

Indian Institute of Technology Kharagpur  
School of Information Technology  
IT 60037 : Introduction to Internet

Mid-Semester Examination

Marks: 50

Time: 2 hrs

---

1. The following code vectors (1001011, 0101101 and 0011110) are generated from a (7,3) parity check code. Find the rule for generating each of the parity checks. What is the minimum distance of this code? What is the error detection and correction capability of this code? (8 Marks)
2. If each packet carries 1000 bits of data, how long does it take to send 1 million bits of data using (i) stop and wait ARQ, (ii) go-back-n ARQ and (iii) selective repeat ARQ. Assume that all three ARQs are using 3 bits for representing sequence numbers. The distance between sender and receiver is 5000 Km and the propagation speed is  $2 \times 10^8$  m? Ignore transmission, waiting and processing delays. Assume no data or control frame is lost or damaged. (8 Marks)
3. Consider building a CSMA/CD network running at 1 Gbps over 1 km cable with no repeaters. The signal speed in the cable is 2,00,000 km/sec. What is the minimum frame size required? (3 Marks)
4. Briefly discuss the following:  
    (i) Binary exponential backoff algorithm  
    (ii) Ethernet frame format (6 Marks)
5. Consider the subnet shown in Fig. 1. 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 measured delays 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 expected delay. (5 Marks)
6. For the following IP addresses (i) determine the class of each IP address, (ii) indicate the network and host ids for each IP address. (1) 198.45.72.231, (2) 227.83.56.42, (3) 184.66.92.133 and (4) 111.211.224.23. (4 Marks)
7. A large number of consecutive IP addresses are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4000, 2000, 4000, and 8000 addresses, respectively, and in that order. For each of these, give the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation. (6 Marks)
8. Mention different header fields in IPv4. Assume a 1024 byte data packet (packet id: 10) has to pass through two networks whose MTUs are 600 and 400 bytes respectively, to reach destination. Specify the IP fields related to fragmentation in the case of transparent and non-transparent fragmentations (i) at the source, (ii) while passing through the network whose MTU is 600 (iii) while passing through the network whose MTU is 400 and (iv) at the destination. How the destination IP combine these fragments and regenerate the original packet? (10 Marks)