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**Question Paper Code : X10366**

**B.E./B.Tech. DEGREE EXAMINATIONS NOVEMBER / DECEMBER 2020**

**Fifth Semester**

Electronics and Communication Engineering

**EC8551 – Communication Networks**

(Common to: Electronics and Telecommunication Engineering)

(Regulations 2017)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

**PART- A (10 x 2 = 20 Marks)**

1. Define transmission impairment. What are some of the main reasons of transmission impairment?
2. Is it possible to have two hosts in different networks to have same link layer address? Explain.
3. Data Link Control (DLC) and Media Access Control (MAC) are part of which layer in OSI model? What is their role?
4. What is the major drawback of IPv4 in terms of security? How it is rectified?
5. Name and compare three different types of Autonomous Systems (ASs).
6. Explain briefly the difference between multicasting and multiple unicasting.
7. Explain briefly how the connectionless and connection-oriented services in transport-layer protocol are different from these services in Network-layer protocol.
8. UDP is a message-oriented protocol while TCP is a byte-oriented protocol. If an application needs to protect the boundaries of its message, which protocol should be used, UDP or TCP?
9. A source socket address is a combination of an IP address and a port number. Explain what each section identifies.
10. In a non-persistent HTTP connection, how can HTTP inform the TCP protocol that the end of the message has been reached?

**PART- B (5 x 13 = 65 Marks)**

11. a) (i) For the following parameters find theoretical capacity of the channel: (6)
- I. Bandwidth: 10 KHz and  $SNR_{dB}=20$
  - II. Bandwidth: 150KHz and  $SNR_{dB}=8$
  - III. Bandwidth: 2 MHz and  $SNR_{dB}=10$
- (ii) What is Scrambling and why it is used? (4)
- (iii) Is the size of the ARP packet fixed? Explain. (3)

**(OR)**

- b) (i) Answer the following questions: (7)
- I. What is the polynomial representation of 110111?
  - II. What is the result of shifting 111000 three bits to the left?
  - III. Repeat part (ii) using polynomials.
  - IV. What is the result of shifting 110011 four bits to the right?
  - V. Repeat part (iv) using polynomials.
- (ii) What is line coding? Why it is used? Give 3 examples of line coding schemes. (6)

12. a) (i) Compare the medium of a wired LAN with that of a wireless LAN in today's communication environment. Explain why the MAC protocol is more important in wireless LANs than in wired LANs? (7)
- (ii) Explain briefly why collision is an issue in random access protocols but not in controlled access protocols or channelization protocols. (6)

**(OR)**

- b) (i) Briefly discuss some of the collision avoidance strategies in CSMA/CA. What is the purpose of NAV in CSMA/CA? (7)
- (ii) Explain how hidden and exposed station problems are addressed in wireless LANs? (6)

13. a) (i) Differentiate between Link-state and Distance-vector routing? (7)
- (ii) Explain IPv6 datagram format with suitable diagram. (6)

**(OR)**

- b) (i) Explain the steps used By DVMRP router to create a source-based tree. (7)
- (ii) Differentiate between compatible and mapped addresses. Briefly discuss their applications. (6)

14. a) (i) Explain the services offered by TCP to process at the application layer. (6)
- (ii) Describe the token bucket mechanism for congestion control. With which other technique is token bucket usually combined to achieve complete flow control? What problems in the simpler approach are addressed by using a token bucket mechanism? (7)

(OR)

b) (i) Sketch the TCP segment format and discuss it in detail. (6)

(ii) I. Consider a reliable data transfer protocol that uses only negative acknowledgements. Suppose the sender sends data only infrequently. Would a NAK-only protocol be preferable to a protocol that uses ACKs? Why? (4)

II. Now suppose the sender has a lot of data to send and the end-to-end connection experiences few losses. In this second case, would a NAK-only protocol be preferable to a protocol that uses ACKs? Why? (3)

15. a) (i) FTP uses the services of TCP for exchanging control information and data transfer. Could FTP have used the services of UDP for either of these two connections? Explain. (4)

(ii) Differentiate between a substitution cipher and a transposition cipher. (4)

(iii) What are the advantages and disadvantages of a decentralized P2P network? (5)

(OR)

b) (i) What do you think would happen if the control connection were served before the end of an FTP session? Would it affect the data connection? (4)

(ii) Differentiate between message authentication and entity authentication. (4)

(iii) Differentiate between centralized and decentralized P2P networks. (5)

**PART- C (1 x 15 = 15 Marks)**

16. a) Suppose 6 host machines and 1 router are connected by a company network consisting of 3 subnets. The configuration is given in the following table:

Subnets	Host IP-Addresses	Router IP-Addresses
66.25.48.0/22	66.25.48.1	66.25.48.44
66.25.52.0/23	66.25.52.1	66.25.52.22
66.25.56.0/23	66.25.52.2	66.25.56.11
	66.25.53.1	
	66.25.56.1	
	66.25.56.3	

(i) Draw a diagram to represent this configuration.

(ii) Draw the forwarding table for the host machine with IP address 66.25.52.2.

(iii) Suppose an additional host machine is connected to the company network. For each of the following IP addresses, either give the subnet to which this IP address belongs, or state that it is not a valid IP address for any of the subnets.

(a) 66.25.50.1

(b) 66.25.58.1

(OR)

- b) Consider two hosts, A and B, connected by single link of rate  $R$  bps. Suppose that the two hosts are separated by  $m$  meters, and suppose the propagation speed along the link is  $s$  meters/sec. Host A is to send a packet of size  $L$  bits to Host B.
- (i) Express the propagation delay,  $d_{\text{prop}}$ , in terms of  $m$  and  $s$ .
  - (ii) Determine the transmission time of the packet,  $d_{\text{trans}}$ , in terms of  $L$  and  $R$ .
  - (iii) Ignoring processing and queueing delays, obtain an expression for the end-to-end-delay.
  - (iv) Suppose Host A begins to transmit the packet at time  $t = 0$ . At time  $t = d_{\text{trans}}$ , where is the last bit of the packet?
  - (v) Suppose  $d_{\text{prop}}$  is greater than  $d_{\text{trans}}$ . At time  $t = d_{\text{trans}}$ , where is the first bit of the packet?
  - (vi) Suppose  $d_{\text{prop}}$  is less than  $d_{\text{trans}}$ . At time  $t = d_{\text{trans}}$ , where is the first bit of the packet?
  - (vii) Suppose  $s = 2.5 \times 10^8$ ,  $L = 100$  bits, and  $R = 28$  kbps. Find distance  $m$  so that  $d_{\text{prop}}$  equals  $d_{\text{trans}}$ .