UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2011/2012 – 2nd Year Examination – Semester 4

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

22nd 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 (✗), (e.g. ✗) the numbers of the questions answered.

	Question numbers			
To be completed by the candidate by marking a cross (✗).	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) It 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

(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
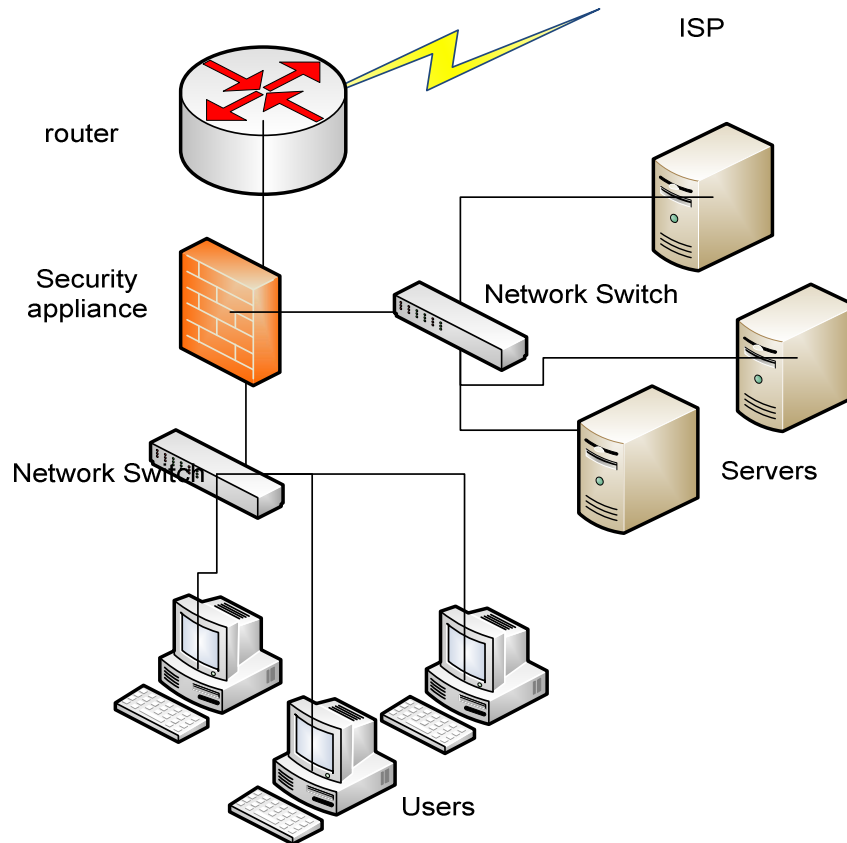
Servers, segregate the network, NAT, PAT and routing.

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

(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.

2)

(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	**ANSWER IN THIS BOX** • **Session establishment, maintenance and termination. (Allows two application processes on different machines to establish, use and terminate a connection, called a session).** • **Session support (performs the functions that allow these processes to communicate over the network, performing security, name recognition and logging).**
Network	**ANSWER IN THIS BOX** • **Routing** • **Subnet traffic control** • **Frame fragmentation(if it determines that a downstream router's maximum transmission unit (MTU) size is less than the frame size),** • **Logical-physical address mapping (translates logical addresses, or names, into physical addresses).** • **Subnet usage accounting (has accounting functions to keep track of frames forwarded by subnet intermediate systems, to produce billing information).**
Presentation	**ANSWER IN THIS BOX** • **Character code translation (ASCII to EBCDIC).** • **Data conversion (bit order, CR-CR/LF, integer-floating point).** • **Data compression (reduces the number of bits that need to be transmitted on the network).** • **Data encryption (encrypt data for security purposes. Like password encryption)**
Data link	**ANSWER IN THIS BOX** • **Link establishment and termination** • **Frame traffic control.** • **Frame sequencing** • **Frame acknowledgment** • **Frame delimiting (creates and recognizes frame boundaries).** • **Frame error checking (checks received frames for integrity).** • **Media access management (determines when the node "has the right" to use the physical medium).**

(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.**

> • **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

(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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