

Roll Number: _____

Thapar Institute of Engineering & Technology, Patiala
 Department of Computer Science and Engineering
EST Examination

B. E. (Third Year): Semester-V (2022-23) ODD	Course Code: UCS413
Branch: CSE/COE	Course Name: Network Programming
13 Dec, 2022 (Tuesday)	Time: 9:00 A.M.
Duration: 3 Hours	Max Marks: 40

Name of Instructors: Dr. Surjit, Dr. Ashima, Dr. Jayendra, Dr. Shashank

Note: ALL questions are compulsory. Attempt ALL 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	Describe the prototype/syntax (return type and parameters) of the following functions: <i>select()</i> , <i>FD_SET()</i> , <i>FD_ISSET()</i> , <i>recvfrom()</i> , <i>sctp_sendmsg()</i> , <i>sctp_rcvmsg()</i> , <i>getsockopt()</i>	7
Q2	Write a date-time TCP Server program that returns current date and time to the client. Take the help of the below program for retrieving date. [No need to write client-side code and header files] <pre>#include<time.h> int main(){ time_t t; time(&t); char *s = ctime(&t); printf("\nCurrent date and time is %s", s); return 0; }</pre>	5
Q3	Write a program to implement IP broadcast packet sending process using connectionless socket programming. Take the class B network segment 172.16.x.x as an example, where the smallest address 172.16.0.0 represents the network segment; and the largest address 172.16.255.255 is the broadcast address in the network segment. When we send a data packet to this address, all hosts on the network segment will receive and process it. Broadcast packets are sent and received through UDP sockets. [No need to write the receiving process code and header files]. The steps to be followed are as follows: a) Create a UDP socket; b) Fill the broadcast information structure; <i>struct sockaddr_in</i> c) Set socket options to allow broadcast packets to be sent; <i>setsockopt()</i> d) Send data packet; <i>sendto()</i>	4
Q4	a) Explain why we can only create 4094 VLANs on one physical network? (0.5 marks) b) Why TPID is kept as the first field in VLAN tag? (0.5 marks) c) Explain how VLANs reduces Broadcast domain on one physical network. (2 marks) d) Explain the statement "Stations do not belong to VLANs, but packets do". (1 mark) e) Why do we require SVIs? What limitations VLANs will face in absence of SVIs? (1 mark) f) Given following network topology in Fig.1: Consider following information: Interface P2, P1 are in VLAN10 and interface P3 is in VLAN20. The Gateway IP addresses of VLAN10 and VLAN20 are 192.168.1.1 and 192.168.2.1 respectively. These Gateways are configured as SVIs at interface P7 of Router. The MAC addresses of PC1, PC2, PC3 and P7 are MR1, MR2, MR3 and MR7 respectively. Suppose all the ARP requests are completed in this scenario. Answer the following question.	7

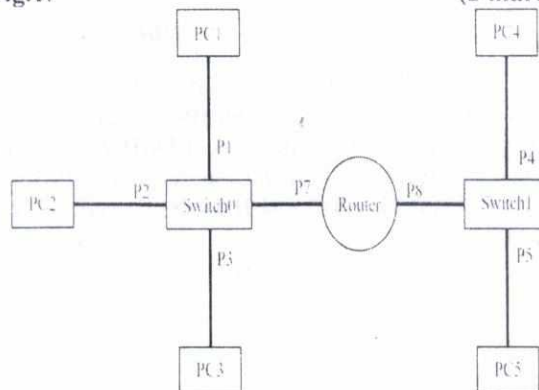
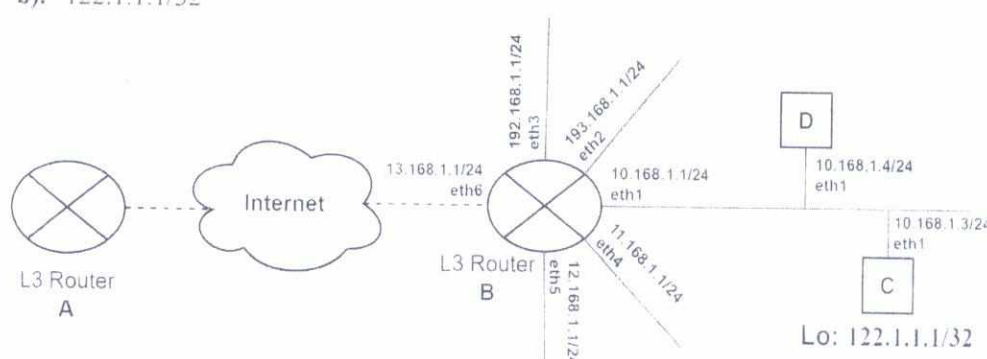
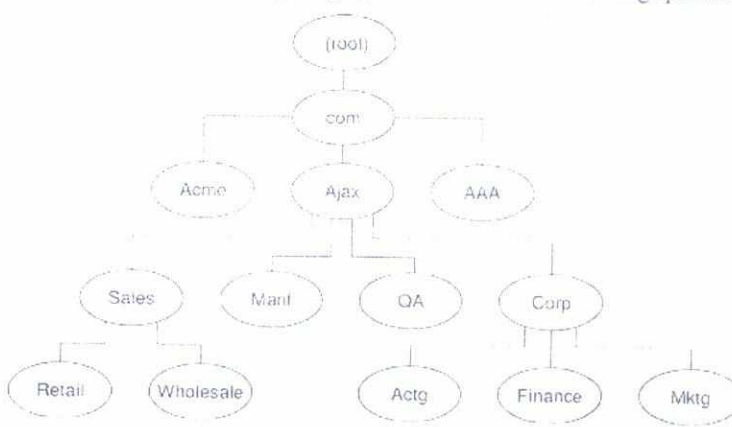


Figure 1

	<p>If PC1 (ip: 192.168.10.10/24) wants to send a packet to PC3 (ip: 192.168.20.20/24). Write down Destination IP, Destination MAC, and VLAN ID of packet/frame header at each node (including source and destination) in the path.</p>	
Q5	<p>Consider the following network (Fig. 2) consisting of two routers and two host devices. Let Router A wants to send packet to Host machine C. Explain the routing strategy used at Router B when the destination IP is taken as:</p> <p>a). "10.168.1.3/24" b). "122.1.1.1/32"</p>	4
 <p style="text-align: center;">Figure 2</p>		
Q6	<p>a). Why encapsulation and decapsulation are needed? Explain the three transition strategies that are used in IP encapsulation.</p> <p>b). Which problems exists in the communicating machines that are solved by TLVs? Explain the TLV components and procedure to solve the compatibility problem between different machines along with suitable example.</p>	8
Q7	<p>Consider the following DNS hierarchy (Fig.3) and answer the following questions:</p>	5
 <p style="text-align: center;">Figure 3</p>		
<p>a) State down the steps to resolve the DNS query to find the IP address of "retail.sales.ajax.com" using iterative mode. (2 marks)</p> <p>b) Explain the different components of FQDN: "finance.corp.ajax.com." (1 mark)</p> <p>c) What is the role of TLD "arpa" server in the DNS hierarchy. (1 mark)</p> <p>d) What are First Hop DNS (FH DNS) servers? Why are these servers required in DNS hierarchy? (1 marks)</p>		