15. (a) Explain in detail how electronic mail application is carried out in a network. Also explain the protocols used in this application. (13)

Or

(b) Briefly explain the Domain Name Service protocol with an example. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A student attaches a laptop to campus network and requests/receives a web page from www.google.com. Explain the sequence of operations carried out with the help of different protocols used in application, transport, network and link layers. (15)

Or

(b) (i) How error correction is handled at different layers in an IP network? (9)

(ii) If IP provides connectionless service. How TCP supports connection-oriented service? (6)

27/11/18

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20371

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth/Fifth/Sixth/Seventh/Eighth Semester

Computer Science and Engineering

CS 6551 – COMPUTER NETWORKS

(Common to Electronics and Communication Engineering, Mechatronics Engineering, Information Technology, Biomedical Engineering)

(Regulations 2013)

(Also Common to PTCS 6551 – Computer Networks for B.E. (Part-Time) Third Semester – Computer Science and Engineering – Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Which layer implements the node to node channel connection in OSI layered architecture?

2. Suppose the following sequence of bits arrives over a link:

   110101111101011111100101111110110. Show the resulting frame after any stuffed bits have been removed. Indicate any errors that might have been introduced into the frame.

3. Suppose you are designing a sliding window protocol for a 1.5 Mbps point-to-point link, which has one way latency of 1.5 seconds. Assuming each frame carries 10 KB of data, what is the minimum number of bits required for the sequence number if SWS = RWS?

4. What details are provided by DHCP other than IP address?

5. List the two factors that affect the performance of a network switch.

6. Check whether the following IPv6 address notations are correct?

   (a) ::0F53:6382:AB00:67DB:BB27:7332

   (b) 7803:42F2:::88EC:D4BA:B75D:11CD

7. Suppose TCP operates over 10-Gbps link. Assuming TCP could utilize the full bandwidth continuously, how long would it take the sequence numbers to wrap around completely? Is the sequence number space adequate?

8. Define QoS.

9. Consider an HTTP client that wants to retrieve a Web document at a given URL. The IP address of the HTTP server is initially unknown. What transport and application-layer protocols are needed in this scenario?

10. What is the use of SNMP protocol in a network?

PART B — (5 × 13 = 65 marks)

11. (a) (i) List the requirements in building a computer network. (5)

(ii) Suppose a 128-kbps point-to-point link is set up between the Earth and a rover on Mars. The distance from the Earth to Mars (when they are closest together) is approximately 55 Giga meters, and data travels over the link at the speed of light at 3×10^8 m/s.

(1) Calculate the minimum RTT for the link.

(2) Calculate the delay-bandwidth product for the link.

(3) A camera on the rover takes pictures of its surroundings and sends these to Earth. How quickly after a picture is taken can it reach Mission Control on Earth? Assume that each image is 5 Mb in size. (8)

Or

(b) (i) Suppose we want to transmit the message, 1011 0010 0111 and protect it from errors using the CRC polynomial $x^4 + x^2 + 1$. Use polynomial long division to determine the message that should be transmitted. Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred? (5)

(ii) Explain the algorithm used for reliable transmission and flow control. (8)

12. (a) (i) Explain the media access control algorithm, CSMA/CD used in Ethernet. Why the same algorithm cannot be used in wireless LAN? (8)

(ii) Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation. (5)

Or

(b) (i) Explain the error reporting using ICMP protocol. How does Traceroute program makes use of ICMP to determine the name and addresses of the routers between source and destination? (7)

(ii) Suppose all of the interfaces in each of three subnets are required to have the prefix 223.1.17/24. Also suppose that Subnet 1 is required to support at least 60 interfaces, Subnet 2 is to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses that satisfy these constraints. (6)

13. (a) (i) Explain the link-state algorithm in detail. (5)

(ii) Consider the network shown in Fig 1. Compute the shortest path from C to all other nodes using link-state algorithm. Also update the forwarding table of node C. (8)

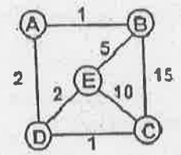

Fig. 1

Or

(b) (i) Briefly explain the Border Gateway Protocol used for Inter domain routing in internetwork. (8)

(ii) Explain multicast routing protocol DVMRP. (5)

14. (a) (i) Explain three ways of connection termination in TCP using state transition diagram. (8)

(ii) Suppose you are hired to design a reliable byte-stream protocol that uses a sliding window (like TCP). This protocol will run over a 50-Mbps network. The RTT of the network is 80 ms, and the maximum segment lifetime is 60 seconds. How many bits would you include in the AdvertisedWindow and SequenceNum fields of your protocol header? (5)

Or

(b) (i) Explain the original, Karn/Patridge and Jacobson/Karel's algorithms of adaptive retransmission in TCP. (8)

(ii) Consider a RED gateway with MaxP = 0.02, and with an average queue length halfway between the two thresholds. Find the drop probability P_{count} for count = 1 and count = 50. Also calculate the probability that none of the first 75 packets is dropped. (5)