Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 4, Semester 1 (2022)

Computer Systems and Network Administration (IT4110)

Duration: 2 Hours

June 2022

Instructions to Candidates:

- This paper is preceded by a 10-minute reading period. The supervisor will indicate when answering may commence.
- This paper contains 4 (Four) questions on 5 (Five) pages (including the cover page)
- Answer all questions
- The entire exam is worth **100 marks** which contributes to **50%** of the final grade.
- All questions carry equal marks. The marks assigned for each part of a question is indicated in brackets.
- Exam paper is to be collected back with the answer booklet.

Question 1 **(25 Marks)**

a. Explain the major advantage of asymmetric cryptography over symmetric key cryptography? (5 marks)

b. Symmetric encryption algorithms use a combination of two basic types of ciphers: substitution cipher and transposition cipher. "One-time pad Cipher" can be identified as one of the substitution cipher techniques.

Encrypt the plain text: "**THIS IS SECRET**" using the One-time pad Cipher encryption process.

Plain text – "THIS IS SECRET"
Seret Key – "QCPW CO FSRXHS"

(10 Marks)

c. Encipher the following message using the one-time pad (OTP) or Vigenère Cyphering Discuss how you might do this (hint: represent each letter by a number, starting with 'a = 0). Using this method, encipher the below message using the key "Your First Name". .(eg Kamal)

"**THIS IS SECRET**"

(10 marks)

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
B	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a
C	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b
D	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c
E	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d
F	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e
G	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f
H	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g
I	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h
J	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i
K	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j
L	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k
M	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l
N	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m
O	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n
P	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
Q	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
R	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
S	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
T	t	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s
U	u	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
V	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
W	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
X	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w
Y	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x
Z	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y

Figure 1: Vigenère table

Question 2 **(25 Marks)**

a. You are asked to design a new computer network for ABC Campus. The campus has five (5) called Faculty A, Faculty B, Faculty C, Faculty D, and Faculty E located in five buildings. Faculties A, B, and C have approximately 1000 computers each, and Faculty D, and E has approximately 500 computers each. Requirements to be considered in your design are as follows:

(i) All computers on the campus should be networked and required to have internet access.

(ii) Any computer connected to the campus network should be able to communicate with any other computer within the network.

(iii) Server Room located at Faculty A where the corporate mail server, web server, proxy server, file servers, etc. are located.

(iv) Sites C, D and E have only PCs.

(v) The campus network is connected to the Internet at Faculty A.

(vii) Faculty B maintain Backup servers

Sketch your design showing the 5 sites, communication links, and main network equipment using enterprise network Campus design Structured engineering principles. Your answer should cover Hierarchy, Modularity, Resiliency, Flexibility,

(15 marks)

b. IPv6 is the new version of the Internet address protocol that has been developed to supplement (and eventually replace) IPv4, the version that underpins the Internet today.

i. Describe two features of IPv6

(3 marks)

ii. Interpret Full Ipv6 Address Represented By Ff02::130f:5

(2 marks)

c. Shorten the following IPv6 addresses

i. 2001:0db8:0000:0000: 0000:0123:0000:0100
ii. fe80:0000: dead:beef:07c8:0000:0000:7008
iii. 2002:7676:0404:9cad: 0443:89cb: 0047:0001
iv. 4786:0000:0000: 0000:0000:0000: 0001:0123
v. D770:0000:0000: 0012:0000:0000: 0000:078A

(5 marks)

Question 3 (25 Marks)

a. Describe the different types of models used for deployment in cloud computing (8 marks)

b. Compare SaaS and PaaS cloud with their advantages and disadvantages. (4 marks)

c. Cloud computing is the buzzword now in the field of information technology. It is the concept of where an organization has its data and application hosted on third-party infrastructure. Sometimes the applications are designed and developed by the service provider and the company using it uses that application against its own data. There are several factors for deciding in favor of it as well as several factors that raise strong questions about its acceptance. It is totally based on the need of the organization, whether it leverages cloud computing or not. As a consultant, you have been asked to prepare a report considering the potential risks and benefits of migrating existing servers into the cloud.

Hint: Your answer should cover significance of migration, advantages and disadvantages, risk, etc.? (13 marks)

Question 4 (25 Marks)

a. Answers the questions based on the given network topology diagram (Figure 4.1)

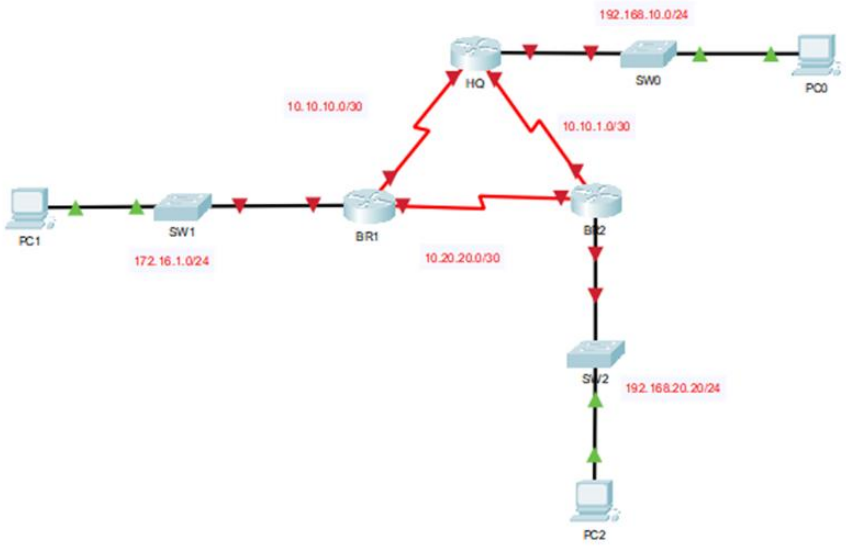

Figure 4.1 -Topology Diagram

i. Write down all the configurations that you are using to configure EIGRP (Enhanced Interior Gateway Routing Protocol) in router HQ. Assume that this router belongs to the AS 20.

HQ(config)#router eigrp 20 [2]
HQ(config)#network 10.10.10.0 0.0.0.3 [2]
HQ(config)#network 10.10.1.0 0.0.0.3 [2]
HQ(config)#network 192.168.10.0 0.0.0.255 [2]

(6 marks)

ii. Name the command which uses to list down all EIGRP routes on the HQ router. This command should only list down EIGRP entries.

HQ#show ip route eigrp

(4 marks)

b. Today, email is delivered using client/server architecture. An email message is created using a mail client program. This program then sends the message to a server. The server then forwards the message to the recipient's email server, where the message is then supplied to the recipient's email client. To enable this process, a variety of standard network protocols allow different machines, often running different operating systems and using different email programs, to send and receive email. Using a diagram to describe the process of a mail server

(8 marks)

c. Dynamic Host Configuration Protocol (DHCP) is a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. Describe how to use the DHCP server to assign IP addresses for large no of computers in the typical organization.

(7 marks)

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