1. Write client and server programs that communicate using TCP sockets.

* Implement ‘Selective repeat’ ARQ (Automatic Repeat Request) mechanism. The packet size of the data is 256 bytes.
* If the acknowledgement message is not received in a user defined amount of milliseconds, the message is resent in a user defined number of times until the program moves on to the next packet of data.
* The server program outputs the received data to a file.
* Use timeouts as 200ms and measure the reliability of the network as a function of timeout and throughput.

1. Write client and server programs that communicate using TCP sockets.

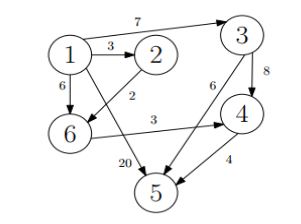
* Implement ‘Go back N’ ARQ (Automatic Repeat Request) mechanism.
* The packet size of the data is 256 bytes and set the window size is 5
* If the acknowledgement message is not received in a user defined amount of milliseconds, the message is resent in a user defined number of times until the program moves on to the next packet of data.
* The server program outputs the received data to a file.
* Use timeouts as 200ms and measure the reliability of the network as a function of timeout and throughput

1. Write client and server programs that communicate using TCP sockets.

* The client will send messages and listen for acknowledgements based on stop and wait sliding window protocol.
* The server will listen for messages and send back acknowledgements.
* The client will consider a message delivered once it receives an acknowledgment and resend an unacknowledged message after a timeout.
* After 2 attempts of retransmission, the client will report an error message.
* Use timeouts as 100ms and datagram sizes of 512 bytes.
* Measure the reliability of the network as a function of timeout and throughput.

1. Apply shortest path routing algorithm for the following directed graph.

* Find the shortest graph distances between every pair of vertices for the given graph.
* Take ‘3’ as the source node



Also print the following

(i) What are the Edges included in each iteration

(ii) What are the Edges excluded in each iteration

1. Establish a TCP connection between the sender and receiver.

Sender side:

1. Encrypt the message “INFORMATION TECHNOLOGY’’ Using substitution algorithm.
2. The key size is 4
3. Send the encrypted message to the receiver side.
4. The key is to be copied in a file “Key” and the same file is to be transmitted to the receiver side,

Receiver side:

1. Receive the encrypted message
2. Receive the file “Key” and display the content of the file
3. Decrypt the content using the key
4. Display the original message
5. Write client and server programs that communicate usingTCP sockets.
   1. Upload a file from the client to a server.
   2. If the file is uploaded display a message “file is uploaded” in the client side
   3. In the server side display the contents of the uploaded file along with size of the file and uploaded time.
6. Write client and server programs that communicate using UDP sockets.
   1. Implement a FTP using UDP sockets.
   2. Use timeout is 5 seconds and if the file is received by the client within 5 seconds, measure the file size and propagation delay and display it.
   3. Otherwise report an error as “time to live” period is exhausted.
7. Establish a TCP connection between the client and server

Write a program for Remote keyboard control using sockets.

**At the Client side :** A character is pressed using the key board.

**At the server side:** The pressed character is converted into uppercase and it is displayed in the server side. When the tab “space” is entered it should display the length of the string entered

1. Implement a client-server application using RPC.

* The client invokes a function call with appropriate arguments.
* The server implements the function call on the arguments and returns result to the client.
* For example if the client invokes “Palindrome (str)”, the server should return “Yes” or “No“.

1. Write client and server programs that communicate using TCP sockets.

* Five numbers of clients with port id of 5000, 5001, 5002, 5003 and 5004 are connected with a single server.
* Create group 1 consists of the clients with the port id of 5000, 5001 and 5002.
* Group 2 consists of the clients with the port id of 5003 and 5004.
* Implement multicast communication by sending a message to either Group1 or Group 2.

1. Write a file server using TCP sockets.

* The server sends a reply to the user with the files.
* The user specified files need to be downloaded at the user side.
* If the file does not exist, error message is to be displayed from the server as “ file is not found”

12.Establish a TCP connection between the sender and receiver.

Sender side:

1. Encrypt the message “INFORMATION TECHNOLOGY’’ Using substitution algorithm.
2. The key size is 4
3. Send the encrypted message to the receiver side.
4. The key is to be copied in a file “Key” and the same file is to be transmitted to the receiver side,

Receiver side:

1. Receive the encrypted message
2. Receive the file “Key” and display the content of the file
3. Decrypt the content using the key
4. Display the original message
5. Implement a client-server arithmetic calculator application for addition, subtraction, multiplication and division using RPC. The client invokes a function call with appropriate arguments. The server implements the function call on the arguments and returns arithmetic result to the client
6. Establish a TCP connection between the client and server. Write a program for remote command execution using sockets
7. ARP & RARP
8. Remote screen capture
9. Write a HTTP web client program to download a web page using TCP sockets
10. Change Echo Client server Application so that server receive a number from

client and returns square and cube of number to client

1. Write a client/server system in which the client program sends five numbers to a

server program which returns the sum of the five numbers

1. Write a UDP client/server system in which the client program sends a number
2. between 1 and 10 and the server program returns the corresponding element
3. in an array of strings e.g.
4. Client>Input any number between 1 and 10 : 5
5. Client> Response from server is : Fiv
6. Write a UDP client/server system in which the client program sends a number
7. between 1 and 10 and the server program returns the corresponding element
8. in an array of strings e.g
9. Write a UDP client/server system in which the client program sends a number
10. between 1 and 10 and the server program returns the corresponding element
11. in an array of strings e.g
12. Write a UDP client/server system in which the client program sends a number
13. between 1 and 10 and the server program returns the corresponding element
14. in an array of strings e.g
15. Write a UDP client/server system in which the client program sends a number

between 1 and 10 and the server program returns the corresponding element

in an array of strings e.g.

Client>Input any number between 1 and 10 : 5

Client> Response from server is : Five

1. Write the server side of the application in a file named DayTimeServer.java.
2. •The DayTimeServer simply listens on port 1078 and as soon as it receives a
3. request from the DayTimeClient, it returns the current Date on the server
4. using the following function of the java.util package Date now = new
5. Date();
6. •Similarly you need to write the client side of the application in a file named
7. DayTimeClient.java.
8. •The client simply sends a request to the server when it is run and the
9. server returns the current Date at the server as mentioned above
10. Write the server side of the application in a file named DayTimeServer.java.

•The DayTimeServer simply listens on port 4078 and as soon as it receives a request from the DayTimeClient, it returns the current Date on the server using the following function of the java.util package Date now = new Date();

* Similarly you need to write the client side of the application in a file named DayTimeClient.java.
* The client simply sends a request to the server when it is run and the

server returns the current Date at the server as mentioned above

1. Write a client Server Application in which, clients send four digit numbers i.e., “3145” to server. Server sends back the sum of all digits to client i.e., Use UDP Socket and port of your choice
2. Write a program that will count the number of lines in file that is specified on the command line. Assume that the files are text files and placed in c:\ driver of server. Write file name, along with the number of lines in that file, to standard output at the client end. If an error occurs while trying to read from the files, you should print an error message.
3. LAB MANUAL KALEEM ULLAH
4. BESE 21 B
5. Computer Networks

24. This Activity implements a client, DNSClient that connects to the DNS server. The DNS server simply receives data from its client and performs the following:

Store the data in database if the request is to register the client.

•Replay the Name/IP address if the request is to Resolve

•Delete the all stored entries

Store the data in database if the request is to register the client.

•Replay the Name/IP address if the request is to Resolve

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* Store the data in database if the request is to register the client
* Replay the Name/IP address if the request is to Resolve
* Delete the all stored entries

•Store the data in database if the request is to register the client.

•Replay the Name/IP address if the request is to Resolve

•Delete the all stored entries

The DNS server is a service built into most operating systems. DNS Client creates a socket and gets a connection to the DNS server. You must implement checks on data where required

25. Broadcast