

Roll Number: \_\_\_\_\_

**Thapar Institute of Engineering & Technology, Patiala**

Department of Computer Science and Engineering

**WRITTEN TEST**

B. E. (Third Year): Semester-V (2021-22) ODD	Course Code: UCS413
Branch: CSE/COE	Course Name: Network Programming
25 Oct, 2021 (Monday)	Time: 2:45 P.M.
Duration: 2 Hours	Max Marks: 45
Name of Instructors: Dr Surjit Singh, , Dr Sonu Lamba, Dr Jayendra Barua, Dr Ashima Anand, Dr Tanya Garg	

**Note:** Attempt any **FIVE** questions in a proper sequence. Questions having multiple parts should be attempted at one place. Without proper steps and justification (wherever required), no marks will be awarded. Write your programs in C. Assume missing data, if any, suitably.

Q1	<p>Write down the server side program (using TCP protocol) to find maximum of two file descriptors which are received from client. The server can only receive via structure '<i>descriptor</i>' from client and reply with structure '<i>result</i>'. Consider the declaration of structures as follows:</p> <table><tr><td><pre>struct <i>descriptor</i>{     short <i>fd1</i>, <i>fd2</i>; } D;</pre></td><td><pre>struct <i>result</i> { short <i>max</i>; } M;</pre></td></tr></table> <p>Here, <i>fd1</i> and <i>fd2</i> are two file descriptors. In structure result, '<i>max</i>' is used to store the maximum of <i>fd1</i> and <i>fd2</i>.</p>	<pre>struct <i>descriptor</i>{     short <i>fd1</i>, <i>fd2</i>; } D;</pre>	<pre>struct <i>result</i> { short <i>max</i>; } M;</pre>	Marks 9
<pre>struct <i>descriptor</i>{     short <i>fd1</i>, <i>fd2</i>; } D;</pre>	<pre>struct <i>result</i> { short <i>max</i>; } M;</pre>			
Q2	<p>a) Write down the <i>two</i> programming instructions <i>only</i> to send '<i>data</i>' and receive '<i>result</i>' by the UDP client (using UDP protocol) for the above problem (given in Q1).</p> <p>b) Given following FQDNs: support.lenovo.com developers.google.com cloud.google.com scholar.google.com</p> <p>Based on these FQDNs, draw a schematic diagram showing hierarchy of DNS and Host servers in resolution of above domain names.</p> <p>c) Give the difference between iterative and recursive DNS queries. Write down the steps to resolve the FQDN "colab.research.google.com" into IP address using Iterative DNS resolution. Assume that the First Hope DNS Resolver is not an authority for the given domain name.</p>	2  2  2+3		
Q3	<p>Assume a HTTP server is running on port 8080 with IP address 11.0.0.1. We use web browser as client and open link <a href="http://11.0.0.1:8080">http://11.0.0.1:8080</a> on browser. The server accepts the connection from the client and returns following HTML string to client, <code>&lt;html&gt;&lt;body&gt;&lt;h2&gt;connection accepted&lt;/h2&gt;&lt;/body&gt;&lt;/html&gt;</code>. Use appropriate <i>status code</i> so that the browser without an error shows the appropriate message and server must print the information of the browser received successfully along with the <i>port</i> number of connected client.</p>	9		
Q4	<p>a) Explain the IPv4 and IPv6 Socket Address Structures with suitable examples.</p> <p>b) How is SCTP different from TCP and UDP? Also compare the TCP header with UDP header.</p> <p>c) An SCTP association can carry multiple logical streams. These are numbered from zero upward. So, for example, stream zero could carry control instructions, while stream one could carry small pieces of data (such as small files), and stream two could carry larger pieces of data (such as an MPEG movie). The three streams are logically independent, so that delays on one stream do not cause delays on any other stream.</p> <p>Write down the <i>three</i> instructions <i>only</i> to set values for creating maximum of 3 output and 3 input logical streams which will be available per socket for three attempts. After that write <i>one</i> instruction to set the SCTP socket options for association. [No need to write complete code]</p> <p>Given:</p> <pre>struct sctp_initmsg initmsg;</pre>	4 1+2 2		



Q5	<p>a) What is IP Network Heterogeneity?</p> <p>b) Consider the following scenario: Source ---&gt; Router (R1) -----&gt; Router(R2) ---&gt; Router(R3) --&gt;Router(R4) ---&gt; Destination IP address of the Source and Destination are given as follows: Source (IPv6: 2001:db8::7777:8888.), Destination (IPv6: 2001:db8::EEEE:FFFF.) <b>R1</b> supports IPv6 and IPv4, <b>R2</b> supports IPv4, <b>R3</b> supports IPv4 and IPv6, <b>R4</b> supports IPv6 Assume that the source host presents in an Ethernet LAN and an application X is running over TCP protocol. Similarly, the destination host presents in another Ethernet LAN and an application Y is also running over TCP protocol. Assume the suitable MAC addresses of their interfaces. Draw a schematic diagram showing network topology. Discuss IP in IP encapsulation for each node in the network. Show the contents of TCP/IP stack headers in the following format:</p> <table><tr><td>Ethernet Header: Source MAC, Destination MAC, Type Field Value</td><td>IP Header: Source IP, Destination IP, Protocol Field Value</td><td>Transport Layer Header</td><td>Application Layer Data</td></tr></table> <p>c) Discuss the statement “More the number of collision domains and broadcast domains, the more efficient is the network”. Also, explain which network devices break collision domains and broadcast domains?</p>	Ethernet Header: Source MAC, Destination MAC, Type Field Value	IP Header: Source IP, Destination IP, Protocol Field Value	Transport Layer Header	Application Layer Data	1 1+4   
Ethernet Header: Source MAC, Destination MAC, Type Field Value	IP Header: Source IP, Destination IP, Protocol Field Value	Transport Layer Header	Application Layer Data			