UNIVERSITY OF TECHNOLOGY SYDNEY

TO BE RETURNED AT THE END OF THE EXAMINATION.
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SURNAME: _____

FIRST NAME: _____

STUDENT NUMBER: _____

COURSE: _____

Final Examination – AUTUMN SEMESTER, 2011

SUBJECT NAME   : Communication Protocols

SUBJECT NO.   : 49202

DAY/DATE/TIME   : Saturday 18th June, 2011.   9:30AM to 12:40PM

TIME ALLOWED   : 3 Hours plus 10 Min. reading time

NOTES/INSTRUCTIONS TO CANDIDATES:
- Please read questions carefully
- Please write answers neatly
- Answer ALL QUESTIONS
- Show all working
- Calculators (non-programmable) permitted
- One double-sided A4 sized page of hand-written, original (i.e. not photocopied or reproduced) notes permitted

Question 1 [15 marks total]

(a). What would the problem(s) be if all of the functions of the various layers in the TCP/IP protocol suite existed in a single layer protocol architecture? [5 marks]

(b). A data connection is operating at 100Mbps. The size of the frames at the physical layer are 296 bytes in length. Only 90% of the bit rate is being used for the transfer of user data. What is the size of the headers for each frame in bytes? [3 marks]

(c). In the Internet, explain the difference between tier 1, tier 2 and tier 3 service providers. [7 marks]

Question 2 [15 marks total]

(a). What are the differences between the 802.3 and Ethernet II frame format? [5 marks]

(b). Consider the following diagram:
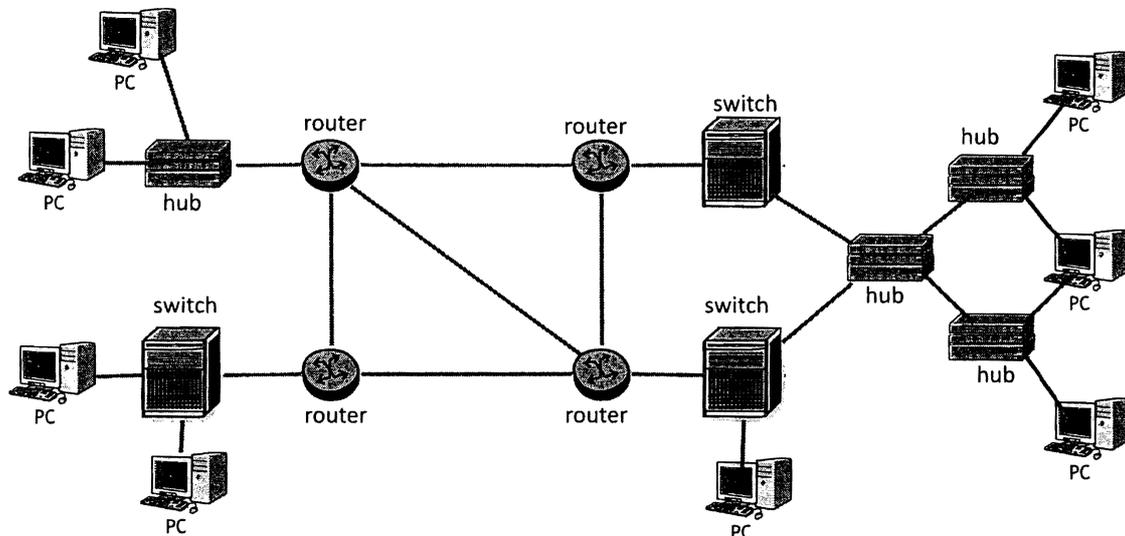
How many collision domains and broadcast domains are there in this network? [4 marks]

(c). Explain the differences in operation between layer 2 forwarding by switches and layer 3 forwarding by routers. [6 marks]

Question 3 [20 marks total]

(a). What is the purpose of the following in IP addressing [5 marks]:
(i). Subnetting
(ii). Route Aggregation

(b). Answer the following questions [2 marks each]:
(i). How many subnets and hosts per subnet can you get from the class B network 172.26.0.0/22?
(ii). You are designing a subnet mask for the 172.20.0.0 network. You want 600 subnets with up to 60 hosts on each subnet. What subnet mask should you use?

(iii). What is the last valid host on the subnetwork 172.20.220.0 255.255.254.0?

(c). What are each of the elements of a routing table? [4 marks]

(d). Two networks are separated by a router. A host on one network pings a host on the other network. Explain the steps taken in this operation in some detail. [5 marks]

Question 4 [20 marks total]

(a). Explain each of the following terms [5 marks]:
  (i). RIB
  (ii). Route-table
  (iii). FIB
  (iv). Route-table manager
  (v). Routing preference value

(b). In OSPF, explain the purpose and operation of the EXCHANGE START and EXCHANGE states when two routers are in the process of forming an adjacency. What may be wrong if they get stuck in the EXCHANGE START state? [6 marks]

(c). What is a static route? Provide an example of why you might want to configure a static route? [4 marks]

(d). What are the main differences between distance vector, link state and path vector routing schemes? [5 marks]

Question 5 [15 marks total]

(a). How does TCP provide reliability when the underlying protocol is best-effort only? Discuss in some detail. [8 marks]

(b). A TCP connection is operating over IP over an Ethernet link with a transmission speed of 100Mbps and a one-way propagation delay of 0.5ms. A file of size 10,000 bytes is to be transmitted. How many phases are there in the TCP transfer and what is the duration of each phase? [7 marks]

Question 6 [15 marks total]

(a). The world-wide web uses HTTP. Why is this a public client-server based protocol based on simple ASCII text commands and responses? [5 marks]

(b). Why are IP-MPLS networks becoming popular with ISPs and other network operators? [5 marks]

(c). Explain how a VPLS is implemented using an IP-MPLS network infrastructure. [5 marks]

End of Paper