***5th Sem. B.Tech & B.Tech Dual Deg. CN IT-3001 (CSE, IT, CSSE***

**kiitlogo**

**AUTUMN END SEMESTER EXAMINATION-2018**

5th Semester B.Tech & B.Tech Dual Degree

**COMPUTER NETWORKS**

**IT-3001**

[For 2017 (L.E), 2016 & Previous Admitted Batches]

**Time: 3 Hours Full Marks: 60**

***Answer any six questions including question No.1 which is compulsory.***

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable and*

*all parts of a question should be answered at one place only.*

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| --- | --- | --- | --- | --- | --- |
| **CN SAMPLE ANSWER(S) & EVALUATION SCHEME** | | | | | |
| **Q1** | **Answer the following questions:** | | **[2 x 10]** | | |
|  | **a)** | For a P2P file-sharing application, do you agree with the statement, "There is no notation of client and server sides of a communication session"? Why or why not? | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | What are the source and destination IP addresses m a datagram that carries the ICMP message? | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **c)** | **What is the use of subnet mask in IP addressing?** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **d)** | Mention the destination IP address used i n a packet for limited broadcast. Specify an application layer protocol that uses this limited broadcast address for its functionality . | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **e)** | system has 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? | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **f)** | **If an IP packet has arrived with the first 8 bits as 0100 0010 then whether the receiver will accept or reject this packet. Justify?** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **g)** | **In TCP, if the value of HLEN is 1010, how many bytes TCP header contains and how many bytes arc in Options field?** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **h)** | **ln TCP, how many sequence numbers are consumed by SYN+ACK segment? Justify.** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **i)** | **Explain a way to do reassembly of IP fragments at the destination .** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **j)** | **One way of detecting errors is to transmit data as a block of n rows of k bits per row and adding parity bits to each row and each column. Will this scheme detect all single errors? Double errors? Triple errors?** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  |  |  | | |  |
| **Q2** | **a)** | **Sketch the packet flow of TCP connection initiation and connection tem1ination using a timing diagran1.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | **A link has a transmission speed of 106 bits/sec. It uses data packets of size I000 bytes each. Assume that the acknowledgment has negligible transmission delay, and that its propagation delay is the same as the data propagation delay. Also assume that the processing delays at nodes are negligible. The efficiency of the stop­ and-wait protocol in this setup is exactly 25%. Calculate the propagation delay in milliseconds.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:**  12  **Explanation:**  In stop and wait, protocol next packet is sent only when acknowledgement of previous packet is received. This causes poor link utilization.  Tansmission speed = 106  Time to send a packet = (1000 \* 8) bits / 106  = 8 miliseconds    Since link utilization or efficiency is 25%, total time taken for 1 packet is 8 \* 100/25 = 32 miliseconds.  Total time is twice the one way propagation delay plus transmission delay. Propagation delay has to be considered for packet and ack both. Transmission delay is considered only for packet as the question says that trans. time for ack is negligible.  Let propagation delay be x.  2x + 8 = 32.  x = 12. | | |  |
|  |  |  | | |  |
| **Q3** | **a)** | **Describe the need of NAT and explain how it works with an example.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | **Describe the functionalities of DNS. If all DNS servers are crashed (taken offline), will the user be able to access the Internet? Briefly, explain the same.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
| **Q4** | **a)** | **What is the limitation of Go-Back-N ARQ? How this l imitation is taken care by Selective-Repeat ARQ?** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | **Explain the working principle of CSMA/CD . Justify, why there is no need for CSMA/CD on a full-duplex Ethernet LAN.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  |  |  | | |  |
| **Q5** | **a)** | **What is the formula to calculate the number of redundancy bits required to correct a bit error in a given number of data bits? Explain an error correction technique on the following data: Data send 1001101 and data received 1000101.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | **Consider the network in the above figure. Distance vector routing is used, and the following vectors have ju st come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, I 2, 6, 0, 9, I 0); and from E: (7, 6, 3, 9, 0, 4). The measured delays to B, D and E are 6, 3 and 5 respectivel y. What is C's new routing table and mention the outgoing line.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  |  |  | | |  |
| **Q6** | **a)** | **A router has the following (CIDR) entries in i ts routing table:**  **Address/mask Next hop**  **135.46.56.0/22 Interface 0**  **135.46.60.0/22 Interface 1**  **192.53.40.0/23 Router l**  **Default Router 2**  **For each of the following IP addresses, what does the router do if a packet with that address arrives?**   1. **192.53.56.7** 2. **(ii) 192.53.40.7** 3. **135.46.63.10** 4. **135.46.57.14** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | **Explain two reasons for using layered architecture n computer network communication . List two ways m which the OSI reference model and the TCP/IP reference model are the same. Also list two ways in which they**  **differ.** | | | **[4]** |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  |  |  | | |  |
| **Q7** | **a)** | **Consider sending a 3000 byte datagram into a link that has an MTU of 500 bytes. Suppose the original datagram is stamped with identification number 422. How many fragments are generated? What are their characteristics?** | | | **[4]** |
|  |  | **Evaluation Scheme:**   * Correct answer with proper explanation : 4 Marks * Some valid explanation with wrong answer: 1-3 marks   **Answer:**  The maximum size of data field in each fragment = 480 (20 bytes IP header).  Thus the number of required fragments is7  (3000-20)/480 = 7  Each fragment will have Identification number 422. Each fragment except the last one will be of size 500 bytes (including IP header). The last datagram will be of size 120 bytes (including IP header). The offsets of the 7 fragments will be 0, 60, 120, 180, 240, 300, 360. Each of the first 6 fragments will have flag=1; the last fragment will have flag=0. | | |  |
|  | **b)** | **Contrast and compare distance vector routing with link state routing.** | | | **[4]** |
|  |  | **Evaluation Scheme:**   * Correct comparison with explanation : 4 Marks * Parial correct : 1-3 marks   **Answer:**  **Comparison Chart**  **Distance Vector Routing Vs Link State Routing**   |  |  |  |  | | --- | --- | --- | --- | | **SL. NO.** | **BASIS FOR COMPARISON** | **DISTANCE VECTOR ROUTING** | **LINK STATE ROUTING** | | **1** | Algorithm | Bellman ford | Dijsktra | | **2** | Network view | Topology information from the neighbour point of view | Complete information on the network topology | | **3** | Best path calculation | Based on the least number of hops | Based on the cost | | **4** | Updates | Full routing table  On broadcast | Link state updates  On multicast | | **5** | Updates frequency | Periodic updates | Triggered updates | | **6** | CPU and memory | Low utilisation | Intensive | | **7** | Simplicity | High simplicity | Requires a trained network administrator | | **8** | Convergence time | Moderate | Fast | | **9** | Hierarchical structure | No | Yes | | **10** | Intermediate Nodes | No | Yes |   **Key Differences Between Distance Vector Routing and Link State Routing**   1. Bellman-Ford algorithm is used for performing distance vector routing whereas Dijsktra is used for performing the link state routing. 2. In distance vector routing the routers receive the topological information from the neighbour point of view. On the contrary, in link state routing the router receive complete information on the network topology. 3. Distance vector routing calculates the best route based on the distance (fewest number of hops). As against, Link state routing calculates best route on the basis of least cost. 4. Link state routing updates only the link state while Distance vector routing updates full routing table. 5. The frequency of update in both routing technique is different distance vector update periodically whereas link state update frequency employs triggered updates. 6. The utilization of CPU and memory in distance vector routing is lower than the link state routing. 7. The distance vector routing is simple to implement and manage. In contrast, the link state routing is complex and requires trained network administrator. 8. The convergence time in distance vector routing is slow, and it usually suffers from count to infinity problem. Conversely, the convergence time in link state routing is fast, and it is more reliable. 9. Distance vector doesn’t have hierarchical structure while in link state routing the nodes can have a hierarchical structure. | | |  |
| **Q8** |  | **Write short notes (any two)** | | **[4 X 2]** | |
|  | **a)** | **ICMP** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **b)** | **Congestion control in TCP** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |
|  | **c)** | **Checksum technique** | | |  |
|  |  | **Evaluation Scheme:**  **Answer:** | | |  |