BUE The British University In Egypt الجامعة البريطانية في مصر	**Examination Paper Proofing & Printing Confirmation Sheet**

Module Title : Introduction to Computer Networks and Communications	Module Code: ***15CSCN01I***
Module Leader Assoc. Prof. Amal ElNahas	Semester ONE
Proofed by : Prof.Dr. Omar Karam	Date of examination

I hereby confirm:

That this examination paper assesses the ILOs defined in the module specification	√
That appropriate model answers were provided with this examination paper	√
That this examination paper has been proof-read and is approved for printing	√
That this examination paper follows the approved University template	√

Signed (Proof Reader): Prof. Omar Karam

Printing instructions & stationery requirements

Number of copies of examination paper to be printed		170
Date of examination		
		Number required per student
Stationery Requirement(s)	8 page answer book	One
	12 page answer book	
	Graph paper	
	Other	

Signed (Module Leader) Dr. Amal ElNahas

BUE The British University In Egypt الجامعة البريطانية في مصر	**Module Code 15CSCN01I Final Examination, 2015-2016**
Module Title: Introduction to Computer Networks and Communications	
Module Leader: Assoc. Prof. Amal ElNahas	Semester: One
Equipment allowed (for example calculator)	Calculator

Instructions to Students

- *You should attempt all questions*
- *The exam paper is **3** pages long, and is in **1** section.*
- *The approximate allocation of marks is shown in brackets by the questions.*

This examination is **2** hours long.

Answer All Questions

Q 1 Which OSI layer is responsible for the following:

i. Determining the best path to route packets

ii. Providing connection-oriented (if needed) for application which need reliable service between hosts.

iii. Fragmentation of large packets

iv. Adding the physical address of the next hop to its protocol header

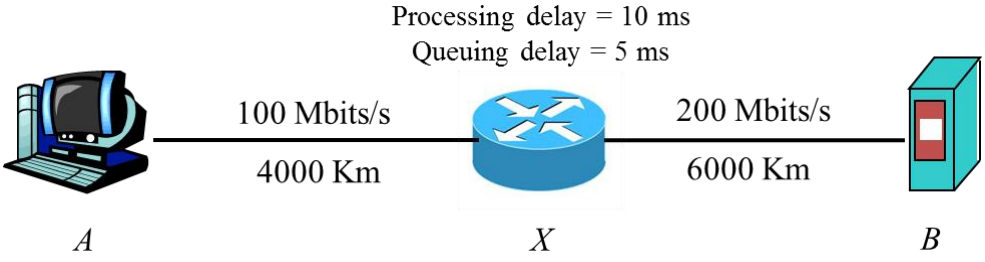
[Total: 16 marks]

Q 2 The following sequence of events takes place in order for Host A to send a message to Host B.

i. Host A sends a message of size 50 Mbits to router X. The transmission speed is 100 Mbits/s and the length of the link is 4000 Km.

ii. Router X forwards the packet (after a processing delay of 10ms and queuing delay of 5ms) to Host B. The transmission speed of the router is 200 Mbits/s and the length of the link is 6000 Km.

This network is illustrated in the figure below. Calculate the total delay until the message reaches host B. You may assume that the propagation speed over both links is always 2.0×10^8 m/s.



[Total: 16 marks]

Q 3 i. Given the following classful IP addresses, classify which of them are class A, class B or class C and write their corresponding masks.

[12 marks]

IP address	**Class and subnet mask**
IP: 127.0.0.1	Class: Subnet mask:
IP: 212.23.56.7	Class: Subnet mask:
IP address:123.164.8.8	Class: Subnet mask:

ii. An organization has a class C network of address 207.100.200.0 and it wants to form subnets for 4 departments with the number of hosts as follows:

- Subnet A: 62 hosts
- Subnet B: 35 hosts
- Subnet C: 40 hosts
- Subnet E: 28 hosts

Provide a possible arrangement of the network address space, together with the respective range of IP addresses for each subnet and the subnet mask. Explain your work **[16 marks]**

[Total: 28 marks]

Q 4 An IP datagram carrying 3 Kbytes of data must be sent over a link that has an MTU of 1000 bytes. Assume the datagram has an Identification number 224 and an IP header of 20 bytes.

i. How many fragments will be generated? **[4 marks]**

ii. State the values (in decimal numbers) of the following fields for each of the fragments:

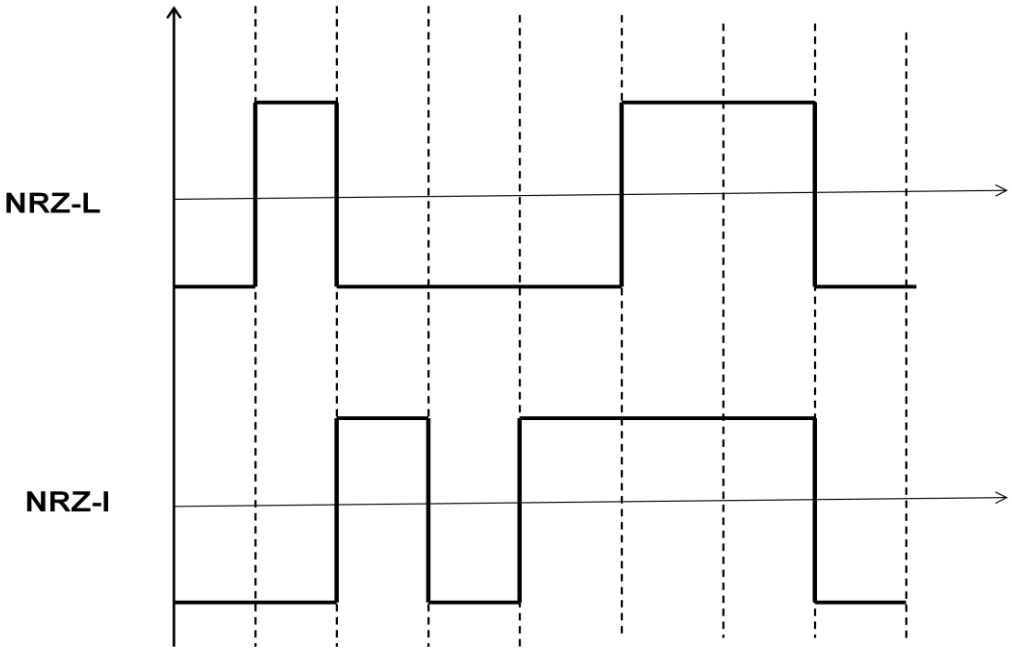
Identification, Total Length, D-bit, M-bit, Fragmentation Offset

[18 marks]

[Total: 22 marks]

Q5 For the following signal encodings, what is the corresponding bit stream in each case?

[18 marks]



Model Answer

BUE The British University In Egypt الجامعة البريطانية في مصر	**Module Code** ***15CSCN01I*** **Final Examination, 2015-2016**
Module Title: Introduction to Computer Networks and Communications	
Module Leader: Dr. Amal ElNahas	Semester **One**
Equipment allowed (for example calculator)	Calculator

Instructions to Students

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Model Answers

Q 1 i. Network layer

ii. Transport layer

iii. Network layer

iv. Data link layer

Q 2 Total delay = Transmission delay from A + propagation delay AX + queuing delay + processing delay + transmission delay from X + propagation delay XB

Total delay = (50e6/100e6) + (4000e3/2e8) + 5e-3 + 10e-3 + (50e6/200e6) + (6000e3/2e8) = 0.815s

Q 3 i.

IP address	**Class and subnet mask**
IP: 27.0.0.1	Class: A Subnet mask: 255.0.0.0
IP: 212.23.56.7	Class: C Subnet mask: 255.255.255.0
IP address:133.164.8.8	Class: B Subnet mask: 255.255.0.0

ii. Class C address gives us 8 bits for host id. To form 3 subnets, 2 bits are needed for subnetting, leaving 6 bits for host id per subnet.

The largest subnet can have up to 62 hosts (2^6-2=62 hosts). A possible solution would be as follows:

- Subnet A: 207.100.200.0 subnet mask: 255.255.255.0
- Subnet B: 207.100.200.64 subnet mask: 255.255.255.0
- Subnet C: 207.100.200.128 subnet mask: 255.255.255.0
- Subnet E: 207.100.200.192 subnet mask: 255.255.255.0

Q 4 Data size = 3000 bytes. MTU=1000 bytes including 20 bytes of header.

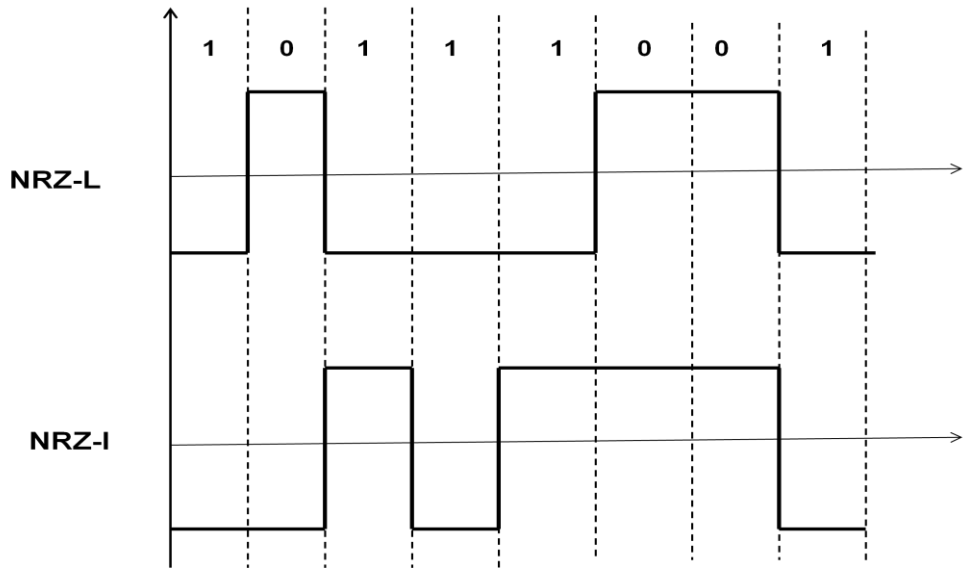
Thus maximum data size in an MTU = 976 (divisible by 8).

i. Total number of fragments = 3000/976 = 4 fragments

ii.

Fragment #	ID	Total Length	D-bit	M-bit	Fragmentation Offset
1	220	996	0	1	0
2	220	996	0	1	122
3	220	996	0	1	244
4	220	72	0	0	366

Q 5



Module Code: 15CSCN01I	**Title:** Introduction to Computer Networks and Data communication
Modular weight: 10	**Examination weighting:** 60%
Prerequisite modules: CSCI01P, CSCI08C	
Reassessment: No restriction.	
Module Leader: Assoc.Prof. Amal El Nahas	
Semester taught: 1	
Key words: Computer Communication**,** Network Systems, Network Protocols, Internet	
Date of latest revision: September 2015	

Aims

The aim of the module is to develop a structured approach in analysing the components and overall interconnection of networks in an abstract way. Basic concepts of data transfers over interconnected networks are introduced. Techniques and applications of computer networks and protocols, as well as the analysis of the functionality and purpose of essential networking devices are also discussed. Internet is considered as a case study.

Intended Learning Outcomes

On completion of this module students should be able to:

Knowledge and understanding

1. Describe the fundamental concepts and technologies of computer networks and data communications;[1]

Subject-specific skills

2. Recognise the specifications of network infrastructures and networking components and understand how they inter-work [11];
3. Critically evaluate and test of various applications used in networked environments [14];
4. Evaluate the various options and possible trade-offs for the construction of computer networks and data communications [10];
5. Deploy effectively the available tools and select appropriate and complete network solutions to given problems [12];

Key/transferable skills

6. Plan self-learning and improving performance as the foundation for on-going professional development [21].

Contents

- Types of networks; role and organisation of networks and distributed systems; data communication, and transmission media.
- Principles of network protocols: protocol layering, OSI reference model; Internet TCP/IP protocol suite.

- Web and email protocols (HTTP, SMTP), DNS
- Flow control and congestion control.
- Network layer: IP addressing, sub-netting and super-netting, CIDR; Fragmentation, routing algorithms.
- MAC addressing
- Use appropriate network simulation tools (for example: Opnet or Packet Tracer)

Methods of Learning, Teaching and Assessment

Total student effort for the module is 100 hours on average.

Learning and Teaching

Type of session	ILOs Assessed	Student Effort		
		Number in the Semester/s	Hours per week normally	Total hours
Lecture	1-3	12	2	24
Tutorial	NA			
Laboratory	4-5	12	2	24
Private study	1-3,6			52

Assessment

Assessment Focus	Weight %	Assessment Type	ILOs Assessed	Exam Semester	Exam/ Written Coursework Length (words)
Individual	20	1 hour In-class test	3-5	1	
Individual	20	1 hour Lab test	3-5	1	
	60	One 120 minute unseen written exam	1,2,3,6	1	

Feedback given to students in response to assessed work

Generic written feedback is given per student on both class test and lab exam.

Developmental feedback generated through teaching activities

Dialogue between students and staff in workshops and Labs

Indicative Reading List

- Data Communication and Networking, B. Forouzan, 4th edition, ISBN-10: 0073250325

- Computer Networking: a top down approach featuring the Internet, 6th edition, ISBN-10: 0132856204

Internetworking with TCP/IP, vol.1, D. Comer, ISBN-10: 0131876716