(b) Write a program of TCP client and TCP server implementation in C. Specification of the client and server are mentioned below : (4+8=12)

- Server is running a service on port 11002.
- Client connects to that service of the server.
- Server prints the IP address and port number of each connected client.
- Client then disconnects from the server.

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1197 **I**

Unique Paper Code : 2343010011

Name of the Paper : Unix Network Programming

Name of the Course : **B.Sc. (Hons.) Computer Science**

Semester : V

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **SECTION A** is compulsory.
3. Attempt any **4** questions from **SECTION B.**
4. Parts of a question must be answered together.

SECTION A

(Compulsory)

1. (a) Represent 0x1020 in Little Endian and Big Endian format. (2)

   (b) Socket pair for listening socket is {*:21,*:*}, after connecting to this server, a client's socket pair is {206.169.112.219:1500, 12.106.32.254:21}. What is the socket pair for the connected socket at the server's end? (2)

   (c) What happens if the protocol parameter in socket() system call is specified to be 0? (2)

   (d) Explain the Three-Way handshaking process with the help of diagram. (3)

   (e) What are the scenarios where connect() system call returns an error? Briefly explain. (3)

6. (a) Briefly explain the significance of bacldog parameter in listen() system call. Wiry we do not specify backlog parameter as 0? (3)

   (b) What are slow system calls? When is an error of EINTR returned by such a call? (4)

   (c) Write tire difference between TCP and UDP transport layer protocols. (4)

   (d) Why must value-result arguments such as the length of a socket address structure be passed by reference? Give two examples of value-result arguments. (4)

7. (a) What happens when SO_LINGER socket option is called : (1.5+1.5=3)

   (i) If 1_onoff is nonzero and 1_linger is nonzero.

   (ii) If 1_onoff is nonzero and 1_linger is zero.

5. (a) What happens when select is called in the following cases :

(i) If we specify the timeout argument as a null pointer. (1.5)

(ii) If we specify all three middle arguments *(readset, writeset and exceptset)* as null. (1.5)

(b) Briefly explain IPv4 Socket Address Structure. (3)

(c) Discuss with the help of diagram client-server communication on the same ethemet using TCP. (3)

(d) Write a client-side'program that takes service name and hostname as command line arguments. Use predefined functions to convert service name and hostname into appropriate port number and IP address and use this information to establish the connection. (6)

(f) What do you mean by connected UDP sockets? Does it start the Three-Way Handshaking process? (3)

(g) What happens when three-way handshake technique completes, then the socket connection is established and the client TCP sends an RST before the server process calls accept? (3)

(h) Differentiate between blocking I/O model and non-bfocking I/O model. (4)

(i) Explain the following socket options : (4)

(i) SO_BROADCAST

(ii) SO_DONTROUTE

(j) What is Domain Name System? Explain AAAA and PTR resource records of Domain Name System. (4)

SECTION B

2. (a) What is the purpose of using SO-REUSEADDR socket option? Explain. (3)

   (b) Write a program for UDP echo client and server that verifies the returned socket address of who sent the reply and ignore any received datagrams that are not from the server to whom the client sent the datagram. (12)

3. (a) Write the purpose of close() system call. Does it always initiate the Four-way TCP connection termination? (3)

   (b) Why do we need TIME_WAIT State? Briefly explain. (3)

   (c) Differentiate between network byte order and host byte order. How network byte order is converted to host byte order? (4)

   (d) With the help of a diagram show how actual packet exchange takes place for a complete TCP connection. Clearly show the various TCP states through which client and server passes. (5)

4. (a) Write definition of a function *int sockfd_to_family (int sockfd)* that returns the address family of a socket. (4)

   (b) Explain with help of diagram arrangement of client, context of resolvers and name servers. Write hostent structure return by gethostbyname() function. (3+2=5)

   (c) Explain with an example why do we need to use waitpid() instead of wait(). Write definition of void sig_chld(int signo) function using waitpid() to handle all terminated children. (3+3=6)