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

PAPER ID : 0386   Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2007-08
DATA COMMUNICATION NETWORKS

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

Note :   *(i)   Attempt all questions.*

   (ii)   All questions carry equal marks.

   (iii) Be precise in your answer.

   (iv)   No second answer book will be provided.

1   Attempt any **four** parts of the following :   5×4=20

   (a)   Discuss the major design issues for the layered
           architecture of data communication. How two
           layers exchange information ?

   (b)   How service primitives are classified ? Give the
           service primitives for a connection-oriented service
           and show relationship of services to protocols.

   (c)   Compare the similarities and differences between
           the OSI and TCP reference models and comment
           on their usefulness.

(d)   Give the mechanical, electrical and functional specifications of RS-232C interface.

(e)   Draw a fiber optic ring with active repeaters and give details of the interface. Also compare optical fiber cable versus coaxial cable.

(f)   Show the various interchange circuits associated with X.21 and outline their function. Describe the operation of the X.21 interface protocol with time sequence diagrams.

2   Attempt any **four** parts of the following :   5×4=20

(a)   What is flow control ? Explain the stop and wait flow control and show that the link utilization efficiency is given by $\dfrac{1}{1 + 2\,\dfrac{t_{prop}}{t_{frame}}}$.

(b)   Give the frame structure for HDLC. Explain the control field of HDLC protocol. Why this protocol is some times called super set of all link level protocols ?

(c) Explain the meaning of following terms relating to data link protocols :

    (i)   Character oriented

    (ii)   Bit oriented

    (iii) Framing and data transparency

    (iv) Poll select

    (v)   Primary and Secondary.

(d) Differentiate between pure and slotted ALOHA. Show frame transmission and vulnerable time for slotted ALOHA and prove that the maximum utilization of slotted ALOHA occurs at $G = 1$ with value 36.8%.

(e) Compare the IEEE 802 protocol layers with OSI reference model. How the IEEE 802.3 standard differs from Ethernet ? Draw the format of IEEE 802.3 CSMA/CD frame and give its address fields.

(f) Explain the operation of token ring network and give the IEEE 802.5 frame format. How priority mechanism is included in IEEE 802.5 standards ? Make comparison of IEEE 802.3, 802.4 and 802.5 standards.

3 Attempt any **two** parts of the following : 10×2=20

(a) What are the basic features of a routing algorithm ? Give the Bellman-Ford routing algorithm and illustrate by an example. What is count to infinity problem ? How the split horizon algorithm overcomes this problem ? When does this approach fail ?

(b) What is difference between open loop and closed loop congestion control ? How traffic policing differs from traffic shaping ? Draw and explain the flow chart of the leaky bucket algorithm used for policing the traffic. How leaky bucket is used as traffic shaper ?

(c) (i) Produce a sketch of an Internet to illustrate the role of a subnet router, interior gateway and exterior gateway.

(ii) In relation to Internet produced for part (i), identify the scope of the Address Resolution Protocol (ARP), Interior Gateway Protocol (IGP) and Exterior Gateway Protocol (EGP).

(iii) List the massage types associated with Internet Control Message Protocol (ICMP).

4 Attempt any **two** parts of the following :   10×2=20

(a) Show the fields that makeup the header of a TCP segment and explain the function of each. Why and how TCP pseudoheader is used ? In addition to having acknowledgement field in the TCP header, ACK bit is also provided. What would happen if the ACK bit were not provided ?

(b) Is a deadlock possible using only two-way handshake rather than a three-way handshake to setup connections ? Give an example or prove otherwise. Explain the connection establishment and connection termination using three-way handshaking. How half open connections are killed off ?

(c) What are the basic functions of ATM Adaptation Layer (AAL) ? Show that AAL sublayers and their purpose. What are the drawbacks of AAL3/4 ? How AAL5 overcomes them ? Explain the operation of AAL5 clearly showing the Convergence and SAR sublayer and the CPCS-PDU.

5   Attempt any **four** parts of the following :   5×4=20

(a)   Under what situations mapping of physical address to logical address is needed ? Name the various protocols for this purpose and show how DHCP (Dynamic Host Configuration Protocol) can provide static and dynamic address allocation that can be manual or automatic.)

(b)   What are the functions to be performed by a network management system ? Show the components of the SNMP management model and discuss the object groups of the Management Information Base version MIB2.

(c)   What is the need of Trivial File Transfer Protocol (TFTP) ? Give the different types of TFTP messages alongwith their formats.

In TFTP, indicate the next message sent by the client/server when

(i)   The Read Request from the client is lost in transit

(ii)   Data message containing less than 512 octets from the client is lost in transit and the server times out.

(iii) The acknowledgement from the server is lost and client timesout.

(d) What were the deficiencies of IP_{V4} ? Give the advantages of IP_{V6} over IP_{V4}. Make comparison between IP_{V4} and IP_{V6} packet headers and show how an IP_{V6} packet header can be converted to IP_{V4} packet header.

(e) Why do we need a DNS system when we can directly use an IP address ? What is DNS server ? Explain generic domains, country domains and inverse domains in the internet and give the structure of the DNS messages.

(f) What is World Wide Web (WWW) ? List the major components that constitute the Web. How is HTTP related to WWW ? Discuss the salient features of HTTP and show similarities between HTTP, FTP and SMTP.

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