11 share this property with Ethernet? Discuss your answer.  (b) Describe Fourth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 25. | (a) List two advantages and two disadvantages of having international standards for network protocols.  (b) Describe fifth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 26. | (a) When a system has a permanent part and a removable part (such as a CD-ROM drive and the CD-ROM), it is important that the system be standardized, so that different companies can make both the permanent and removable parts and everything still works together. Give three examples outside the computer industry where such international standards exist. Now give three areas outside the computer industry where they do not exist.  (b) Differentiate between the following with the help of diagrams  a. Hubs and switches  b. Transparent and spanning tree bridge  c. Gateway and Router | CO1 | Understand |
| 27. | (a) Suppose the algorithms used to implement the operations at layer *k* is changed. How does this impact operations at layers *k* − 1 and *k* + 1?  (b) Explain TCP/IP reference model with functions of each layer. | CO1 | Understand |
| 28. | (a) Suppose there is a change in the service (set of operations) provided by layer k. How does this impact services at layers k-1 and k+1?  (b) “Computer networks are useful for real time applications”, Justify | CO1 | Understand |
| 29. | (a) Provide a list of reasons for why the response time of a client may be larger than the best-case delay.  (b) Describe in brief the design issues for the layers | CO1 | Understand |
| 30. | (a) What are the disadvantages of using small, fixed-length cells in ATM?  (b) Explain in detail about OSI Reference Model with neat sketch | CO1 | Understand |
| 31. | (a) Make a list of activities that you do every day in which computer networks are used. How would your life be altered if these networks were suddenly switched off?  (b) Differentiate a circuit-switched network with a packet-switched network with an example | CO3 | Understand |
| 32. | (a) Find out what networks are used at your school or place of work. Describe the network types, topologies, and switching methods used there.  (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 |
| 33. | (a) The *ping* program allows you to send a test packet to a given location and see how long it takes to get there and back. Try using *ping* to see how long it takes to get from your location to several known locations. From these data, plot the one-way transit time over the Internet as a function of distance. It is best to use universities since the location of their servers is known very accurately. For example, *berkeley.edu* is in Berkeley, California; *mit.edu* is in Cambridge, Massachusetts; *vu.nl* is in Amsterdam; The Netherlands; *www.usyd.edu.au* is in Sydney, Australia; and *www.uct.ac.za* is in Cape Town, South Africa.  (b) Explain Circuit Switching Networks in detail. | CO1 | Understand |
| 34. | (a) Go to IETF’s Web site, *www.ietf.org*, to see what they are doing. Pick a project you like and write a half-page report on the problem and the proposed solution.  (b) Explain Packet Switching Networks in detail | CO1 | Understand |
| 35. | (a) The Internet is made up of a large number of networks. Their arrangement determines the topology of the Internet. A considerable amount of information about the Internet topology is available on line. Use a search engine to find out more about the Internet topology and write a short report summarizing your findings.  (b) List and explain different types of networks based upon scale | CO1 | Understand |
| 36. | (a)Search the Internet to find out some of the important peering points used for routing packets in the Internet at present.  (b) . List and explain different types of networks based upon transmission technology with example for each. | CO1 | Understand |
| 37. | (a) Write a program that implements message flow from the top layer to the bottom layer of the 7-layer protocol model. Your program should include a separate protocol function for each layer. Protocol headers are sequence up to 64 characters. Each protocol function has two parameters: a message passed from the higher layer protocol (a char buffer) and the size of the message. This function attaches its header in front of the message, prints the new message on the standard output, and then invokes the protocol function of the lower-layer protocol. Program input is an application message (a sequence of 80 characters or less).  (b) Define Topology. Explain various topologies with advantages and disadvantages | CO1 | Understand |
| 38. | (a) When transmitting, but each user transmits only 20 percent of the time. (See the Suppose users share a 2 Mbps link. Also suppose each user transmits continuously at 1 Mbps discussion of statistical multiplexing.  a. When circuit switching is used, how many users can be supported?  b. For the remainder of this problem, suppose packet switching is used.  Why will there be essentially no queuing delay before the link if two  or fewer users transmit at the same time? Why will there be a  queuing delay if three users transmit at the same time?  c. Find the probability that a given user is transmitting.  d. Suppose now there are three users. Find the probability that at any  given time, all three users are transmitting simultaneously.  Find the fraction of time during which the queue grows  (b)Describe the critiques of the OSI reference model and its protocols. | CO1 | Understand |
| 39. | (a) Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are R1 and R2, respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length L? (Ignore queuing, propagation delay, and processing delay.)  (b) Describe the critiques of the TCP/IP reference model and its protocols | CO1 | Understand |
| 40. | a) Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 500 kbps, R2 = 2 Mbps, and R3 = 1 Mbps.  a. Assuming no other traffic in the network, what is the throughput for the file transfer?(CO1)  b. Suppose the file is 4 million bytes. Dividing the file size by the  throughput, roughly how long will it take to transfer the file to Host B?  c. Repeat (a) and (b), but now with R2 reduced to 100 kbps.  (b) . Explain the architecture of the internet with a neat sketch | CO1 | Understand |
| 41. | (a)The president of the Specialty Paint Corp. gets the idea to work with a local beer brewer to produce an invisible beer can (as an anti-litter measure). The president tells her legal department to look into it, and they in turn ask engineering for help. As a result, the chief engineer calls his counterpart at the brewery to discuss the technical aspects of the project. The engineers then report back to their respective legal departments, which then confer by telephone to arrange the legal aspects. Finally, the two corporate presidents discuss the financial side of the deal. What principle of a multilayer protocol in the sense of the OSI model does this communication mechanism violate?  (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 |
| 42. | (a) In this problem we consider sending voice from Host A to Host B over a packet-switched network (e.g., Internet phone). Host A converts on-the-fly analog voice to a digital 64 kbps bit stream. Host A then groups the bits into 48-byte packets. There is one link between host A and B; its transmission rate is 1Mbps and its propagation delay is 2 msec. As soon as Host A gathers a packet, it sends it to Host B. As soon as Host B receives an entire packet, it converts the packet's bits to an analog signal. How much time elapses from when a bit is created (from the original analog signal at A) until a bit is decoded (as part of the analog signal at B).  (b) Describe Second generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 43. | (a)Suppose users share a 1 Mbps link. Also suppose each user requires 100 Kbps when transmitting, but each user only transmits 10% of the time. (See the discussion on "Packet Switching versus CircuitSwitching”)  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 40 users. Find the probability that at any given  time, *n* users are transmitting simultaneously.  d) Find the probability that there are 10 or more users transmitting simultaneously.  (b) Describe Third generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 44. | (a) Consider the queueing delay in a router buffer (preceding an outbound link). Suppose all packets are *L* bits, the transmission rate are *R* bps and that *N* packets arrive to the buffer every *L/RN* seconds. Find the average queueing delay of a packet.  (b) Describe Fourth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples. | CO1 | Understand |
| 45. | (a) Consider the queueing delay in a router buffer. Let I denote traffic intensity, that is, I = La/R. Suppose that the queueing delay takes the form LR/(1-I) for I < 1. (a) Provide a formula for the "total delay," that is, the queueing delay plus the transmission delay. (b) Plot the transmission delay as a function of L/R.  (b) Describe fifth generation mobile phone networks with technology used in detail along with advantages, disadvantages and examples | CO1 | Understand |
| 46. | (a) Consider an application that transmits data at a steady rate (e.g., the sender generates one packet of *N* bits 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.  a) Would a packet-switched network or a circuit-switched network be more appropriate for this application? Why?  b) Suppose that a packet-switched 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 or why not?  (b) Differentiate between the following with the help of diagrams   1. Hubs and switches 2. Transparent and spanning tree bridge 3. Gateway and Router | CO1 | Understand |
| 47. | (a) Write a one-paragraph description for each of three major projects currently under way at the W3C  (b) Explain TCP/IP reference model with functions of each layer | CO1 | Understand |
| 48. | (a) What is Internet phone? Describe some of the existing products for Internet phone. Find some of the Web sites of companies that are in the Internet phone business.  (b) “Computer networks are useful for real time applications”, Justify | 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 | 1,48 | 280 | 15,34 | 294 | 5,44 | 2A9 | 19,30 | 2C3 | 9,40 |
| 267 | 2,47 | 281 | 16,33 | 295 | 6,43 | 2B0 | 20,29 | 2C4 | 10,39 |
| 268 | 3,46 | 282 | 17,32 | 296 | 7,42 | 2B1 | 21,28 | 2C5 | 11,38 |
| 269 | 4,45 | 283 | 18,31 | 297 | 8,41 | 2B2 | 22,27 | 2C6 | 12,37 |
| 270 | 5,44 | 284 | 19,30 | 298 | 9,40 | 2B3 | 23,26 | 2C7 | 13,36 |
| 271 | 6,43 | 285 | 20,29 | 299 | 10,39 | 2B4 | 24,25 | 2C8 | 14,35 |
| 272 | 7,42 | 286 | 21,28 | 2A0 | 11,38 | 2B5 | 1,48 | Le-7 | 15,34 |
| 273 | 8,41 | 287 | 22,27 | 2A1 | 12,37 | 2B6 | 2,47 | Le-8 | 16,33 |
| 274 | 9,40 | 288 | 23,26 | 2A2 | 13,36 | 2B7 | 3,46 | Le-9 | 17,32 |
| 275 | 10,39 | 289 | 24,25 | 2A3 | 14,35 | 2B8 | 4,45 | Le-10 | 18,31 |
| 276 | 11,38 | 290 | 1,48 | 2A4 | 15,34 | 2B9 | 5,44 | Le-11 | 19,30 |
| 277 | 12,37 | 291 | 2,47 | 2A5 | 16,33 | 2C0 | 6,43 | Le-12 | 20,29 |
| 278 | 13,36 | 292 | 3,46 | 2A6 | 17,32 | 2C1 | 7,42 |  |  |
| 279 | 14,35 | 293 | 4,45 | 2A8 | 18,31 | 2C2 | 8,41 |  |  |