(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1078   Roll No. | 0 | 5 | 0 | 9 | 1 | 1 | 3 | 0 | 0 | 1 |

B. Tech.

(SEM. VI) EXAMINATION, 2007-08

COMPUTER NETWORKS

Time : 3 Hours]   *[Total Marks : 100*

Note : (1)   Attempt **all** questions.

(2)   All questions carry **equal** marks.

(3)   Be precise in your answer.

(4)   No second answer book will be provided.

1   Attempt any **four** parts :   5×4

(a)   Differentiate between bit-rate and baud-rate. A modem constellation diagram has data point at coordinates: (1,1), (1,-1), (-1,1) and (-1,-1). How many bps can a modem with these parameters achieve at 1200 baud?

(b)   A system is designed to sample analog signals, convert them to digital form with a 4-bit converter, and transmit them. What bit rate is required if the analog signal consists of frequencies between 400 Hz to 3400 Hz ?

(c) Compare and contrast circuit, message and packet switching techniques.

(d) What are the relative merits and demerits of a single-mode fiber in comparison to a multi-mode fiber? Describe the structure and composition difference between the two.

(e) In a certain communication channel, the signal power is 100 W and the noise power is 10 W. In order to send information at the rate of 10 kbps, what is required bandwidth?

(f) What is ISDN? Differentiate between-

    (i)   BRI & PRI

    (ii)   B-ISDN & N-ISDN

2   Attempt any **four** parts.   5×4

(a) A series of 8-bit message blocks (frames) is to be transmitted across a data link using a CRC for error detection. A generator polynomial of 11001 is to be used. Use an example to illustrate the following:

    (i)   The CRC generation process

    (ii)   The CRC checking process.

(b) (i) A bit string, 01111 011111 0111111 0, needs to be transmitted at the data link layer. What is the string actually transmitted after bit stuffing?

   (ii) Sketch the Manchester encoding for the bit stream: 0001110101.

(c) Discriminate between the send window and receive window for link and how are they related with

   (i) a selective repeat retransmission scheme

   (ii) a go-back-N control scheme.

(d) (i) Why is the channel throughput doubled in slotted ALOHA compared to pure ALOHA?

   (ii) A stop-and-wait protocol uses a 100 kbps satellite link which employs a round-trip propagation delay of 250 ms approximately. Find out the percentage of time the sender is blocked to wait for acknowledgement, if the frame size is 1000 bits.

(e) How do contention-free protocols differ from contention-oriented protocols? Discuss any one protocol of contention-free category.

(f)   How is bridge different from a repeater? What are the advantages and disadvantages of each? State with reason whether an LAN can be extended to any size by increasing the number of repeaters or not?

3   Attempt any two parts :   **10×2**

(a)   (i)   What is count-to-infinity problem? How is it addressed in link sate routing protocol? For following subnet, distance vector routing is used and the vectors that 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.
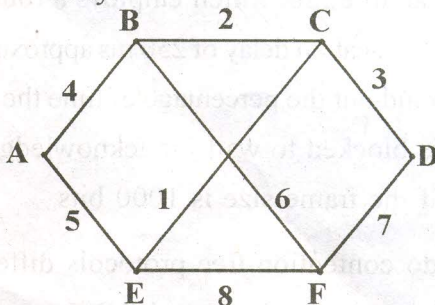

Fig.

(ii)   What is fragmentation? Why do we need it? Discuss pros and cons of transparent and non-transparent fragmentation.

(b)   (i)   Explain how do ARP and RARP map IP addresses onto data link layer such as Ethernet?

(ii)   Sketch the IP header neatly and explain the function of each field. List major differences between IPv4 and IPv6.

(c)   (i)   Explain token bucket algorithm. What problems of leaky bucket algorithm are addressed by it?

(ii)   With the aid of an example, explain why subnetting was introduced. Hence state the meaning of a subnet router and an address mask. What is the maximum number of hosts which a network on internet having a subnet mask of 255.255.240.0 can handle?

Attempt any **two** parts :   10×2

(a)   Draw the diagram of TCP header and explain the use of following :

(i)   Source and destination port addresses

(ii)   Sequence and acknowledgement numbers

(iii) Code bits

(iv) Window size

(v) Urgent pointer

Describe the role of checksum field and optional pad bytes.

(b) With the aid of a time sequence diagram, explain how a logical connection between two TCP entities is established using three-way handshake procedure. Include in your diagram the socket primitives at both the client and server side that trigger the sending of each segment. Also explain how the initial sequence number in each direction is seleted.

(c) (i) What is cryptography? Distinguish between symmetric and asymmetric key cryptography.

(ii) Discuss different steps of JPEG compression standard.

5 Attempt any **two** parts: 10×2

(a) Explain why a DNS is required with the Internet and describe its main functional parts. In relation to DNS, explain why a hierarchical naming structure is used instead of a flat structure?

(b) What is the function of SMTP?

Differentiate between a user agent (UA) and a
mail transfer agent? How does MIME enhance
SMTP?

(c) Show the working of RSA algorithm with
suitable example.

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