UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING
DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2010/2011 – 2nd Year Examination – Semester 4

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

7th August, 2011
(ONE HOUR)

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 **6 pages**.
- **Answer all questions.** All questions **do not** carry identical marks.
- **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)   Consider an office network.

(i)   The Internet Service provider has configured the main router in the network with following.
- The LAN interface IP 192.248.19.35
- Subnet 255.255.255.248

(a)   What is the network address /subnet ID?

(3 marks)

192.248.19.32

(b)   What is the broadcast address for the specified subnet?

(3 marks)

192.248.19.39

(c)   How many usable IP numbers are available for your equipment?

(3 marks)

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(d) Write the above router interface IP in Classless Inter-Domain Routing (CIDR) notation.

(3 marks)

192.248.19.35/29

(ii)   Sate four (4) technologies that are available to secure a Wi-Fi network. Explain briefly how you can use them to secure a wireless network.

(18 marks)

Encryption using WPA, WEP , MAC address filtering, prevent SSID from broadcasting,

User based access control using Username and Passwords , End to end VPN

There are several level of securing needs to be done in a Wi-Fi network. The data transfer /

transmitted in the wireless media must be secured by encryption (WPA, WEP, and end to end

VPN). Then the access to the Wi-Fi must be secured using MAC filtering ,keeping the SSID

confidential, using username and password etc.

2)

(i) Suppose you have received an **IPV6** address from your ISP having a 48-bit public address prefix. Calculate the maximum possible subnets that you can have in your network

(10 marks)

$$2^{(64-48)}$$

$$=2^{16}$$

$$=65,536$$

(ii) Fill in the table bellow.

(20 marks)

Service	Port	Lower layer protocol (TCP/UDP/TCP or UDP)	Usage

DNS	**53**	**TCP or UDP**	To provide domain name servicers translation of domain to IP
SMTP	25	**TCP**	Transfer of E-mails uses specifically for outgoing mail from clients and mail exchange between servers
FTP	21	**TCP**	Transfer files from one host to another over a TCP-based network
SSH	**22**	**TCP or UDP**	Is a network protocol that allows data to be exchanged using a secure channel between two networked devices
HTTPS	**443**	**TCP**	**Hypertext Transfer Protocol Secure** (**HTTPS**) is a combination of the Hypertext Transfer Protocol (HTTP) with SSL/TLS protocol to provide encrypted communication

(iii) The maximum end-to-end propagation delay in a shared Ethernet is .002 seconds and the data rate is 32,000kbps. What is the minimum frame length appropriate for this Ethernet?

(5 marks)

2 X.002X32000 kbits

64kb

(iv) The measured signal power and the noise power of a certain data communication channel having a 44KHz band with was 15w and 1w respectively. What is the corresponded data rate of a signal?
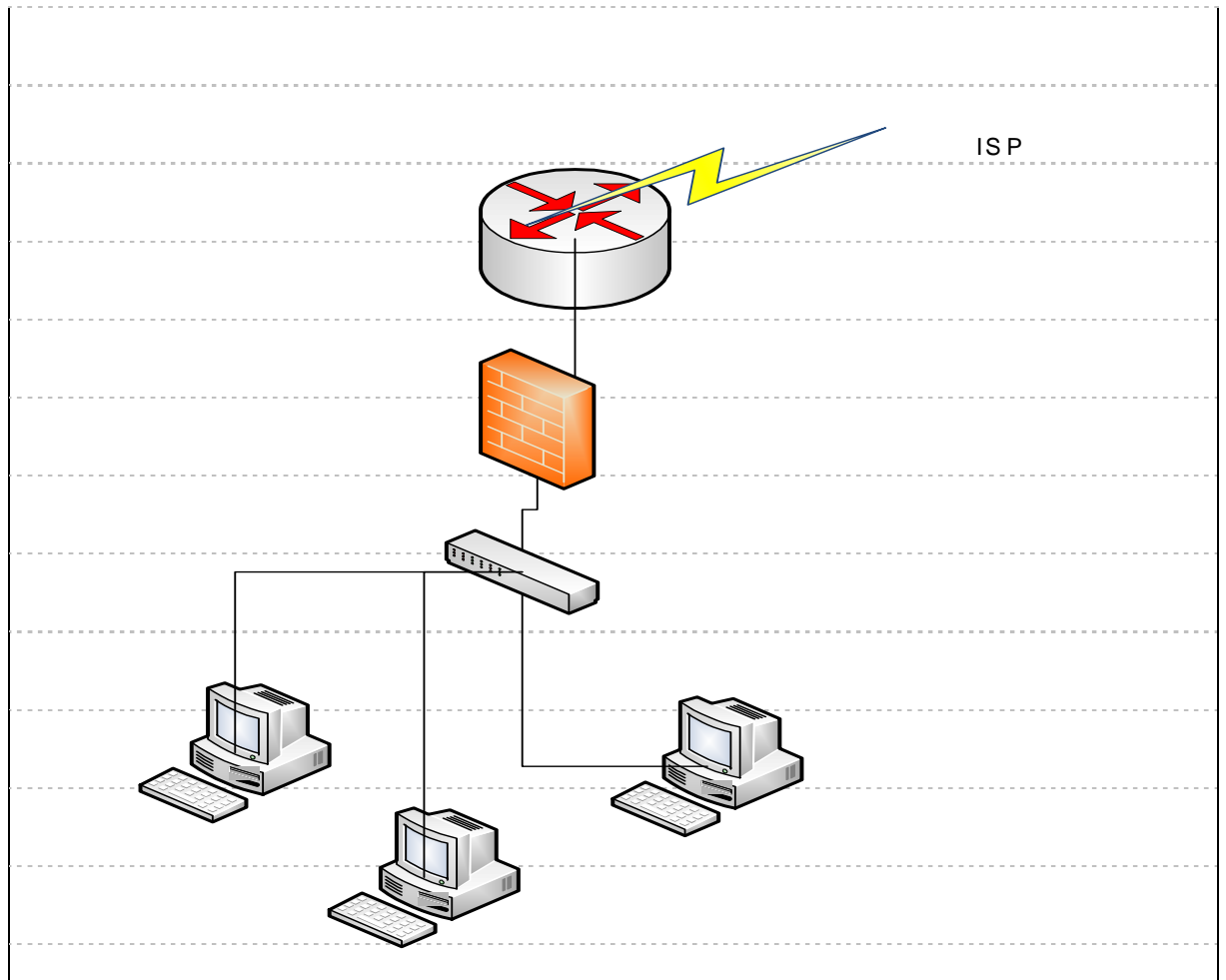
(5 marks)

44 000 *(log 2)*(1+ 15/1)

=44000 *log2 (16)

=44000*4

=176000 bps

(3) Suppose you have been asked to design a network with Internet services to an office of 50 staff with the constraints given below

- All the staff have individual desktops.

- Only the executive staff of 10 will have access to both email and web access.

- All the staff need access to email.

- Mail and web services are provided by an ISP.

- The system must provide an adequate level of network security from external threats.

(i) State the basic equipment (active components) that you will require for the network and draw a high level diagram showing the interconnectivity.

(15 marks)

Router,

Switchers,

firewall, or NAT box (the router itself can do this

(ii)   Explain a mechanism by which you can provide a few of the staff with both email and web access while all the others are served with email only.

(15 marks)

Using user based access privileges, using access lists (ACL), MAC, IP based filtering , port

filtering

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