Nirma University

Institute of Technology

Semester End Examination (IR/RPR), December 2021

B. Tech. in Computer Science and Engineering, Semester V

2CS502 Computer Networks

Time: 2 Hours   Max. Marks: 50


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.
5. **Sub-questions of each of the three questions must be written together.**

Q.1 Do as Directed. [18]

A) Explain the Optimality Principle with the help of an example. For the **(6)**
CO2 figure given below, find the shortest path from A to D using Dijkstra's
BL6 shortest path algorithm explaining each step of the algorithm in detail.
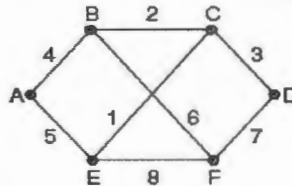
OR

A) What is a forbidden region? Which are the two scenarios in which **(6)**
CO2 senders can enter the forbidden region? Explain with diagrams.
BL4

B) What do you mean by count to infinity problem? Suggest an approach **(4)**
CO1 to overcome this problem.
BL4

C) Compare Bitmap and Adaptive Tree Walk protocols for shared channel **(4)**
CO1 access.
BL5

D) Write a pseudocode for bidirectional stop-and-wait data link layer **(4)**
CO2 protocol for reliable channel.
BL6

Q.2 Do as Directed. [16]

A) What is the practical significance of a SINK tree in the area of **(6)**
CO2 communication? For a network given below, generate a SINK tree
BL3 considering node 1 as sink.
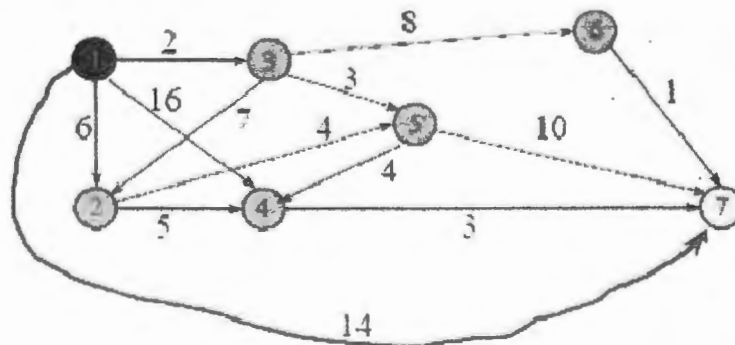
B) A company is assigned the network address 172.10.0.0/17. The **(6)**
CO3 network is to be divided into four subnets having 1024, 4096 and
BL3 2048 and 8192 host computers. Please note that subnets are to be
created in this order only. Calculate network address, subnet mask
and range of IP addresses for each subnet. How many IP addresses
will remain unallocated?

OR

B) How does a router with a Weighted Fair Queueing (WFQ) ensure **(6)**
CO4 bandwidth and delay guarantees are met for a source whose traffic is
BL3 shaped by (R, B) token bucket?

C) Connection oriented service does not always mean finding a path **(4)**
CO1 between sender and receiver and using same path for forwarding
BL4 packets of that connection (True/ False). Justify.

Q.3 Do as Directed. **[16]**

A) Write pseudocode of a client application to send an email to an email **(6)**
CO3 server by implementing SMTP protocol using Berkeley Sockets API.
BL3

B) A 1-km-long, 10-Mbps CSMA/CD LAN (not 802.3) has a propagation **(6)**
CO2 speed of 200 m/μsec. Repeaters are not allowed in this system. Data
BL6 frames are 256 bits long, including 32 bits of header, checksum, and
other overhead. The first bit slot after a successful transmission is
reserved for the receiver to capture the channel in order to send a 32-
bit acknowledgement frame. What is the effective data rate, excluding
overhead, assuming that there are no collisions?

C) What is jitter? Why is it an important quality of service parameter? **(4)**
CO3 Why UDP is preferred over UDP for better jitter performance?
BL4