



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 – 2021

HNDIT2042-Data Communication and Computer Networks

(Model Answer)

Instructions for Candidates:

Answer (5) questions only

Non programmable calculators are allowed

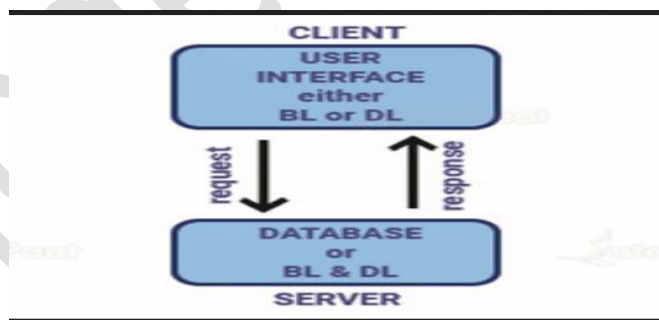
No. of questions : 6

No. of pages : 11

Time : 3 hours

Question 01

1. i.) Briefly explain Internet, Intranet and Extranet (3 Marks)
Internet-Network of Network
Globule Network
Intranet-Share the information within organization
Extranet – Share the information with organization and outside organization
(suitable answer)
- ii.) Explain 2-tier Client/Server model (4 Marks)



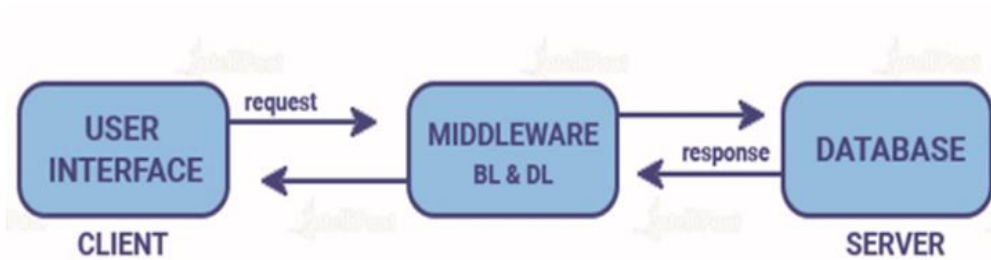
The 2-tier Architecture is based on a client-server machine. In this type of architecture, the applications on client-side interact directly with the database present at the server-side. (Suitable Answer with drawing)

- iii.) Explain benefits of 3-tier over 2-tier Client/Server model (4 Marks)
security
The application logic in the middle-tier is more independent of the client and the back-end server
It should be more robust

The application logic in the middle-tier can work more easily with data from multiple source.

Encourage multiple back-end server.

Encourage data distribution



...(any correct answer with drawing 4 Marks)

iv.) Write down four advantages of **Leased Line** (4 Marks)

- Dedicated connection between customer premises and provider local exchange
- Bandwidth is dedicated to a customer
- Symmetric speed
- High performance
- High reliability
- Greater speed

Public IP are generally provided ...(any four answer 4 Marks)

v.) Compare and Contrast Fiber cable and Cat 6 Cable (5 Marks)

Fiber optic cables are unique from other types of cabling, especially cat6.

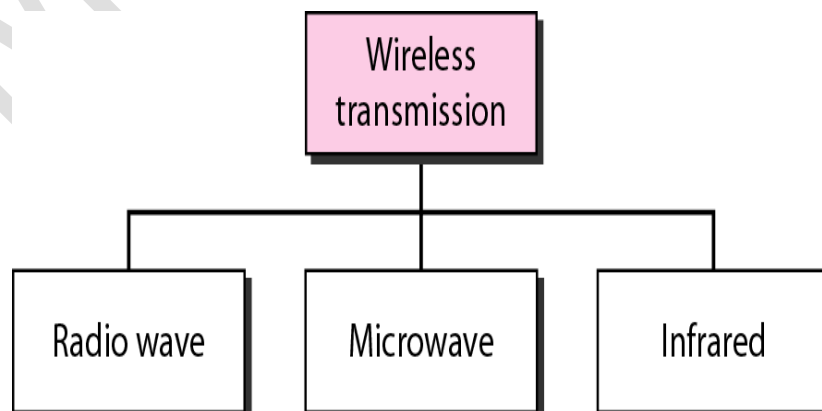
Instead of relying on electrical power to bounce signals through the wiring, the

Twisted pair cable	Optical fiber
1. Transmission of signals takes place in the electrical form over the metallic conducting wires.	1. Signal transmission takes place in an optical form over a glass fiber.
2. In this medium the noise immunity is low.	2. Optical fiber has highest noise immunity as the light rays are unaffected by the electrical noise.
3. Twisted pair cable can be affected due to external magnetic field.	3. Not affected by the external magnetic field.
4. Cheapest medium.	4. Expensive
5. Low Bandwidth.	5. Very high bandwidth
6. Attenuation is very high.	6. Attenuation is very low.
7. Installation is easy.	7. Installation is difficult.

...(any two answer 5 Marks)

Question 02

i.) Briefly explain three type of wireless media (3 Marks)



- ii.) Write four advantages Wireless Network (4 Marks)
 Mobility
 Flexibility
 Cost-effectiveness
 Easy installation and setup
- iii.) ABC company need to block face book in the network. What solution you are propose? (2 Marks)
 Proxy server (any other suitable answer)
- iv.) What is IoT (2 Marks)
 Internet of the thinks
- v.) Write five IoT **Technologies and Trends** (5 Marks)
 Artificial Intelligence (AI)
 Social, Legal and Ethical IoT
 Infonomics and Data Broking
 The Shift from Intelligent Edge to Intelligent Mesh
 IoT Governance
 Sensor Innovation
 Trusted Hardware and Operating System
 Novel IoT User Experiences
 Silicon Chip Innovation
 New Wireless Networking Technologies for IoT ...(any five answer 5 Marks)
- vi.) Write down Two names Cloud Business Applications (2 Marks)
 Mailchimp, Chatter ,Google App, Quickbooks ...(any two answer 2 Marks)
- vii.) Write down two names Cloud Database (2 Marks)
 FireBase,MongoDb,Google Cloud platform ...(any two answer 2 Marks)

Question 03

- i.) List the Layers in TCP/IP reference Model (4 Marks)
 Layer 4: Application
 Layer 3: Transport
 Layer 2: Internet
 Layer 1: Network access
- ii.) Write down the functions of 2 Layers given in part (i) above. (4 Marks)

network access layer- Concerned with all of the issues that an IP packet requires to actually make the physical link. All the details in the OSI physical and data link layers.

Electrical, mechanical, procedural and functional specifications.

Data rate, Distances, Physical connector.

internet layer- Send source packets from any network on the internetwork and have them arrive at the destination independent of the path and networks they took to get there.

Packets, Logical addressing.

Internet Protocol (IP).

Route , routing table, routing protocol.

transport layer- transport layer deals with the quality-of-service issues of reliability, flow control, and error correction.

Segments, data stream, datagram.

Connection oriented and connectionless.

Transmission control protocol (TCP).

User datagram protocol (UDP).

End-to-end flow control.

Error detection and recovery.

application layer- Handles high-level protocols, issues of representation, encoding, and dialog control.

The TCP/IP combines all application-related issues into one layer, and assures this data is properly packaged for the next layer.

FTP, HTTP, SMTP, DNS ...

Format of data, data structure, encode ...

Dialog control, session management ...(any two answer 4 Marks)

iii.) Briefly explain the following protocols

- a.) HTTPS
- b.) ICMP
- c.) SSH
- d.) IMAP

(4 Marks)

- **HTTPS: Hyper Text Transport SSL (Secure)-** HTTPS consists of communication over Hypertext Transfer Protocol (HTTP) within a connection encrypted by Transport Layer Security or its predecessor, Secure Sockets Layer.
- **ICMP (Internet control message protocol)**

Error Messages

Intended for the TCP/IP software itself
PING (host unreachable messages)
Simple Headers

- **SSH: Secure Shell telnet for remote login** - A cryptographic network protocol for operating network services securely over an unsecured network.

The best known example application is for remote login to computer systems by users.

- **IMAP-Internet Mail Access Protocol**

Improved POP3
Automatically assigns folders
Leaves mail on server
Only transfers as much as needed per message (headers, subject only on list)

iv.) Write Down suitable protocols use following cases

- a.) In the Network have Five Host. Host are not assigning IPs statically . It is automatically assign.
- b.) Saman Download YouTube video using Internet
- c.) Lecturer conducting lectures using zoom (3 Marks)

a-DHCP

b-TCP

c-UDP

v.) Explain functions of Router (3 Marks)

It is Layer 3 Device

Froward packet one network to Other Network

Understanding IP

It can configure routing protocols

vi.) Explain functions of Switch (2 Marks)

It is Layer 2 device

Understating MAC

Broadcasting Frame in within Network

Question 04

- 1.) i.) Write down three types of IPV4 Private IP ranges with Class (3 Marks)

Class	First octet value
A	0-127
B	128-191
C	192-223

- ii.) ABC company has three departments IT, HR and Accounts. IT Department has 14 hosts, HR Department has 28 hosts and Accounts Department has 90 hosts. ABC Company need to divided three sub netting -Fill in the blanks following tables

	ITDepartment	HR Department	Accounts Department
Subnet Marks	255.255.255.224	255.255.255.224	255.255.255.128
Unicast IP	192.168.1.0	192.168.1.32	192.168.1.128
Start IP	192.168.1.1	192.168.1.33	192.168.1.129
Last IP	192.168.1.30	192.168.1.62	192.168.1.254
Broad Cast IP	192.168.1.31	192.168.1.63	192.168.1.255
Number of Host	30	30	126
Number of Ips	32	32	128
CIDR	27	27	25

(12 Marks)

- iii.) Write a command to view computer logical address and physical address (2 Marks)

ipconfig

ipconfig /all (Suitable Answer 2 Marks)

- v.) How to check whether A and B computer properly connected in the Network

A IP address is 192.168.0.1 and B IP address is 192.168.0.2 (3 Marks)

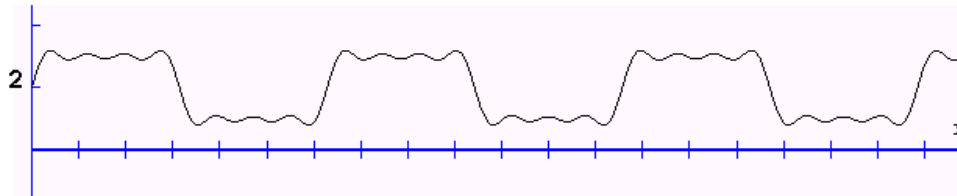
User in A computer ping 192.168.0.2

User in B computer ping 192.168.0.1

(Suitable Answer 3 Marks)

Question 05

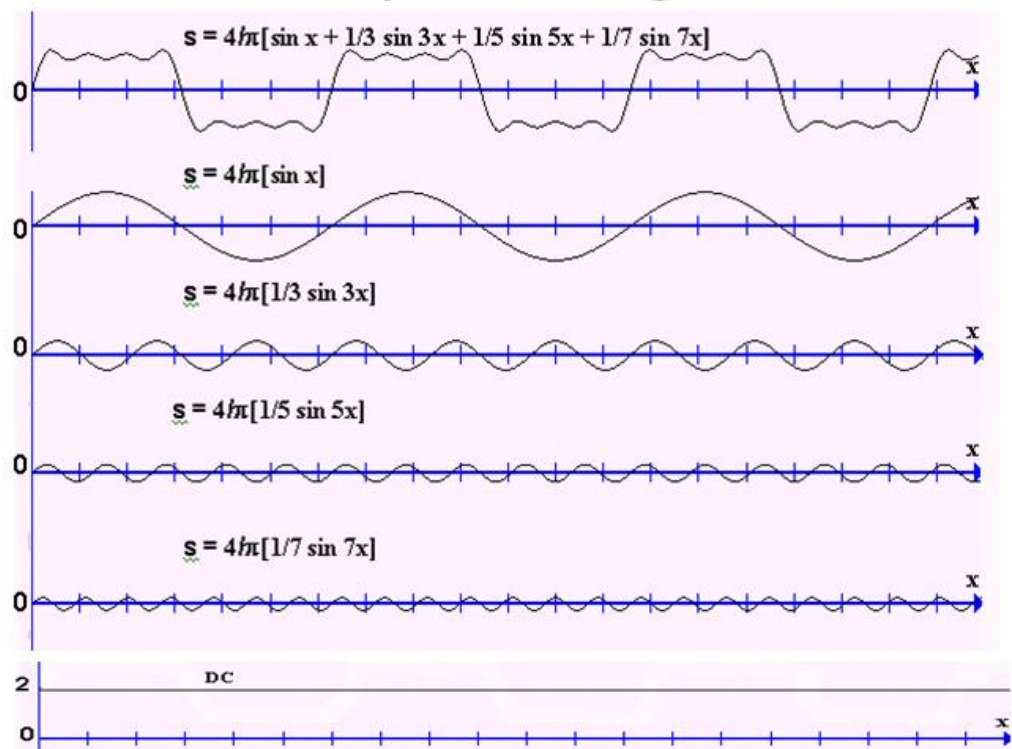
i.) Consider the following periodic composite (non sinusoidal) signal.



It can be mathematically represented as follows.

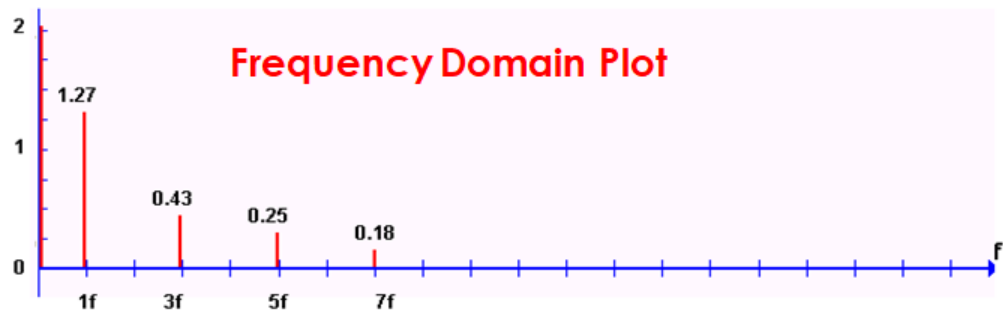
$$S(t) = 2 + 4/\pi [\sin x + 1/3 \sin 3x + 1/5 \sin 5x + 1/7 \sin 7x]$$

a.) Draw the four frequency signal and one DC signal, (Hint-it can be decomposed using S (t) equations). (10 Marks)



(Graph is correct full marks otherwise Any Frequency Graphs 2 Marks and DC Signal Graphs 1 Marks)

b.) Draw the **Frequency Domain Plot** above signals (4 Marks)



(Graph is correct full marks otherwise zero marks)

ii.) Write down computer security objective CIA triad (3 Marks)

Confidentiality, Integrity, Availability

iii.) Explain Threats, Vulnerabilities, and Impact on computer security (3 Marks)

When a threat exploits a vulnerability it results in a loss. The impact identifies the severity of the loss.

- A threat is any circumstance or event with the potential to cause a loss. You can also think of a threat as any activity that represents a possible danger. Threats are always present and cannot be eliminated, but they may be controlled.
- Threats have independent probabilities of occurring that often are unaffected by an organizational action. As an example, an attacker may be an expert in attacking Web servers hosted on Apache. There is very little a company can do to stop this attacker from trying to attack. However, a company can reduce or eliminate vulnerabilities to reduce the attacker's chance of success.

Question 6

i.) Write down The Three Elements of Access Control (3 Marks)

Identification, Authentication, Authorization, Custodian

(if any three 3 Marks)

ii.) Explain User Account Control (UAC) (3 Marks)

- Asks the user for permission when installing software
- Principle of **least privilege**
- Users run with limited privileges by default

- Applications run in standard user accounts
- Standard users can perform common tasks

(if any three 3 Marks)

iii.) Write down three Logical access controls

(3 Marks)

- Access control lists (ACLs)
- Group policies
- Account restrictions
- Passwords

(if any three 3 Marks)

iv.) Name three qualities that a good password should have

(4 Marks)

- At least 12 characters long but 14 or more is better.
- A combination of uppercase letters, lowercase letters, numbers, and symbols.
- Not a word that can be found in a dictionary or the name of a person, character, product, or organization.
- Significantly different from your previous passwords

(Or Any 4 suitable answer 4 Marks)

v.) Imagine you are a computer network administrator of an international company.

What practice should be followed for the security of his computer network?

Write at least four.

(4 Marks)

Be Organized

Develop And Enforce A Strong Password Policy

Build A Vulnerability Management Program

Install Endpoint And Antivirus Protection

Ensure Firewalls Are Properly Configured

Set User Access Permissions

Develop Data Backup Solutions

Don't Forget Spam And Email Security

(Related Answer – Any four 4 Marks)

vi.) Cyber attacks are a war that the world has not been able to prevent at this time.

The only solution for that is everyone's follow good behavior in the cyber space.
But it doesn't happen like that. Do you agree with this idea? Submit your opinion.

(4Marks)

Yes,(any Suitable Answer)