

16/12/19 (m)

123

[This question paper contains 7 printed pages]

**Your Roll No.** : .....  
**Sl. No. of Q. Paper** : **7405** **J**  
**Unique Paper Code** : 32341303  
**Name of the Course** : **B.Sc.(Hons.) Computer Science**  
**Name of the Paper** : **Computer Networks**  
**Semester** : **III**  
**Time : 3 Hours** **Maximum Marks : 75**

**Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) **Section-A** is compulsory and carries **35** marks.
- (c) Attempt any **four** questions from **Section-B**.

**Section-A**

1. (a) A bit stream of **10111011** is to be transmitted using the standard CRC method having  $x^3+1$  as the generator polynomial. Show the actual bits transmitted. Suppose the 4<sup>th</sup> bit from the left gets inverted due to an error, check whether the error can be caught.

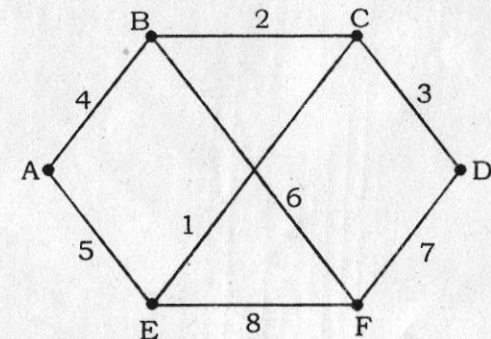
4

P.T.O.

- (b) Ethernet requires that valid frames must be at least 64 bytes long. Give reasons for choosing the minimum frame size as 64 bytes. 2
- (c) Convert the IP address whose hexadecimal representation is **C22F1582** to dotted decimal representation. 1
- (d) Explain briefly the following fields of the IP header : 4
- Internet Header Length (IHL)
  - Identification,
  - DF & MF, and
  - TTL
- (e) Briefly discuss the following CSMA protocols : 6
- 1-persistence
  - p-persistence and
  - non-persistence
- (f) Match the following to one or more layers of the TCP/IP model : 5
- Transmission of bit stream across physical medium
  - Defines frames

7. (a) Consider the following subnet where distance vector routing is used. The following information have just arrived at the router C : 4
- 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 measured delays to B, D, and E, are 6, 3, and 5 respectively. Give the new routing table for C specifying both the delay and the outgoing line to use.



- Compare ARP and RARP. 3
- What is MIME ? What problems does it solve ? 3



4. (a) Television channels are 6 MHz wide. How many bits/sec can be sent if four-level digital signals are used? Assume a noiseless channel. 3
- (b) Explain briefly the terms : FDM, WDM, and TDM. 3
- (c) What is the significance of the twisting in twisted-pair cable? 2
- (d) What is the purpose of cladding in an optical fiber? 2
5. (a) Explain the binary exponential back-off algorithm used in CSMA/CD protocols. 3
- (b) There are five classes in IPv4 addressing. Give the identifiers for each of the classes. 3
- (c) Explain the TCP header fields : URG, PSH, SYN, and FIN. 4
6. (a) What is HTTP? Explain briefly two of its message types. 4
- (b) What is an URL? Give an example to explain its parts. 3
- (c) Briefly explain any **three** ICMP message types. 3

- (iii) Reliable process-to-process message delivery
- (iv) Route Selection
- (v) Provides user services such as email and file transfer
- (g) What is the baud rate of classic 10-Mbps Ethernet? 2
- (h) Five channels, each with a 100-kHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link, if there is a need for a guard band of 10-kHz between the channels to prevent interference? 3
- (i) What does the following address mean and when are they used? 3
- (i) 0.0.0.0
- (ii) 127.xx.yy.zz
- (iii) 156.76.255.255

- (j) Explain simplex, half-duplex, and full-duplex modes of communication. 3
- (k) State the Nyquist sampling theorem for analog-to-digital conversion. 2

### Section-B

2. (a) 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? 3
- (b) Explain the concept of byte stuffing used for framing. 2
- (c) Define bandwidth of a signal. A periodic signal has a bandwidth of 20 Hz. The highest frequency is 60 Hz. What is the lowest frequency? 2

- (d) What is the Nyquist sampling rate for each of the following signals? 3
- (i) A low-pass signal with bandwidth of 200 KHz?
- (ii) A band-pass signal with bandwidth of 200 KHz if the lowest frequency is 100 KHz?
3. (a) Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital-to-analog modulation? 4
- (i) ASK                      (ii) FSK
- (iii) PSK                     (iv) QAM
- (b) Why has the PCM sampling time been set at 125  $\mu$ sec? 2
- (c) On which layer of the TCP/IP model does the following devices operate. Briefly state their functionality: 4
- (i) Repeater
- (ii) Router
- (iii) Bridges
- (iv) Switches