

B.E. COMPUTER SCIENCE & ENGINEERING 3RD YEAR 2ND SEMESTER EXAM- 2018**COMPUTER NETWORKS**

Time: 3 hours

Full Marks: 100

Answer question 1 and any four questions
All questions carry equal marks

1. Answer any ten 10X2=20
- i. In Pure ALOHA, when a frame will reach its destination successfully?
 - ii. Why there is no need of CSMA/CD in today's Ethernet? Explain it.
 - iii. Explain why collision is an issue in a random access protocol, but not in controlled access or channelizing protocols?
 - iv. What is the difference between a unicast, multicast and broadcast address?
 - v. Explain hidden and exposed terminal problems.
 - vi. What is scatternet in Bluetooth?
 - vii. What is the purpose of NAV?
 - viii. What is the network address in a block of address?
 - ix. Explain why most of the addresses in class A are wasted and why a corporation does not want a class C addresses.
 - x. What are the two major functionalities of ICMP?
 - xi. What additional services are provided by SCTP?
 - xii. How does recursive resolution differ from iterative resolution?
 - xiii. Describe the functions of two FTP transmission connections.
 - xiv. In e-mail, what is MIME?.
 - xv. How are control and data characters distinguished in NVT?
2. a) Explain, why slotted ALOHA performs better than pure ALOHA with the help of throughput and maximum throughput calculations and schematic diagram. A network produces 200-bit frames on a shared channel of 200 kbps. Find the throughput if the system generates 500 frames/sec using i) Pure ALOHA ii) Slotted ALOHA. 6+4
- b) Why the vulnerable time in ALOHA depends on the average time required to send out a frame and CSMA depends on the maximum propagation time? Explain the behavior of three persistence methods when a station finds a channel busy (use timing diagram and flow diagram). 4+6
3. a) How CDMA differs from FDMA and TDMA? Explain how a receiver can get the data sent by a specific sender in CDMA. Find the chips for a network with 4-stations using Walsh table for $W_1 = [-1]$. 3+3+4
- b) What are the different fields of IEEE 802.3 MAC frame (give a schematic representation of the frame)? Explain their functionalities. Why Ethernet has imposed restrictions on both the minimum and maximum length of a frame? 6+4
4. a) Define subnetting and supernetting. How do the subnet mask and supernet mask differ from a default mask in classful addressing? How can NAT help in address depletion? Explain the address translation mechanism using NAT for outgoing packets and packets coming from the Internet? 2+2+2+4

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b) Assume that an ISP is granted a block of addresses starting from 190.100.0.0/16 for Jadavpur University. The ISP needs to distribute these addresses to four groups as follows:

- i. Faculty Council of Engineering and Technology has 128 units; each needs 256 addresses.
- ii. Faculty Council of Science has 64 units; each needs 128 addresses.
- iii. Faculty Council of Arts has 32 units; each needs 64 addresses.
- iv. Interdisciplinary Schools and Centers has 128 units; each needs 64 addresses.

Design the subblocks and find out how many addresses are still available. 10

5. a) Why physical to logical address mapping is required? Why RARP is obsolete? Explain how DHCP provides static and dynamic address allocation. 2+2+6
 b) Explain different error reporting messages of ICMP. Why IGMP message is encapsulated in an IP datagram? 8+2
6. a) Explain steps involved in Distance Vector Routing? Discuss the instability issue of distance vector routing. What strategies can be used to solve two-node loop instability problem? 4+3+3
 b) Compare the TCP header and UDP header (give schematic representations of the headers). Some fields are missing from UDP header, explain the reason for their absence. 6+4
7. a) Explain how TCP provides stream delivery service to the processes at the application layer. Why sliding window is used in TCP? Explain the main steps of error detection and correction in TCP. 5+2+3
 b) Describe the general architecture of e-mail system and main protocols used to implement it. 10