

Fifth Semester B. E. (Computer Science and Engineering) Examination

COMPUTER NETWORKS

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions are compulsory.
- (2) All questions carry marks as indicated.
- (3) Internal choices are given for some questions.
- (4) Explain your answer with neat sketches, wherever applicable.

1. Solve any Two :

- (a) How long was a bit in the original 802.3 standard in meters ? Use a transmission speed of 10 Mbps and assume the propagation speed in coax is $\frac{2}{3}$ the speed of light in vacuum. 5(CO1)
- (b) A system has an 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 ? 5(CO1)
- (c) Classify the network based on network topology. Also list the advantages and disadvantages of each type. 5(CO1)

2. (a) How much bandwidth is there in 0.1 microns of spectrum at a wavelength of 1 micron ? 3(CO2)

OR

Calculate the end-to-end transit time for a packet for both GEO (altitude: 35,800 km), MEO (altitude: 18,000 km) and LEO (altitude: 750 km) satellites. 3(CO2)

- (B) Explain the working of Fiber optics. Explain different modes of fiber optics. Also explain the architecture of fiber optics. 7(CO2)

3. Solve any **Two** :

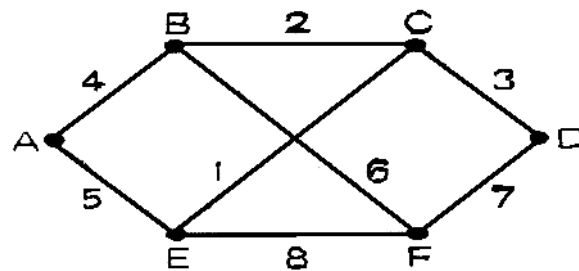
- (a) A 1024-bit message is sent that contains 992 data bits and 32 CRC bits. CRC is computed using the IEEE 802 standardized 32-degree CRC polynomial. For each of the following, explain whether the errors during message transmission will be detected by the receiver with justification:
- (a) There were two isolated bit errors.
 - (b) There were 18 isolated bit errors.
 - (c) There were 47 isolated bit errors.
 - (d) There was a 24-bit long burst error.
 - (e) There was a 35-bit long burst error. 5(CO3)
- (b) Station A uses 32 byte packets to transmit messages to Station B using a sliding window protocol. The round trip delay between A and B is 80 milliseconds and the bottleneck bandwidth on the path between A and B is 128 kbps. What is the optimal window size that A should use ? 5(CO3)
- (c) Explain HDLC frame format. Also explain different types of frames in HDLC. 5(CO4)

4. Solve any **Two** :

- (a) Differentiate between pure and slotted ALOHA with an example and discuss their throughputs. 5(CO4)
- (b) Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are prime numbers suddenly become ready at once, how many bit slots are needed to resolve the contention ? 5(CO4)
- (c) Consider five wireless stations, A, B, C, D, and E. Station A can communicate with all other stations. B can communicate with A, C and E. C can communicate with A, B and D. D. can communicate with A, C and E. E can communicate with A, D and B.
- (a) When A is sending to B, what other communications are possible?
 - (b) When B is sending to A, what other communication are possible?
 - (c) When B is sending to C, what other communications are possible? 5(CO3)

5. Solve any **Two** :

- (a) List the disadvantages of Distance vector routing algorithm. Describe the steps in link state routing algorithm. 5(CO4)
- (b) Consider the network given in figure. Distance vector routing is used, and the following vectors have just come in to router C: from B:(5,0,8,12,6,2); from D:(16, 12, 6, 0,9,10); and from E:(7,6,3,9,0,4). The cost of the links from C to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table ? Give both the outgoing line to use and the cost.



5(CO3)

- (c) If input to the bucket is 25 MB/sec for 40 msec.
- What is an output rate of leaky bucket for 500 msec ?
 - What is an output from token bucket with capacities of 250 KB, 500 KB 750 KB ?
 - What is an output from 500 KB token bucket feeding a 10MB/sec leaky Bucket ? 5(CO3)

6. Solve any **Two** :

- (a) Let the size of congestion window of a TCP connection be 32 kb when a timeout occurs. The round trip time of the connection is 100 msec and maximum segment size used is 2kb. Calculate the time taken (in msec) by the TCP connection to get back to 32 kb congestion window. 5(CO4)
- (b) What are the types of Connection release ? Explain Two Army problem with an example. How this problem can be solved ? 5(CO4)
- (c) How the crash recovery is handled by transport layer ? What are the difficulties in crash recovery process ? How those difficulties can be handled? 5(CO3)