Question Paper

Exam Date & Time: 09-Jun-2022 (02:00 PM - 05:00 PM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH (IT /CCE) END SEMESTER EXAMINATIONS, JUNE 2022

COMPUTER NETWORK PROTOCOLS [ICT 2255]

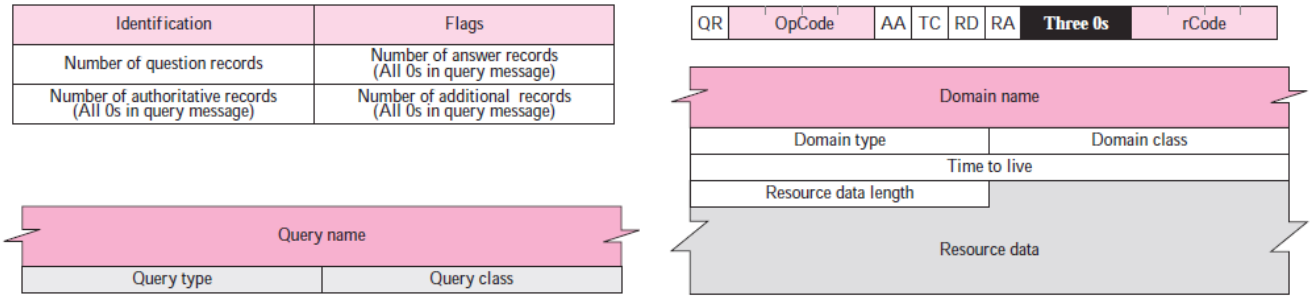
Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Instructions to Candidates:
Answer ALL questions Missing data may be suitably assumed

1) A) A DNS client is looking for the names of the computer with IP address 132.1.17.8 and 128.3.5.17.5. Show both the query and response messages assuming that the names are **mail.google.com** and **ict.mit.manipal.edu**. Also, with response message include extra 1,536 bytes of authoritative data and send to the DNS client. Assume that DNS uses UDP service for communication. Refer the DNS packet format given in Fig. Q.1A (5)

Fig.Q.1A



B) A diskless client on a Class C Ethernet network uses DHCP. The DHCP server is on a Class B Ethernet network. Draw the network diagram with appropriate IP addresses for the client, server, and relay agent. Fill out a DHCP request and reply packet (3)

C) A router with IP address 125.45.23.12 and Ethernet physical address 23:45:AB:4F:67:CD has received a packet for a host destination with IP address 125.11.78.10 and Ethernet physical address AA:BB:A2:4F:67:CD. Show the ARP request and response packet. (2)

2) A) An ISP is granted a block of addresses starting with 10.0.0.0/12. The ISP needs to distribute these addresses to five groups of customers as follows: (5)

i. The first group has 8 customers; each needs 248 addresses.
ii. The second group has 128 customers; each needs 64 addresses.
iii. The third group has 256 customers; each needs 8 addresses.
iv. The fourth group has 16 customers; each needs 4 addresses.
v. The fifth group has 100 customers; each needs 16 addresses.

Design the subblocks for the above listed customers (Show first and last address block of each group).

B) An ICMP message has arrived with the header (in hexadecimal) (3)

09 00 11 12 01 08 03 02 11 0B 03 02 00 00 00 03

i. What is the type of the message?
ii. What is the code?
iii. What is the purpose of the message?
iv. What does the last bytes signifies?

C) Explain congestion avoidance phase of Congestion control in TCP with suitable diagram (2)

3) A) Draw the network topology for the routing table entries given in Table Q.3A of router R1 (5)

Table Q.3A

Mask	Network Address	Next-hop Address	Interface
/27	192.16.7.0	111.15.17.32	m0
/24	145.80.0.0	125.80.0.4	m1
/22	125.80.0.0	----------	m1
/22	170.14.128.0	----------	m2
/16	111.0.0.0	----------	m0
/16	100.0.0.0	170.14.128.11	m2
/8	10.0.0.0	170.14.128.11	m2
default	default	111.30.31.18	m0

B) Explain the basic framework of Simple Network Management Protocol (SNMP) with neat diagram (3)

C) What are the different types of packets used in OSPF? (2)

4) Draw a multistage switch with N = 16, n = 4, k = 2 and answer the following questions. (5)

4) Draw a multistage switch with N = 16, n = 4, k = 2 and answer the following questions. (5)

A)
i. What is the maximum number of connections that can be supported at any given time?

ii. Compute the number of cross points.

Redesign the switch with k = 10 and state whether k = 10 leads to blocking condition.

B) Explain when send window and receive window opens, closes or shrink in TCP with suitable diagram. (3)

C) Differentiate between Fully Qualified Domain Name and Partially Qualified Domain Name (2)

5) Show the change in the Sequence No., Acknowledgement No., control flag field and rwnd size for the following trail of communication between client and server. Also show the appropriate actions taken by client or server during this communication trail. Show the detailed step. (5)

A)
i. 3-way Connection establishment phase with Sequence No from Client is 401, Sequence No from Server is 901 and rwnd size of 500 bytes.

ii. Client process pushes 200 bytes of data into the buffer and send the segment to server.

iii. Client process pushes 100 bytes of data into the buffer but the segment does not reach the server.

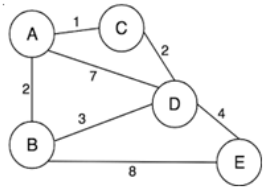
iv. Client pushes 100 bytes of data into the buffer and send the segment to the server.

v. Server process consumes 200 bytes of data and acknowledges 200 bytes of data.

vi. Server process consumes 100 bytes of data and acknowledges 100 bytes of data

B) Using Dijkstra's algorithm find the shortest path tree for the node A and provide the routing table entries of node A for the topology given in Figure Q.5B (3)

Fig Q.5B



C) Draw a Banyan switch with eight inputs and eight outputs. Which of the following traffic patterns are successfully routed without contention? (2)

i. Pattern 1: Packets from inputs 0, 1, 2, 3, and 4 are to be routed to outputs 2, 3, 4, 5 and 7 respectively.

ii. Pattern 2: Packets from inputs 0, 1, 2, 3, and 4 are to be routed to outputs 1, 2, 4, 3, and 6 respectively.

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