RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES
B.Sc. (General) Degree in Applied Sciences
Third Year Semester I/II Examination October/ November 2014

COM3401 – DATA COMMUNICATION AND NETWORKING

Answer **all** questions — Time: **3 hours**

1).

a) Define Simplex, Half Duplex and Full Duplex data transmission modes. [15 marks]

b) Discuss the advantages and disadvantages following network topologies.
   i) Bus
   ii) Star
   iii) Mesh
   iv) Ring [20 marks]

c) Briefly describe the functions and responsibilities of each layer in the ISO-OSI layered architecture. [35 marks]

d) Compare and contrast the following.
   i) Hub and Switch
   ii) Repeater and Bridge
   iii) Layer 3 Switch and Router [30 marks]

[Total: 100 marks]

2).

a) Briefly explain the following.
   i) Specific Addresses
   ii) Port Addresses
   iii) Logical Addresses
   iv) Physical Addresses [20 marks]

b) Compare and contrast TCP and UDP. [30 marks]

c) Briefly describe the purpose of any **seven** fields of the IP header. The fields of the IP header are given in **Figure 1**. [35 marks]

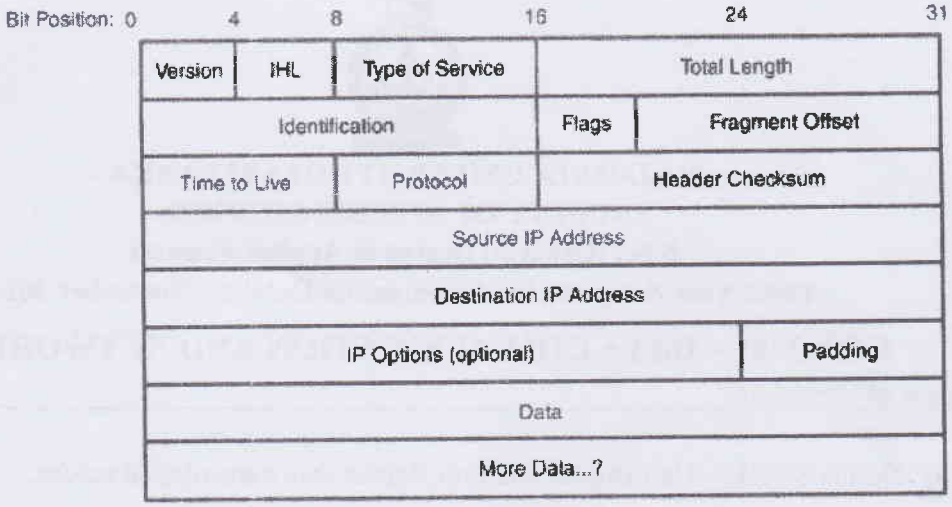

Figure 1

d) IP does not provide reliable transmission. Explain how IP achieve reliability. [15 marks]

[Total: 100 marks]

3).

a) Briefly describe the different types of switched networks. [30 marks]

b) What are single bit error and burst error in data transmission? [20 marks]

c) Briefly describe Distance Vector Routing and Link State Routing. [30 marks]

d) What is an Autonomous system? Briefly explain interior and exterior routing protocols. [20 marks]

[Total: 100 marks]

4).

a) Assume you have been working as a network engineer for a company which has 9 departments. You are supposed to design a local area network for the company. Numbers of hosts in each department are 52, 6, 2, 22, 50, 13, 5, 12 and 25. IPv4 address block which is allocated to subnets is 192.168.12.0/24.

Give the following of each of your subnets. [Clearly show how you derive the subnets]

i. Network Address
ii. Subnetmask
iii. Default Gateway
iv. Broadcast Address

(Hint: Include your workings on deriving the networks)

[40 marks]

b) What are the advantages and disadvantages of static IP configuration and Dynamic IP Configuration? [20 marks]

c) Briefly describe recursive and iterative DNS approaches. [30 marks]

d) What is the purpose of ARP? [10 marks]

[Total: 100 marks]

5).

a) Assume a new state university is established in Sri Lanka. You have been appointed as the network engineer of the new university. The university has five (05) faculties and an administration section. Each faculty has a separate building and consists of two departments. Departments are located in the faculty building and at the initial stage each department consists of three (03) computers to be connected to the network. Administration section also has a separate building in which the server room [Network Core] is located. Administration section also has (03) computers. You are free to select suitable devices and transmission media for the network.

i) Draw the design diagram for the above network. [20 marks]

ii) Indicate the type of devices and links in your diagram. [30 marks]

b) Find the followings in above design in part **a).**

i) Number of collision domains [15 marks]

ii) Number of broadcast domains [15 marks]

c) Compare and contrast UTP cables and Fiber cables? [20 marks]

[Total: 100 marks]