JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2023

B.Tech-VI Semester (CS&IT)

COURSE CODE (CREDITS): 18B11CI611 (3) MAX. MARKS: 35

COURSE NAME: COMPUTER NETWORKS

COURSE INSTRUCTORS: Amit, Arvind, Vipul, Pankaj MAX. TIME: 2 Hours

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q. No. 1 (a) A router receives an IPv4 packet with source IP address 130.45.3.3 and destination IP address 201.23.4.6. The router cannot find the destination IP address in its routing table. Which message should be sent, explain with example? **[2, 3] [CO-6,2]**

(b) Consider a source computer (S) transmitting a file of size 10^6 bits to a destination computer (D) over a network of two routers (R 1 and R 2) and three links (L 1, L 2, and L 3). L 1 connects S to R 1; L 2 connects R 1 to R 2; and L 3 connects R 2 to D. Let each link be of length 100 km. Assume signals travel over each link at a speed of 10^8 meters per second. Assume that the link bandwidth on each link is 1Mbps. Let the file be broken down into 1000 packets each of size 1000 bits. Find the total sum of transmission and propagation delays in transmitting the file from S to D?

Q. No. 2 (a)Solve the following: **[2, 3]**

(i) A client uses UDP to send data to a server. The data are 16 bytes. Calculate the efficiency of this transmission at the UDP level (ratio of useful bytes to total bytes). **[CO-4,5]**

(ii) Calculating the efficiency of transmission at the data link layer. Assume no options for the IP header and use Ethernet at the data link layer.

(b) In an IPv4 datagram, the *M* bit is 0, the value of HLEN is 5, the value of total length is 200, and the offset value is 200. What is the number of the first byte and number of the last byte in this datagram? Is this the last fragment, the first fragment, or a middle fragment?

Q. No. 3 (a) Specify issues like "count to infinity" and "two-node instability" and how these can be tackled. **[2,3] [CO-4]**

(b) Contrast and compare Distance Vector Routing with Link State Routing with a suitable illustration.

Q. No. 4 (a) Compare the TCP header and the UDP header with suitable illustrations. List the fields in the TCP header that are missing from UDP header. Give the reason for their absence. **[3, 2] [CO-5]**

(b) Show the entries for the header of a UDP user datagram that carries a message from a TFTP client to a TFTP server. Fill the checksum field with 0's. Choose an appropriate ephemeral port number and the correct well-known port number. The length of data is 40 bytes.

Q. No. 5 (a) An organization is granted the block 123.34.0.0/16. The administrator wants to create 1024 subnets. **[5] [CO-4]**

a. Find the subnet mask.
b. Find the number of addresses in each subnet.
c. Find the first and last addresses in subnet 1.
d. Find the first and last addresses in subnet 1024.

Q. No. 6 (a) A TCP connection is using a window size of 10,000 bytes, and the previous acknowledgment number was 22,001. It receives a segment with acknowledgment number 24,001 and window size advertisement of 12,000. Draw a diagram to show the situation of the window before and after. **[2,3] [CO-5]**

(b) A window holds bytes 2001 to 5000. The next byte to be sent is 3001. Draw a figure to show the situation of the window after the following two events.

(i) An ACK segment with the acknowledgment number 2500 and window size advertisement 4000 is received.
(ii) A segment carrying 1000 bytes is sent.

Q. No. 7 (a) In electronic mail, what is MIME? Why do we need POP3 or IMAP4 for electronic mail? **[2, 2, 1] [CO-7]**

(b) Describe the functions of the two FTP connections. What are the three FTP transmission modes?

(b) In symmetric-key and asymmetric-key cryptography, if every person in a group of 10 people needs to communicate, with every other person in the group, how many secret keys are needed?