

## **ASSIGNMENT - 01**

### **COMPUTER NETWORKING (CSE-3034)**

- (1) List two ways in which the OSI reference model and the TCP/IP reference model are the same and also list two ways in which they differ.
- (2) What is the main difference between TCP and UDP?
- (3) What is the principal difference between connectionless communication and connection oriented communication?
- (4) Identify the five components of a data communications system.
- (5) What is the total delay (latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of  $2\ \mu\text{s}$  and a processing time of  $1\ \mu\text{s}$ . The length of the link is 2000 Km. The speed of light inside the link is  $2 \times 10^8\ \text{m/s}$ . The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible?
- (6) What is the essential difference between message switching and packet switching?
- (7) Why does ATM use small, fixed-length cells?
- (8) With suitable example briefly explain the function of service primitives for execution of protocols in a protocol suite.
- (9) List out different types of twisted pair cables used in computer network briefing their features.
- (10) Justify, why the refractive index of cladding is less than that of core in an optical fiber cable used for transmission of signal. Also state the difference between multimode and single mode fiber.
- (11) How much bandwidth is there in 0.1 micron of spectrum at a wavelength of 1 micron?
- (12) Justify, why there is an asymmetric allocation of spectrum for upstream and downstream channel supported by an ADSL modem.
- (13) What is the difference between FDM and TDM?
- (14) What signal to noise ratio is needed to put a T1 carrier on a 50-KHz line?
- (15) Why has the PCM sampling time been set at  $125\ \mu\text{sec}$ ?
- (16) 16 bits messages are transmitted using a Hamming code. How many check bits are needed to ensure that the receiver can detect and correct single bit errors? Show the bit pattern transmitted for the message 1101001100110101. Assume that even parity is used in the Hamming code.
- (17) The following data fragment occurs in the middle of a data stream for which the byte stuffing algorithm described in the text is used: A B ESC C ESC FLAG FLAG D. What is the output after stuffing?
- (18) If a T1 carrier system slips and loses track of where it is, it tries to resynchronize using the 1st bit in each frame. How many frames will have to be inspected on average to resynchronize with a probability of 0.001 of being wrong?
- (19) Three packet-switching networks each contain  $n$  nodes. The first network has a star topology with a central switch, the second is a (bidirectional) ring, and the third is fully interconnected, with a wire from every node to every other node. What are the best-, average-, and-worst case transmission paths in hops?
- (20) Is the Nyquist theorem true for optical fiber or only for copper wire?
- (21) What are the services provided by data link layer? Explain any one methods of framing and flow control?
- (22) What are headers and trailers, how do they get added and removed? Explain with appropriate figure?
- (23) A sender uses the Stop-and-Wait protocol for reliable transmission of frames. Frames are of size 1000 bytes and the transmission rate at the sender is 80 Kbps (1Kbps = 1000 bits/second). Size of an acknowledgment is 100 bytes and the transmission rate at the receiver is 8 Kbps. The one-way propagation delay is 100 milliseconds. Assuming no frame is lost, the sender throughput is \_\_\_\_\_ bytes/second.
- (24) Consider a selective repeat sliding window protocol that uses a frame size of 1 KB to send data

on a 1.5 Mbps link with a one-way latency of 50 msec. To achieve a link utilization of 60%, the minimum number of bits required to represent the sequence number field is \_\_\_\_\_.

(25) Consider the store and forward packet switched network given below. Assume that the bandwidth of each link is 106 bytes/sec. A user on host A sends a file of size 103 bytes to host B through routers R1 and R2 in three different ways. In the first case a single packet containing the complete file is transmitted from A to B. In the second case, the file is split into 10 equal parts, and these packets are transmitted from A to B. In the third case, the file is split into 20 equal parts and these packets are sent from A to B. Each packet contains 100 bytes of header information along with the user data. Consider only transmission time and ignore processing, queuing and propagation delays. Also assume that there are no errors during transmission. Let  $T_1$ ,  $T_2$  and  $T_3$  be the times taken to transmit the file in the first, second and third case respectively. Which one of the following is CORRECT?