**Computer Networks (CST - 1003)**
**Computer Science and Technology Department**
**Full Marks: 100 Time: 3:00 Hours**

**Answer any five questions taking at least two from each half.**
**Each question carries equal marks.**

## First Half

1. Describe how the socket connection is set up for
   i) stream socket 7
   ii) UDP socket 7
   [You may use diagrams to explain].
   Write a short note on accept system call. 4
   "listen() is a blocking system call" - comment on the statement. 2

2. Why is 4B/5B encoding used? 2
   What is the maximum efficiency of 4B/5B encoding? 2
   Show clearly with the help of constellation diagram, how encoding is done in 16 QAM (3 amp, 12 phase). 7
   In 16 QAM (Quadrature Amplitude Modulation), all the possibilities are not utilized for encoding - Explain why? 3
   State the sending and receiving algorithm for bit stuffing in HDLC (High -level Data Link Control) framing mechanism. 6

3. Show how using CRC (mention the assumptions also)
   i) all single bit errors can be detected 3
   ii) isolated two single bit errors can be detected 3
   Using the hamming code for the data 1010101, find the data bits those are transmitted. 4
   If there is a transmission error, the $7^{th}$ bit of the transmitted bit stream is inverted, and then show how you can retrieve the position of the bit in error from the received data stream. 5
   State in brief the steps followed in call setup in GSM protocol. 5

4. Explain why four address fields are used in wireless LAN 802.11 protocol. 3
   Give a brief overview of how they are used in different contexts? 4
   Describe a situation where the split horizon cannot solve the problem of "count to infinity" and propose a solution for the same. 5
   State the roles of 1) TTL 2) header length 3) options 4) flags in IP datagram format. 8

## Second half

5. State the difference between ARP and RARP protocol? 2
   Give an example where RARP is used. 2
   Describe clearly how a mobile host, when it has moved to a foreign network, can receive the packet from an external client. 8
   What is triangle routing problem? 4
   Consider the situation where a mobile host moves from one foreign network F1 to foreign network F2 and to another F3 and describe how such a situation is handled in Mobile IP. 4

6. Suppose an ISP is entitled to assign IP addresses from 194.24.0.0 to 194.24.255.255. A client asks for 5000 addresses. Considering this to be the first assignment from the ISP address block, calculate the base address and the mask for this client. 4
   Write brief notes on 1) EBGP and IBGP 2) multihomed AS and stub AS 3) BGP speaker 4) internal peer and external peer 5) Local traffic and transit traffic. 5x2=10
   Describe the path selection algorithm in BGP. 6

7. Describe the Kerberos protocol (trusted third party authentication protocol and point out clearly at which steps the server is authenticated to the client and the client is authenticated to the server. 5
   Describe the problem of public key distribution and propose a solution for the same. 6
   "Filter-based firewall is not suitable for ftp"- comment. 5
   Write the significance of resource record type 1) CNAME and 2) MX 4

8. Describe the concept of a) static dictionary and b) adaptive dictionary in the light of dictionary based compression. Discuss about the advantages and disadvantages in both the cases. 6
   How can you control the compression ratio in JPEG? 3
   In MPEG what are the sizes of the macro blocks for Y component, U component and V component? 3
   Why the sizes are different? 2
   Describe how the scenarios are treated in MPEG at the receiving end when 1) an I frame is lost 2) a P frame is lost 3) a B frame is lost. 6