[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 4th 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

(i) Internet Header Length (IHL)

(ii) Identification,

(iii) DF & MF, and

(iv) TTL

(e) Briefly discuss the following CSMA protocols : 6

(i) 1-persistence

(ii) p-persistence and

(iii) non-persistence

(f) Match the following to one or more layers of the TCP/IP model : 5

(i) Transmission of bit stream across physical medium

(ii) Defines frames

(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 μ 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

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

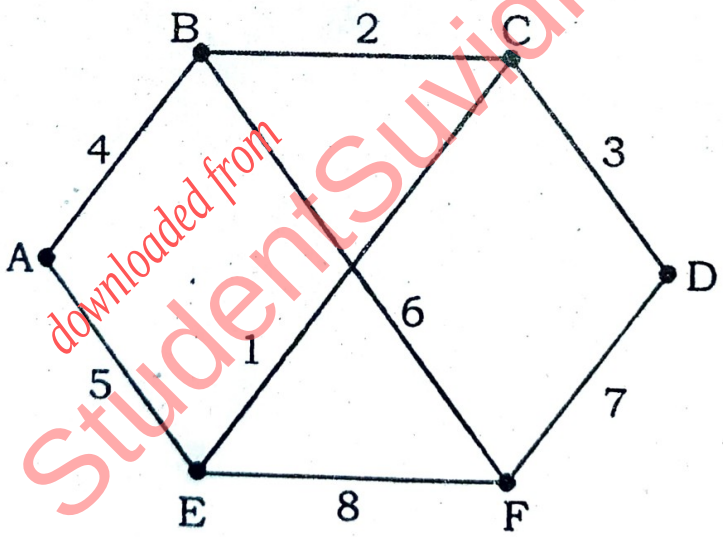
7. (a) Consider the following subnet where distance vector routing is used. The following information have just arrived at the router C : 4

(i) From B : (5,0,8,12,6,2)

(ii) From D : (16,12,6,0,9,10) and,

(iii) 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.



(b) Compare ARP and RARP. 3

(c) What is MIME ? What problems does it solve ? 3