SLIATE
SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION
(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Information Technology

First Year, Second Semester Examination - 2018

HNDIT 1213 – Data Communication and Computer Networks

MARKING SCHEME

Instructions for the Candidates:
Answer any five questions.
All questions carry equal marks.

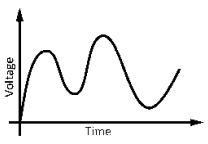
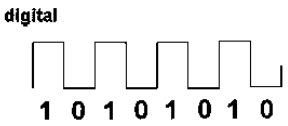
No of Pages: 11
No. of Questions: 06
Time: Three (03) hours

Question 01

(I) Define the term **"Computer Network"**. (03 Marks)

Two or more computers (computing devices) connected each other with communication links	**(03 Marks)**
OR	
two or more computer or devices	(2 Marks)
connected with network or communication media	(1 Mark)

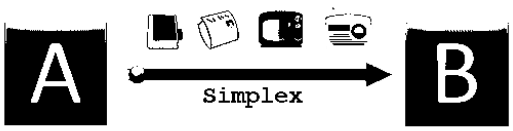
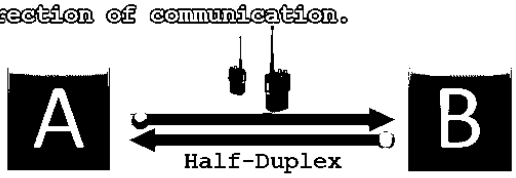
(II) Compare and contrast the **Analog** and **Digital Signals.** (06 Marks)

Analog Signal	*Digital Signal*
	
Continuously varying signal (01 Mark)	Discrete signal (01 Mark)
Analog signal has more information on it (01 Mark)	Digital signal has less information on it (01 Mark)

There are infinite number of levels between two points in a signal (01 Mark)	There is not intermediate signal levels (01 Mark)
OR	
If just only two pictorial representations are correct and no explanations, offer 02 marks. If explanations are there, don't consider the pictorial representation.	

(III) Explain the two terms **Simplex** and **Half Duplex** with the help of a diagram.

(04 Marks)

	02 Marks
	02 Marks
OR	
Simplex mode, the communication can take place in only one direction all the time.	02 Marks
Half Duplex mode, Transmits in both directions but in one direction at a time.	02 Marks

(IV) Write the command which you use to view **ip configurations** of a computer which runs windows operating system? (02 Marks)

Ipconfig (02 Marks)

(V) Write the answer for the following questions based on the Figure – A.

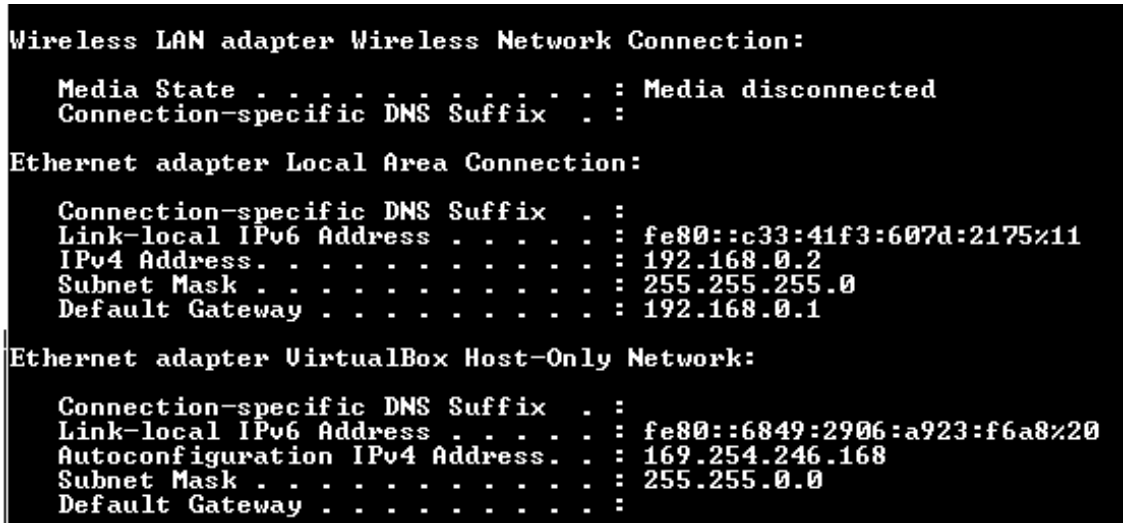


Figure - A

i. What is the **IP address** of the computer? (02 Marks)

192.168.0.2 (02 Marks)

ii. What is the **network address** of the computer? (02 Marks)

192.168.0.0 (02 Marks)

iii. How many network connections are available? (01 Mark)

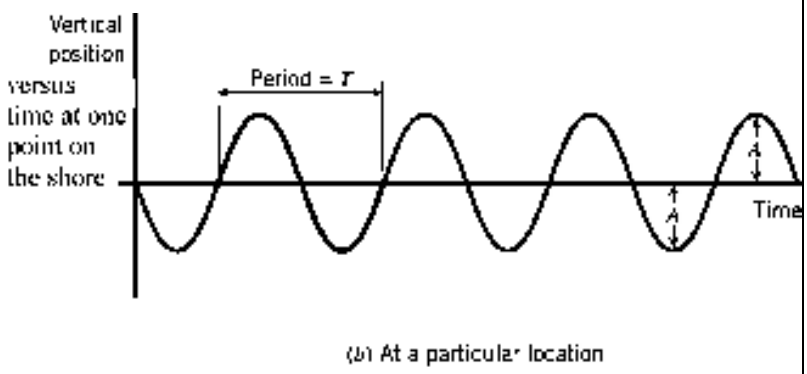
Two connections (01 Mark)

(Total =20 Marks)

Question 02

I. Draw a sinusoidal wave and illustrate **Amptitude** and **Period** on the same diagram.

(04 Marks)



Amplitude	(02 Marks)
Period	(02 Marks)

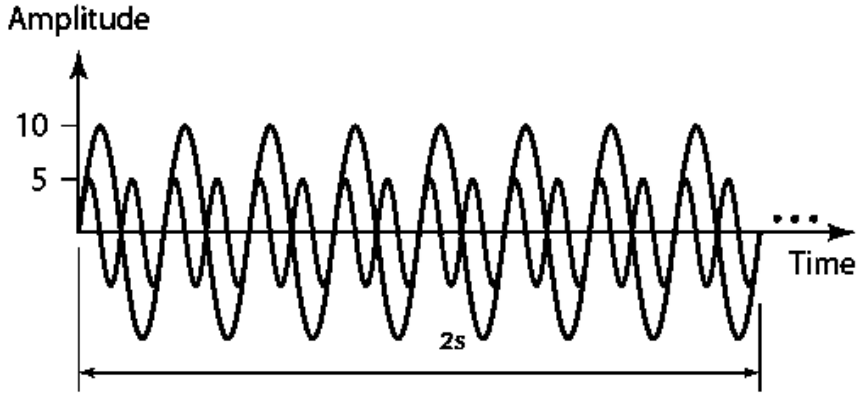
II. A signal transmitted over a channel has 50 Hz frequency. Calculate the **period** of the wave in milli seconds(ms). (Show all the units and equations used for your calculation)

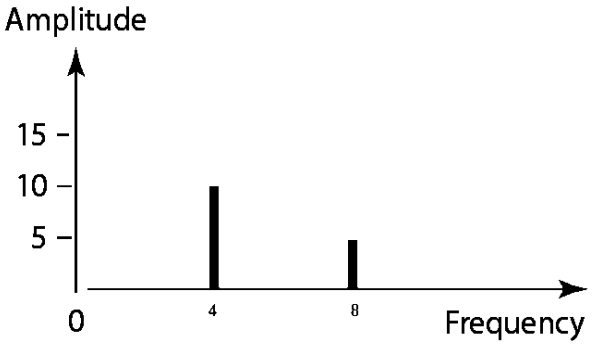
(06 Marks)

$Period = \frac{1}{Frequency}$	(02 Marks)
$Period = \frac{1}{50Hz} = 0.02Seconds$	(02 Marks)
$0.02X1000ms = 20ms$	(02 Marks)

III. Following diagram shows a **Time Domain** representation of two **sine** wave signals. Considering the given information draw the **Frequency Domain** representation of the two signals.

(06 Marks)





For identifying a correct frequency "4".	**(02 Marks)**
For identifying a correct frequency "8".	**(02 Marks)**
For correct amplitudes	**(02 Marks)**

IV. A periodic signal is decomposed into six sinewaves with frequencies 150Hz, 200 Hz, 300 Hz, 600Hz, 900 Hz and 1200 Hz. Calculate the bandwidth of the signal.

(04 Marks)

Bandwidth = (Maximum Frequency – Lowest Frequency)	**(02 Marks)**
Bandwidth = 1200 Hz – 150 Hz = 1050 Hz	**(02 Marks)**

(Total =20 Marks)

Question 03

I. Name three (03) Transmission impairments. (03 Marks)

Attenuation	(01 Mark)
Distortion	(01 Mark)
Noise	(01 Mark)

II. Define the term **Noise** and provide three (03) types of noises in communication links

(06 Marks)

Unwanted energy comes for a communication is Noise.	(03 Marks)
Thermal noise, Induced noise, Crosstalk, Impulse noise, Shot Noise, White Noise, Galactic Noise.	Any 03 (03 Marks)

III. Briefly explain **Peer – to – Peer** networks (03 Marks)

Simple network without servers is called a peer to peer networks	(03 Marks)

IV. Write two (02) advantages of **Client Server Networks.** (04 Marks)

1. Centralized User accounts, 2. security and Access controls so the network administration is simple and easy 3. support for large number of users where resources are heavily used 4. efficient to access 5. or any two acceptable answers	(02 X 2 = 04 Marks)

V. Draw a diagram and briefly explain two (02) network topologies.

(04 Marks)

Suitable diagram and explanation for two network topologies.	(02 Marks X 2 = 04 Marks)

(Total =20 Marks)

Question 04

I. List three (03) layers in **TCP/IP** model, (03 Marks)

Application, Transport, Internet, Network Access	**Any 03 (03 Marks)**

II. Name the seven (07) layers of **OSI** model. (04 Marks)

Physical, Data Link, Network, Transport, Session, Presentation, Application Layers.	07 Layers (04 Marks) 06 Layers (03 Marks) 01 Layer (01 Mark)

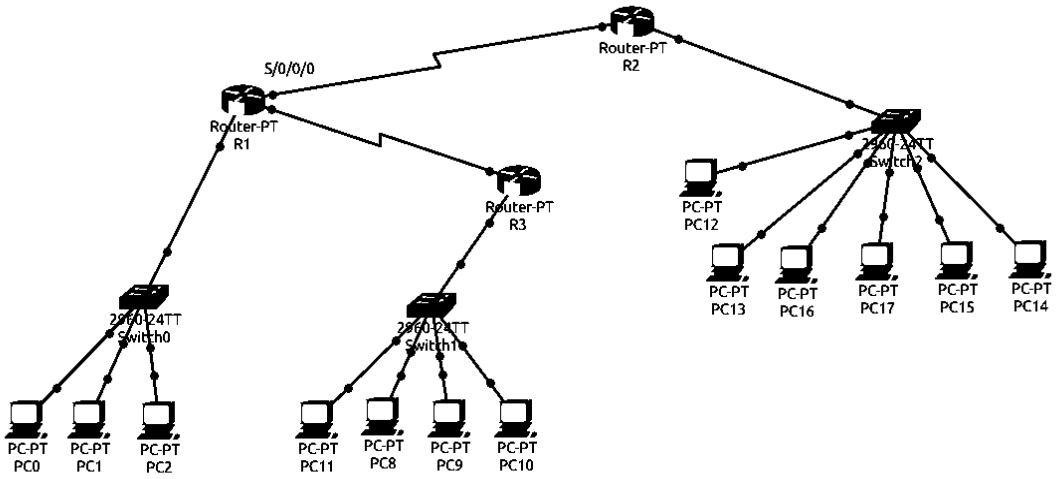
III. Briefly explain the two terms **Unicast** and **Multicast**. (04 Marks)

Unicast i. Unicast is the term used to describe communication where a piece of information is sent from one point to another point. ii. In this case there is just one sender, and one receiver.	(02 Marks)
Multicast i. Multicast is the term used to describe communication where a piece of information is sent from one or more points to a set of other points. ii. In this case there is may be one or more senders, and the information is distributed to a set of receivers (there may be no receivers, or any other number of receivers).	(02 Marks)

OR

Correct pictorial representations, student can earn 02 marks

IV. Consider the following diagram and assign suitable **ip addresses** for the devices shown in the diagram. (09 Marks)



1.Three networks should be assigned with **Class C** private ip range ip addresses 2. routers should have any acceptable ip address with sub netted subnet mask to save ip addresses	correct class C IP ranges for three networks **(02X3 = 06 Marks)** Correct IP address at three router interfaces **(01 X 3 = 03 Marks)** if IP addresses assigned for networks other than class C reduce 02 Marks from the above allocated marks

(Total =20 Marks)

Question 05

I. Define the term **Protocol**. (02 Marks)

Set of rules used in communication	**(02 Marks)**

II. Briefly explain **Physical Address** and **Logical Address** in networking.

(04 Marks)

Physical Address: 1. MAC (Media Access Control) Address 2. Structure of MAC addresses AA:BB:CC:DD: 11: 2A 3. Any acceptable description about MAC address	(02 Marks)
Logical Address: Any acceptable description of IP Address	(02 Marks)

III. Mention three (03) protocols used in networking and their port numbers

(06 Marks)

Protocol	FTP	SSH	TELNET	SMTP	HTTP	POP3	HTTPS	DNS	SNMP	Any 03 (1X3=03 Marks)
Port Number	20,21	22	23	25	80	110	443	53	161	Any 03 (1X3=03 Marks

Or

Any other acceptable 03 valid protocols and correct port numbers	(3 X 02= 06 Marks)

IV. Briefly explain the difference between **Switch** and **Hub**. (04 Marks)

Switch	1. Intelligent Device 2. Has more broadcast domains	02 reasons (02 Marks)
Hub	1. Non-Intelligent Device 2. Only one broad cast domains 3. Work as an amplifier	02 reasons (02 Marks)

V. Write four (04) advantages of **Fiber Optic** cables. (04 Marks)

1. Light in weight 2. Immunity to Electro Magnetic Interference 3. Ability to communicate in longer distances 4. Higher Bandwidth in communication	**(01 X 4 Marks = 04 Marks)**

(Total =20 Marks)

Question 06

I. Write default subnet masks of given IP addresses in **binary format**.

a. 191.215.3.7

b. 126.34.8.9 (02 Marks)

11111111. 11111111. 00000000.00000000	(01 Mark)
11111111. 00000000. 00000000. 00000000	(01 Mark)

II. Write two (02) purposes of a **Router.** (02 Marks)

1. Connect two or more different technology networks 2. provide routing information 3. Perform Routing 4. Find the best path in a network to the destination OR for any two suitable answers	(01 X 2 = 02 Marks)

III. What is the role of **MAC Address** in computer network? (02 Marks)

Identify network interface uniquely	(02 Marks)

IV. Write the answers to the questions asked in part (a – e) , by considering the IP address given in **CIDR** notation.

IP Address **176 . 224 . 112 . 230 / 26**

a) Default class of the above IP address (02 Marks)

Class B	(02 Marks)

b) Network address on this subnet (02 Marks)

Network Address of subnet	*10110000*	*11100000*	*01110000*	*11000000*	(02 Marks)

OR

Network Address of subnet	*176.224.112.192*	(02 Marks)

c) Number of hosts on this subnet (02 Marks)

$2^6 - 2$ = 62 hosts	(02 Marks)

d) First host on this subnet (02 Marks)

176 . 224 . 112 . 193	(02 Marks)

OR

10110000	*11100000*	*01110000*	11000001	(02 Marks)

e) Last host on this subnet (02 Marks)

176 . 224 . 112 . 254	(02 Marks)

OR

10110000	*11100000*	*01110000*	11111110	(02 Marks)

f) Broadcast address on this subnet (02 Marks)

176 . 224 . 112 . 255	(02 Marks)

OR

10110000	*11100000*	*01110000*	11111111	(02 Marks)

g) Number of subnetworks (02 Marks)

2^2 = 4 subnets	(02 Marks)