Nirma University

Institute of Technology

Semester End Examination (IR/RPR), December 2017
B. Tech. in Computer Engineering, Semester V
CE503 Computer Networks

Roll/
Exam No. _____

Supervisor's initial
with date _____

Time: 3 Hours

Max. Marks: 100

Instructions:
1. Attempt all questions.
2. Figures to the right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Assume suitable data wherever necessary and specify them.

Q-1 Answer the following: **[18]**

A) What is the significance of Framing at data link layer? Explain bit level **(6)** framing method.

B) Write pseudocode for bidirectional stop-and-wait data link layer **(6)** protocol for reliable channel.

C) What is the limitation of Leaky bucket algorithm? Suggest an approach **(6)** which can overcome its limitation.

Q-2 Answer the following: **[18]**

A) A group of N stations share a 60kbps pure ALOHA channel. Each **(6)** station outputs a 5000 bit frame once every 100 sec. What is the maximum value of N?

B) The distance from earth to distant planet is approximately $9*10^{10}$ m. A **(6)** sliding window protocol is used to transmit a frame of 32KB on a 64Mbps link. For what sender window size will the link utilization be 100%? The speed of light is $3*10^8$m/s.

C) Host A is connected to a router R1, R1 is connected to host B and a TCP **(6)** message that contains 4,500 bytes is passed to the IP code at host A for delivery to B. IP header is of 20 bytes. Show the Total length, DF, MF, and Fragment offset fields of the IP header in each packet transmitted over the two links. Assume that link A-R1 can support a maximum frame size of 2,500 bytes (payload). Link R1-B can support a maximum frame size of 1500 bytes (payload).

OR

C) 15 stations numbered 1 to 15 are contending for a shared channel. If all **(6)** stations whose addresses are odd numbers becomes ready at once, then how many bit slots are needed to resolve contention using adaptive tree walk protocol? How many bit slots are needed if binary countdown protocol is used?

Q-3   Answer the following: **[14]**

A) Why virtual LANs are used? Explain forwarding between to switches in **(6)** the presence of three virtual LANs with appropriate diagram.

B) What is the drawback of stop and wait protocol? Which approach can **(6)** be used to overcome this drawback? Explain with an example.

OR

B) Which protocol is used to detect loops in a network? Explain the **(6)** protocol with a suitable diagram.

C) Which medium access protocol is preferred in low load? Why?   **(2)**

Q. 4   Answer the following: **[18]**

A) Why physical carrier sensing does not work in wireless LAN? Explain **(7)** how virtual carrier sensing solves hidden and exposed terminal problem with an example.

B) Suppose the hash tables in the two bridges are empty. List all ports on **(5)** which a packet will be forwarded for the following sequence of data transmissions:

    i.   A sends a packet to C.
    ii. F sends a packet to E.
    iii. E sends a packet to F.
    iv. G sends a packet to E.
    v.   D sends a packet to A.
    vi. B sends a packet to F.
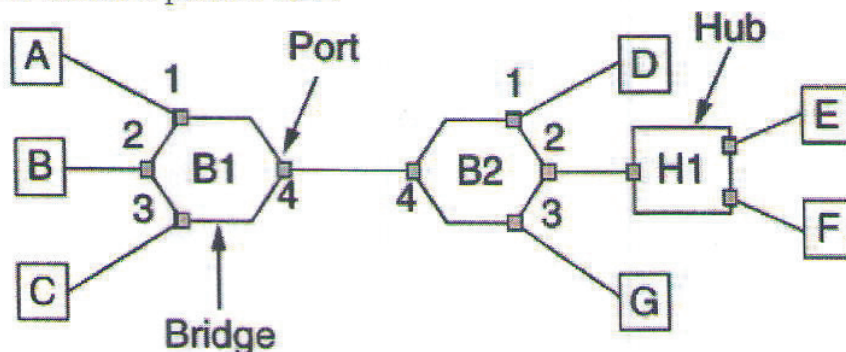
C) Why does Ethernet require that valid frames must have at least 46 **(4)** bytes and at most 1500 bytes of payload?

OR

C) Derive the equation for channel efficiency of Ethernet protocol.   **(4)**

D) Binary Exponential Backoff algorithm dynamically adapts to the **(2)** number of stations trying to send. (True/False). Justify.

Q. 5   Answer the following: **[16]**

A) Explain the working of Dijkstra's shortest path algorithm for an **(6)** example network of 8 nodes with random connections between them. Also, choose weights (cost) of the links randomly.

B) A router has the following (CIDR) entries in its routing table: **(5)**

Address/mask	Next hop
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1

192.53.40.0/23   Router 1
default   Router 2

For each of the following IP addresses, what does the router do if a packet with that address arrives?
- (a) 135.46.63.10
- (b) 135.46.57.14
- (c) 135.46.52.2
- (d) 192.53.40.7
- (e) 192.53.56.7

C) How does a router with a Weighted Fair Queueing (WFQ) ensures **(5)** bandwidth and delay guarantees are met for a source whose traffic is shaped by (R, B) token bucket?

OR

C) A router has just received the following new IP addresses: 57.6.96.0/21, **(5)** 57.6.104.0/21, 57.6.112.0/21, and 57.6.120.0/21. If all of them use the same outgoing line, can they be aggregated? If so, to what? If not, why not?

Q. 6 Answer the following: **[16]**

A) Why in TCP, for a new connection, initial sequence number is chosen **(7)** based on the clock? Why sequence numbers should not increase too fast or too slow with respect to the clock? Hint: Use 'Forbidden region' graph to explain your answer.

B) If a server crashes in the middle of the transport connection and **(5)** reboots quickly, what are the possible strategies for the server and the client to resume the connection? Give possible outcomes, in terms of packet loss/duplicate/perfect, for different combinations of server and client strategies.

C) Explain with example how a name resolution is done in DNS using **(4)** iterative and recursive query mechanism.

OR

C) How does a router allocate bandwidth to different transport layer flows **(4)** to avoid congestion using Max-min fairness?