ALCCS

FEBRUARY 2009

Code: CS32 **Subject: COMPUTER NETWORKS**
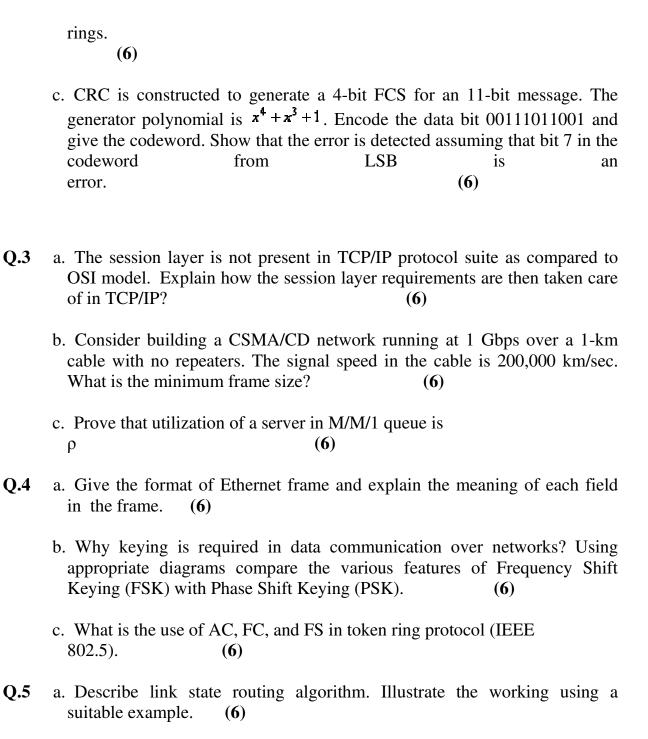**Time: 3 Hours** **Max. Marks: 100**

NOTE:
* **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
* **Parts of a question should be answered at the same place.**

Q.1 (7 x 4)

   a. What is the principal difference between synchronous and asynchronous communication?

   b. Differentiate between RZ and Biphase encoding schemes.

   c. Why should CSMA based protocol have minimum frame size? Give at least two reasons.

   d. Why should maximum windows size be $2^m - 1$ or less rather than 2^m in sliding-window protocol, where m is number of bits representing sequence no.? Explain.

   e. Write four advantages of hierarchical routing.

   f. Suppose an old SYN segment from station A arrives at station B, requesting for TCP connection. Explain how the three-way handshake procedure ensures that the connection is rejected.

   g. How does symmetric key cryptography differ from asymmetric key cryptography? Also write advantages of former over the latter.

Q.2 a. A radio system uses 9600 bps channel and 120 bit long frames. Compute maximum throughput of ALOHA protocol using this system if ALOHA gives an efficiency of 18%. **(6)**

   b. Derive the maximum throughput ρ_{max} for mutitoken, single token and single frame operation n Token passing

rings.
    (6)

c. CRC is constructed to generate a 4-bit FCS for an 11-bit message. The generator polynomial is $x^4 + x^3 + 1$. Encode the data bit 00111011001 and give the codeword. Show that the error is detected assuming that bit 7 in the codeword   from   LSB   is   an error.   **(6)**

Q.3 a. The session layer is not present in TCP/IP protocol suite as compared to OSI model. Explain how the session layer requirements are then taken care of in TCP/IP?   **(6)**

b. Consider building a CSMA/CD network running at 1 Gbps over a 1-km cable with no repeaters. The signal speed in the cable is 200,000 km/sec. What is the minimum frame size?   **(6)**

c. Prove that utilization of a server in M/M/1 queue is
ρ **(6)**

Q.4 a. Give the format of Ethernet frame and explain the meaning of each field in the frame.   **(6)**

b. Why keying is required in data communication over networks? Using appropriate diagrams compare the various features of Frequency Shift Keying (FSK) with Phase Shift Keying (PSK).   **(6)**

c. What is the use of AC, FC, and FS in token ring protocol (IEEE 802.5).   **(6)**

Q.5 a. Describe link state routing algorithm. Illustrate the working using a suitable example.   **(6)**

b. A gateway of infinite buffer capacity receives packets at a mean rate of 125 packets per second and takes 2 milliseconds to forward the packets. Compute the number of jobs in the system and number of jobs waiting in the   queue   for   the gateway.   **(6)**

c. Explain the various classes of IP addresses and also discuss advantages of dividing IP addresses into classes.

(6)

Q.6 a. Explain the following terms in the context of transport layer
(i) Forbidden region (ii) Three-way handshake **(6)**

b. What is the purpose of following fields in TCP segment header?
(i) Urgent pointer (ii) six 1-bit flags (iii) window size **(6)**

c. Describe RSA algorithm used for encryption. **(6)**

Q.7 a. For RSA algorithm p = 7 and q= 11, find the possible values of d. Also find value of e for two possible values of d.

(6)

b. Using Huffman coding generate codes for the following symbols given with their frequency of occurrence (Show the Huffman tree).
A (50%) C(30%) G (15%) T(5%) **(6)**

c. Write a short note on one of the following
(i) Poisson Process (ii) File transfer Protocol (iii) Electronic mail **(6)**