B. Tech.

(SEM. VI) EXAMINATION, 2006-07

COMPUTER NETWORKS

Time : 3 Hours] [Total Marks : 100

Note: Attempt all questions.

1 Attempt any four parts of the following: 4x5=20

(a) What is Signal to Noise Ratio required to achieve Channel capacity of 20 Mbps with 3MHz Bandwidth?

(b) Differentiate the following s:
   (1) Base band and Broadband
   (2) Synchronous and asynchronous transmission.

(c) Compare and Contrast the twisted pair and Coaxial cable and optical fibre transmission medium.

(d) With the help of neat diagram explain the working principal and merits and demerits of the following topologies
   (1) Token Bus
   (2) Star Topology
(e) A frame is consisting two characters each of two bits long is transmitted over the communication channel having the bit error rate of $1(T^3)$. Give the probability at receiver containing at least one error.

(f) A digital signal system is required to operate at 9600 bps, if the signal element encodes a 4 bit word, what is the minimum required bandwidth of the channel?

2 Attempt any four of the followings: $4\times 5=20$

(a) Measurement of slotted ALOHA channel with an infinite number of users show that 10 percent of the slots are idle
   (a) What is the channel load?
   (b) What is the throughput?

(b) For each of the statement given below state whether it is true or false. If there is any ambiguity in the question then you may justify your answer in one or two sentences otherwise just give TRUE or FALSE:
   (a) Aloha performance is not dependent on a.
   (b) Random access protocols can be made stable using back-off parameters.
   (c) Selective Reject protocol will have, on an average, lesser retransmissions than GO Back N protocol when there are frame errors.
(d) If the probability of a bit received with an error on a link is $b$ and $L$ is the packet length in bits, then the probability that the packet is received without error is $(1-(1-b)^L)$.

(e) Ethernet can provide deterministic delay guarantee to its packets.

(c) 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 2,00,000 km/s. What is the minimum frame size?

(d) A system has to be transmit a message 1110111101 over a communication link using the polynomial generator shown in Fig. 1. Determine the message that should be transmitted.

\[ \begin{array}{cccccc}
    c_4 & \rightarrow & (X) & \rightarrow & c_3 & \leftarrow & c_2 & \rightarrow & (X) & \rightarrow & d & \rightarrow & 4 & \rightarrow & (X) & \rightarrow & d & \rightarrow & 4 & \rightarrow & (X) & \rightarrow & d & \rightarrow & 4 & \rightarrow & c_0 & \rightarrow & \{XJ\} & \rightarrow \\
\end{array} \]

\[ \text{Input data} \]

**Fig. 1**
(e) A radio station is using 14.44 Kbps channel for message transmission and the sending message packets are 100 bits long. Calculate the maximum throughput for the channel using slotted aloha.

(f) Explain with the help of neat diagram the basic and extended frame format associated with HDLC protocol. Also mention the control fields and sub fields of each case.

Attempt any two of the following s : 2x10=20

(a) A network consisting of five routers is shown below. The cost of the link connecting the routers is mentioned along with the link. If the network is running using link state routing protocol, give the updates node. A will produce and propel and to whom?

![Network Diagram](V-1078]

Fig.-2
(b) Consider a router in an IP network with the following table:

<table>
<thead>
<tr>
<th>Subnet Numbers</th>
<th>Subnet Mask</th>
<th>Next HOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>203.187.152.0</td>
<td>255.255.248.0</td>
<td>Interface 0</td>
</tr>
<tr>
<td>203.187.128.0</td>
<td>255.255.252.0</td>
<td>R2</td>
</tr>
<tr>
<td>203.96.0.0</td>
<td>255.255.192.0</td>
<td>R3</td>
</tr>
<tr>
<td>203.187.130.0</td>
<td>255.255.254.0</td>
<td>R5</td>
</tr>
<tr>
<td>Default</td>
<td></td>
<td>R4</td>
</tr>
</tbody>
</table>

Table 1

Find the next hops for the following addresses:

1. 203.187.131.25
2. 203.96.130.186
3. 203.187.155.138
4. 203.96.16.234
5. 203.187.129.146

(e) Answer the following related to Internet protocol

1. Explain the Header and Routing table explosion limitation associated with IPv4
2. What are the extension headers available in IPv6?
(3) Describe with example the use of following IPv6 Address schemes
(a) IPv4 Mapped and IPv4 Compatible addressing
(b) Link local and Site local addressing.

Attempt any TWO of the followings: \(2 \times 10 = 20\)
(a) Describe the Nagle's algorithm and Karl - Partridge algorithm and mention their merits and demerits.
(b) Assume for the TCP adaptive retransmission machenism the \(\text{EstimateRTT} = 4.0\) at some point and subsequent \(\text{measuredRTT}\) all are 1.0. How long does it take before the time out value as calculated by the Jacobson/Karels algorithms fall below 4.0? Assume initial value of deviation \(20, 5=1/8, a=1, p=4\).
(c) What are the services provided by the transport layer? Explain with the help of neat diagram the three way handshake process for the connection establishment done by TCP prior to send the data over the transmission channel.
Attempt any two of the following: 2x10=20

(a) What is socket? Explain with the help of diagram using one application the client server communication using TCP socket.

(b) Answer the following related to DNS:
(1) Suppose a host cse.iit.ac.in wants IP address of www.microsoft.com How does the DNS perform this operation?
(2) Give an example of Domain name hierarchy.
(3) Explain with example the DNS iterative and recursive query.
(4) Draw the message format of DNS protocol and explain its fields.

(c) What is firewall? What are the different type of firewall? How does it works? Mention the limitations of firewalls.