B.E PRINTING ENGG EXAMINATION

4TH YEAR, 2ND SEMESTER EXAM, 2018

DATA COMMUNICATION & NETWORKING

Time : 3 hours

Full marks: 100

Answer 1 question from each group

Group- I (CO1)

1. a) What do you mean by computer networks? Discuss the various components of a network in brief. Mention 3 metrics by which the reliability of a network is measured.

b) Discuss the various types of data flow in a computer network.

c) Define the following terms:

Transmission time, Propagation time, Bandwidth, Response time, Throughput, .

d) Discuss the various causes of transmission impairment.

[(1+5+3)+3+5+3=20]

Or,

2. a) Define decibel. The loss in a cable is usually defined in decibel/km (dB/km). If the signal at the beginning of a cable with -0.3dB/km has a power of 2milliwatts, what is the power of the signal at 5km apart?

b) What do you mean by SNR? What are the values of SNR for a noiseless and an extremely noisy channel?

c) How can you measure the bit rate of a noisy channel? Find the bit rate of a channel with 1 Mbps bandwidth and SNR=63.

d) Discuss the functionalities of the 7 layers of the OSI model in brief.

[(1+4)+(1+3)+(1+3)+7=20]

Group- II (CO2)

3. a) What do you mean by line coding? Draw the signal pattern for the bit stream 00110101 using NRZ (unipolar), NRZ-L, RZ, Manchester and AMI encoding scheme.

b) Name and discuss the various metrics by which the performance of a network is measured.

[(3x5)+5=20]

Or,

4. a) Draw the waveform for the bit stream 10110010 using NRZ-I, RZ, Differential Manchester and Pseudo-ternary encoding scheme.

b) What do you mean by network topology? How many types of network topologies are there? Distinguish between mesh and ring topologies in terms of robustness, security, reconfiguration complexity and expenses.

[(3x4)+(1+3+4)=20]

Group-III (CO3)

5. a) Briefly discuss the pattern of a data link layer frame. Explain when byte stuffing is necessary to be performed. How it differs from bit stuffing?

b) Suppose the sender has to send a set of data (7,11,12,0,6,0) to the receiver.

Calculate the checksum (using one's complement and wrapped sum method) that needs to be transmitted along with these data for error detection purpose. Hence show how the receiver verifies whether the received data is correct or corrupted.

c) Design a sender site protocol for Stop-and-Wait protocol for a noiseless channel.

[(4+3+2)+(3+3)+5=20]

Or,

6. a) Suppose in the data link layer, a dataword to be transmitted by the sender is 1011. The divisor which is agreed upon both by the sender and the receiver is 1001. Calculate the codeword which has to be actually sent to the receiver using Cyclic Redundancy Check (CRC) encoding scheme. Now show how the receiver verifies whether the received codeword is valid or corrupted.

b) What is the main drawback of GO Back N ARQ protocol? How it is eliminated in Selective Repeat ARQ?

c) What are the window sizes of the sender and receiver for Stop and Wait ARQ, GO Back N ARQ and Selective Repeat ARQ?

[(4+4)+(3+3)+(2+2+2)=20]

Group -IV (CO4)

7.a) Discuss the working principle of ALOHA with the help of a flowchart. Explain the significance of choosing a random number and wait for the back-off time after a collision is occurred.

b) Calculate graphically the vulnerable time of pure ALOHA. Hence show how slotted ALOHA provides an improvement over it.

c) Why ALOHA falls under the random access category of MAC protocols? What is the main drawback of ALOHA?

[(6+2)+(4+3)+(2+3)=20]

Or,

8. a) Explain the working principle of CSMA/CD with the help of a flowchart. What is the added advantage of CSMA/CD over CSMA?

b) Explain how CSMA provides an improvement over ALOHA. What are the various persistence procedures of CSMA? Distinguish between 1-persistent and non-persistent procedures of ALOHA.

c) Write a short note on *Polling*.

[(6+2)+(3+3+2)+4=20]

Group-V (CO5)

9. a) Suppose in a block of IP addresses, we know the IP address of one host is 129.37.14.52/18. Calculate the network address and the last address that can be assigned to a machine on the network. Find the maximum number of hosts that can be connected to the network? Also find the range of assignable IP addresses.

b) The IP address of a host and the subnet mask for the network are given as 17.60.52.2 and 255.255.224.0 respectively. Calculate the subnet address to which the host is connected on and also the range of assignable IP addresses on the above subnet.

c) What do you mean by address depletion problem? What do you mean by netid and hostid?

[(2+2+2+3)+(2+3)+(3+3)=20]

Or,

10.a) Consider the following network. Calculate the shortest path trees for the nodes C and D using Dijkstra's algorithm. Hence form the routing tables for the two nodes.
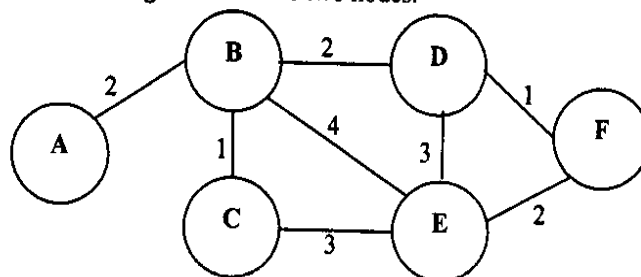
b) Now calculate the routing table for the node B using distance vector routing algorithm. Why does the distance vector routing protocol falls under the category of intra-domain routing protocol? What are the occasions when a node shares its routing table with the other nodes in the network?

c) What do you mean by two_node_loop_instability problem? Explain it with the help of suitable diagrams.

[(4+4)+(4+2+2)+4=20]

Course Outcomes:

CO1: **Discuss** the fundamentals of computer network.

CO2: **Describe** and **illustrate** the various network topologies and the functionalities of the physical layer.

CO3: **Explain** and **analyse** the data link layer protocols.

CO4: **Discuss** and **describe** the media access control protocols.

CO5: **Demonstrate** and **analyse** different routing protocols and network protocols.