



UNIVERSITY OF RUHUNA  
BACHELOR OF COMPUTER SCIENCE (BCS) (GENERAL) DEGREE  
LEVEL II (SEMESTER I) EXAMINATION – July 2016

COURSE UNIT : CSC2113 - Data Communication & Computer Networks      TIME : 2 Hours

Answer All Four (04) Questions

1.

a.

- i. Define the theorem to calculate the highest data rate (channel capacity) for noisy channel.
- ii. Consider a noisy channel in which the power of a signal is 100 mW and the power of the noise is 1  $\mu$ W. What is the Signal-to-Noise Ratio (SNR) of the above channel?
- iii. Calculate the highest channel capacity for the above channel if the bandwidth of the channel is 3000 Hz.

b. Briefly explain the difference between the following terms.

- i. Analog Signal and Digital Signal
- ii. Data rate and Signal rate
- iii. Single bit error and Burst error
- iv. Asynchronous Transmission and Synchronous Transmission

c.

- i. Briefly describe the three (03) main types of impairments that affect data transmission.
- ii. When a signal travels through a transmission medium its power is increased 100 times. Calculate the gain of the signal in decibel.

2.

a. Multiplexing is a technique that allows effective bandwidth utilization.

- i. List two multiplexing techniques that can be applied for analog signals.
- ii. Briefly explain the multiplexing process of the above techniques.



iii. Explain how Statistical Time-Division Multiplexing addresses the drawback of Synchronous Time-Division Multiplexing.

b.

i. What is meant by switching in communication system?

ii. Briefly explain the three (03) phases in circuit switched network using a diagram.

iii. State two (02) disadvantages of using a circuit switched network.

c. You are asked to subnet the 192.28.48.0/24 IP address block to the following subnets.

Subnet	Number of Hosts
Subnet One	102 hosts
Subnet Two	53 hosts
Subnet Three	29 hosts
Subnet Four	25 host

Write down each subnet in CIDR form and each subnet's first and last valid IP that can be assigned to hosts.

3.

a.

i. Match each IP address with the appropriate term.

Term	IP Address
Host Address	192.248.140.255
Subnet Mask	192.168.14.0
Broadcast Address	255.255.255.0
Network Address	192.168.40.11

ii. A block of IP addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first and last address of this IP block?



b. Assume that you know an IP address of a host in a particular LAN. Explain how the Address Resolution Protocol (ARP) is able to obtain the MAC address of that host.

c. Write short answers for the following questions with regard to Internet routing.

- i. Write two main functions of an IP router.
- ii. Why adaptive routing is preferred over fixed routing?
- iii. List three (03) examples of routing protocols.
- iv. List three (03) routing protocol metrics.

- d. :
- i. Complete the Routing Table I for router R1, using the configuration given in Figure I.

Mask	Network Address	Next Hop	Interface
/26	180.70.65.192	-	M2
		-	
		-	
Any	Any		

Routing Table I

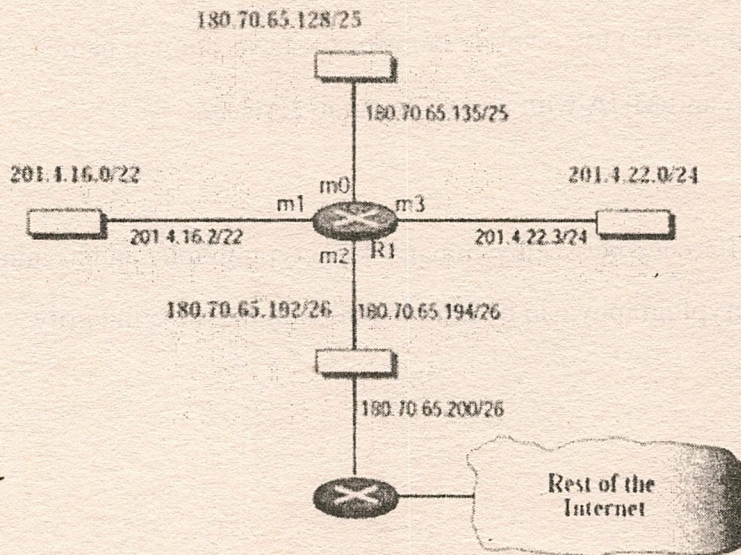


Figure I

- ii. Show the packet forwarding process if a packet arrives at R1 with the destination address 180.70.65.140.



4.

a. Explain the difference between direct and indirect delivery in a TCP/IP network using suitable examples.

b.

i. What is the role of port numbers in the transport layer?

ii. Write down the application layer protocol, port number and transport layer protocol for each of the application listed in the table below.

Application	Application Layer Protocol	Port Number	Transport Layer Protocol
WWW			
Email			
TFTF			
DNS			

iii. IANA has divided the port numbers into three (03) ranges. List three (03) ranges and briefly explain two of them separately.

c.

i. Explain the functionality of the Domain Name Service (DNS)

ii. What are the three (03) top level domains of the DNS domain name space?

iii. Describe MTA and MUA with respect to email service.

d.

i. Explain the difference between symmetry-key cryptography and asymmetric-key cryptography.

ii. Explain how cryptography can be used to maintain message integrity.