



**UNIVERSITY OF COLOMBO, SRI LANKA**

**UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING**

**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)**

**Academic Year 2011/2012 – 2<sup>nd</sup> Year Examination – Semester 4**

***IT4504: Data Communication and Networks***  
***Part 2 - Structured Question Paper***

**22<sup>nd</sup> July 2012**  
**(ONE HOUR)**

**To be completed by the candidate**

BIT Examination Index No: .....

**Important Instructions:**

- The duration of the paper is **1 (One) hour**.
- The medium of instruction and questions is English.
- This paper has **3 questions** and **8 pages**.
- **Answer all questions.** All questions **do not** carry similar marks(40%,30%,30%).
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.

**Questions Answered**

Indicate by a cross (X), (e.g. ☐) the numbers of the questions answered.

To be completed by the candidate by marking a cross (X).	Question numbers			
	1	2	3	
To be completed by the examiners:				

- 1) A medium scale business enterprise having 80 clients requires a stable Internet connectivity for their basic web browsing requirements as well as for video conferencing and voice applications.

- (i) If the ISP has given a public IP block of 8 (6 usable) what concepts or technologies can be used to distribute the internet services to all the computers of the company?

( 3 marks)

**ANSWER IN THIS BOX**

**NAT( Network Address Translation), PAT (Port Address Translation)**

- (ii) If the router IP is given as 192.248.16.122 express it in CIDR notation.

(2 marks)

**ANSWER IN THIS BOX**

**192.248.16.122/29**

- (iii) State and explain a technology which you can utilize to limit the broadcast domain to less than 25 computers in the above company network.

(5 marks)

**ANSWER IN THIS BOX**

**Sub netting- divide the network to several subnets having**

**smaller subnet size controlling the number to less than 25**

**VLAN - divide the network based on IP address, Protocol based**

**VLAN**

Continue...

- (iv) If one is required to provide web and mail in-house hosting facility to users, state four(4) basic equipment you need and explain why you require them for the implementation.

(15 marks)

**ANSWER IN THIS BOX**

**Router ,network switch/hub, security appliance, servers,**

**Router- to route the data packets from inside and outside networks. To provide NAT and PAT services**

**Switch/hub – connect routers, switches, servers, and security device.**

**Security appliance – to provide a secure environment for the Servers, segregate the network, NAT, PAT and routing.**

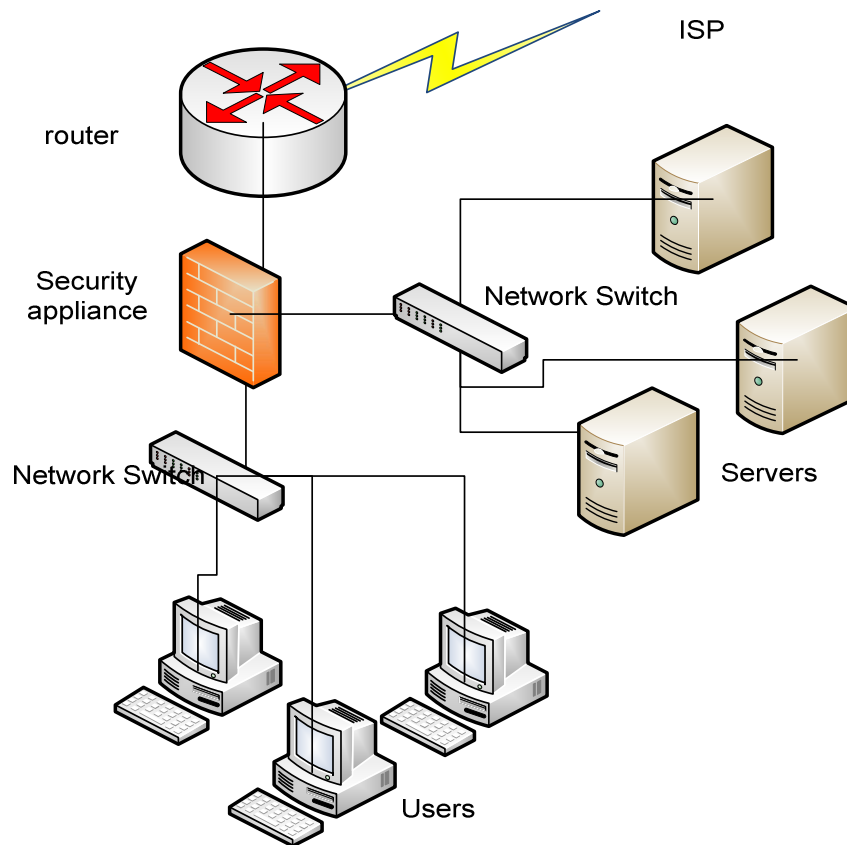
**Servers- to provide hosting servicers of web/mail/DNS.**

Continue...

- (v) Explain using a high level diagram, how one would connect the above mentioned resources in (iv) to provide the intended use.

(15 marks)

**ANSWER IN THIS BOX**



The servers to be separated and secure by using a security appliance, the users are separated as the inside network to provide better security.

- (i) Explain at least two (2) basic activities that take place in following layers of the OSI 7 layer model.

(20 marks)

Layer	Activities
Session	<p><b><u>ANSWER IN THIS BOX</u></b></p> <ul style="list-style-type: none"> <li>• Session establishment, maintenance and termination. (Allows two application processes on different machines to establish, use and terminate a connection, called a session).</li> <li>• Session support (performs the functions that allow these processes to communicate over the network, performing security, name recognition and logging).</li> </ul>
Network	<p><b><u>ANSWER IN THIS BOX</u></b></p> <ul style="list-style-type: none"> <li>• Routing</li> <li>• Subnet traffic control</li> <li>• Frame fragmentation( if it determines that a downstream router's maximum transmission unit (MTU) size is less than the frame size),</li> <li>• Logical-physical address mapping (translates logical addresses, or names, into physical addresses).</li> <li>• Subnet usage accounting (has accounting functions to keep track of frames forwarded by subnet intermediate systems, to produce billing information).</li> </ul>
Presentation	<p><b><u>ANSWER IN THIS BOX</u></b></p> <ul style="list-style-type: none"> <li>• Character code translation ( ASCII to EBCDIC).</li> <li>• Data conversion (bit order, CR-CR/LF, integer-floating point).</li> <li>• Data compression (reduces the number of bits that need to be transmitted on the network).</li> <li>• Data encryption (encrypt data for security purposes. Like password encryption)</li> </ul>
Data link	<p><b><u>ANSWER IN THIS BOX</u></b></p> <ul style="list-style-type: none"> <li>• Link establishment and termination</li> <li>• Frame traffic control.</li> <li>• Frame sequencing</li> <li>• Frame acknowledgment</li> <li>• Frame delimiting (creates and recognizes frame boundaries).</li> <li>• Frame error checking (checks received frames for integrity).</li> <li>• Media access management (determines when the node "has the right" to use the physical medium).</li> </ul>

Continue...

- (ii) Explain as to why a majority of wide area network technologies prefer to use packet switched technology than circuit switched technology for data applications.

(5 marks)

**ANSWER IN THIS BOX****In circuit switched network the resource's are wasted as the allocated****Circuit may be in idle mode between data transferring secessions.****Therefore the packet switched networks have a higher efficiency****in resource utilisation**

- (iii) A 64 Kb frame (minimum size) is sent over an Ethernet at a data rate of 32,000kbps. Calculate the maximum end to end propagation delay in the shared Ethernet.

(5 marks)

**ANSWER IN THIS BOX****64Kb /(2 X32000 kbps)****=0.001s**

3)

- (i) State three (3) reasons for network traffic monitoring being an important aspect in an enterprise network.

(5marks)

**ANSWER IN THIS BOX****The traffic monitoring is important due to following reasons.**

- **Identify problems on the network.**
- **Implement and Manage Security of the network.**
- **Identifying current utilization of resources.**

Continue...

- **Forecast future Capacity and trends (future planning).**

- (ii) Ring networks have been used for constructing LAN but recently it has been replaced by star technology. You may still find ring technology being used in MAN/WAN technologies. Explain two (2) benefits of ring architecture used in implementing MAN.

(5marks)

**ANSWER IN THIS BOX****The current ring networks utilized physical media more efficiently.****The ring networks can provide resistant to single point frailer.****Easily troubleshoot than previous ring Networks.**

- (iii) xDSL is widely used as a last mile connectivity technology for home based customers. Explain two (2) benefits of xDSL technology.

(5marks)

**ANSWER IN THIS BOX****xDSL technology operate using a single pair of copper mainly used for****Telephony networks.****Provides higher bandwidth .****Isolation of downlink and uplink**

Continue...

- (iv) Identify the correct operational layer for each of the following protocols from internet protocol suite. You should mark (✓) in the correct box.

**(15 marks)**

Protocol	Application Layer	Transport Layer	Internet layer	Link Layer
NTP	(✓)			
DNS	(✓)			
ICMP			(✓)	
ARP				(✓)
IPSec			(✓)	
SSL	(✓)			
SSH	(✓)			
SMTP	(✓)			
SNMP	(✓)			
RSVP		(✓)		
LDAP	(✓)			
UDP		(✓)		
SIP	(✓)			
POP	(✓)			
PPP				(✓)

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