19BCE238

Nirma University

Institute of Technology

Semester End Examination (IR/RPR), December 2021

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

2CS502 Computer Networks

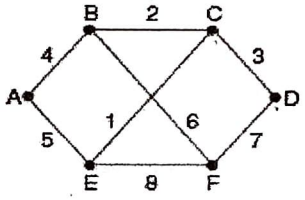
Time: 2 Hours **Max. Marks: 50**

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



OR

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

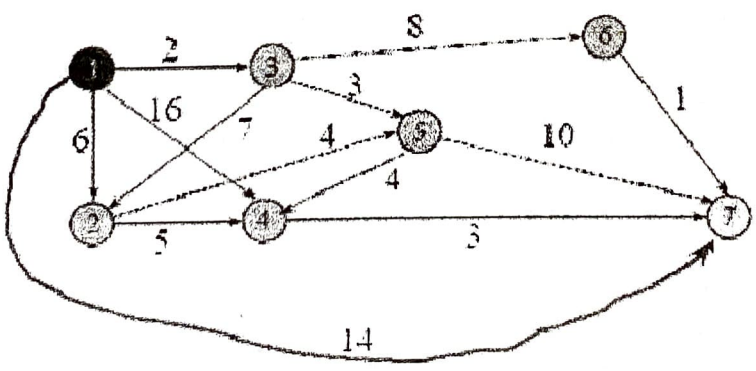
B) CO1 BL4 What do you mean by count to infinity problem? Suggest an approach to overcome this problem. **(4)**

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

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

Q.2 Do as Directed. **[16]**

A) CO2 BL3 What is the practical significance of a SINK tree in the area of communication? For a network given below, generate a SINK tree considering node 1 as sink. **(6)**



B) CO3 BL3 A company is assigned the network address 172.10.0.0/17. The network is to be divided into four subnets having 1024, 4096 and 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? **(6)**

OR

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

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

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

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

B) CO2 BL6 A 1-km-long, 10-Mbps CSMA/CD LAN (not 802.3) has a propagation speed of 200 m/μsec. Repeaters are not allowed in this system. Data 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? **(6)**

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