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PRESIDENCY UNIVERSITY BENGALURU

**SET-A**

SCHOOL OF ENGINEERING

**END TERM EXAMINATION – MAY/JUNE 2024**

**Semester :** Semester VI - 2021

**Course Code :** ECE3108

**Course Name :** Data Communication and Computer Networks

**Program :** B.Tech.

**Date :** June 14, 2024

**Time :**1:00 PM -4:00 PM

**Max Marks :** 100

**Weightage :** 50%

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

**PART A**

**ANSWER ANY FIVE QUESTIONS (5 Q X 4 M = 20 M)**

* 1. Physical layer in the OSI model interfaces communication channel to the network system. List the functions of physical layer.

(CO1) [Knowledge]

* 1. The logical address is also known as the IP address. Write a note on logical address.

(CO1) [Knowledge]

* 1. ALOHA, is the earliest random-access method, which was developed for a wireless LAN. What are the improvements of Slotted Aloha Protocol over Pure Aloha Protocol?

(CO2) [Knowledge]

* 1. Discuss the importance of IP address classification in classful addressing.

(CO3) [Knowledge]

* 1. List out the advantages of IPV6 Protocol over IPV4 Protocol.

(CO3) [Knowledge]

* 1. Transmission Control Protocol is one of the major communication protocols in Internet Protocol suite. Highlight the characteristics of TCP.

(CO3) [Knowledge]

* 1. Explain the inverted structure of DNS system.

(CO4) [Knowledge]

**PART B**

**ANSWER ANY FOUR QUESTIONS (4 Q X 10 M = 40 M)**

* 1. In large networks, there can be multiple paths from sender to receiver. The switching technique will decide the best route for data transmission. Switching technique is used to connect the systems for making one-to-one communication. Explain the two predominant switching approach in packet switching with necessary diagrams?

(CO1) [Comprehension]

* 1. Discuss Stop and Wait ARQ Protocol with the help of flow diagram assuming that one data is lost. Also bring out the limitations of the same. List the protocols which can improve the shortcomings of Stop and Wait ARQ Protocol.

(CO2) [Comprehension]

* 1. IPV4 is getting upgraded IPV6.What are the methods used for this upgradations. Explain them with suitable diagrams?

(CO3) [Comprehension]

* 1. Which protocol of Transport layer is responsible for reliable delivery of messages between two processes (ports) running between two devices connected by different nodes. Explain the segment header format of this protocol.

(CO3) [Comprehension]

* 1. A quick solution to the problem of shortage of IPV4 addresses is NAT. Define NAT and explain the primary application of NAT with the help of a neat diagram.

(CO3) [Comprehension]

* 1. What is the use of DNS? Explain in detail with necessary diagrams the working of two resolvers?

(CO4) [Comprehension]

**PART C**

**ANSWER ANY TWO QUESTIONS (2 Q X 20 M = 40 M)**

* 1. **A)** Assume we have four stations 1, 2, 3, and 4 connected to the same channel. The data from station 1 is bit 0, from station 2 is bit 0, from station 3 no transmission and from station 4 is bit 1. Explain the principle and procedure of CDMA with encoding and decoding, if Station 3 wants to listen to station 1. The codes assigned to station 1 is C1 [-1 -1 -1 -1], station 2 is C2 [-1 +1 +1 -1], station 3 is C3 [-1 -1 +1 +1] and station 4 is C4 [+1 -1 -1 +1]. Also mention the basic advantages of CDMA over its predecessors.

**B)** A pure aloha network transmits 200-bit frames on a shared channel of 200 kbps.

What is the total vulnerable time? What is the throughput if the system (all station together) produces? Calculate number of frames that are received correctly at the receiver for the following cases.

* + 1. 1000 frames per second
    2. 500 frames per second
    3. 250 frames per second

(CO2) [Application]

* 1. a) What are the restrictions basing the design of Classless IP addressing mechanism.

b) An ISP is granted a block of addresses starting with 100.200.0.0/16. The ISP needs to distribute these addresses to three groups as follows:

1. 64 customers, each needs 256 addresses
2. 32 customers with each needs 128 addresses
3. 16 customers with each need 64 addresses.
4. How many total number of addresses can be generated? Design the sub blocks of addresses for each group of customers and find out how many addresses are allotted to each group and how many addresses are still available after these allocations?
5. Find the class of each address.
   1. 01000001 00001011 00001011 11100000
   2. 147.25.120.8
6. Change the following IPv4 addresses from binary notation to dotted-decimal notation.
   1. 10001101 00001011 01001011 11101111
   2. 01000001 10000011 11011011 11111111

e) Find the netid and the hostid of the following IP addresses.

1. 178.34.2.8

1. 72.56.8.6

f) A datagram of 3000 byte (with no option) reached at the router and that must be forwarded to a link with MTU = 250 bytes. How many fragments will be generated and also write the MF and Fragment Offset.

(CO3) [Application]

* 1. a) Sketch UDP segment format and explain its different fields.

b) What is the value of the receiver window (rwnd) in TCP communication for host A if the receiver,

host B, has a buffer size of 3000 bytes and 750 bytes of received and unprocessed data?

1. What are the merits of IPV6 over IPV4?
2. Show the shortest form of the following addresses.
   1. 2340: lABC:0000:AAOO:0000:0000:0000:0000
   2. OOAA:12B0:OOOO:OOOO:OOOO:OOOO: 119A:A231

e). Show the original (unabbreviated) form of the following addresses

1. AA: 8C: :O
2. 0: :1234:3B

(CO3) [Application]