



School of Electrical Engineering, Computing and Mathematical Sciences

Discipline of Computing - Curtin University

CNCO2000 Computer Communications

Final Assessment - Semester 1, 2021

Total Mark: 100

Time allowed: 4 hours (from starting the test to the last uploading of your responses) unless you have a CAP plan.

Assessment Availability: 8:30 am Monday 14 June 2021 to 8:30 am Tuesday 15 June 2020

Test mode: Online test, open-book: you are allowed to access your hand-written notes, lecture slides, textbooks, and printed and electronic materials in your possession.

CONDITIONS

- **The assessment must be completed by yourself only.** No one else should do this assessment for you. Any attempts to compromise the system are strictly prohibited. Any breaches of this policy will be considered cheating and appropriate action will be taken as per University policy.
- You are prohibited from communicating with people other than the unit coordinator, the lecturer and the tutor during the assessment.
- You are prohibited from providing information about this assessment and your work to others during and outside your assessment within two days. Some students may take the assessment later than you.
- You must complete and submit the "**Student Declaration Form**".
- **Some students taking the assessment may be invited to an online interview.** In the interview, students will be asked to explain their solutions and demonstrate their knowledge for randomly selected questions. Students will be shown the questions, as well as their written answers.

INSTRUCTION

- This assessment consists of five (5) questions with a total marks of 100. **Attempt ALL questions.**
- You can submit your responses multiple (up to 3) times during the assessment, but only the last submission will be used for marking. You are also required to submit your response on Turnitin. **NOTE: Multiple attempts (downloading the exam paper again and restarting the timer) are NOT permitted and will be caught.**

Question 1: (20 marks)

- (a) Describe two reasons for using layered network protocols. List two disadvantages of using such layered models.
(6 marks)
- (b) Networks can be connected by different devices. Describe four (4) such devices and indicate which layer of the OSI model they are in.
(4 marks)
- (c) For a bit stream 1100011001, draw its Manchester encoding and MLT-3 encoding if the signal starts from high.
(4 marks)
- (d) Name 3 last mile technologies other than NBN. Briefly describe what NBN is and why it is significance to the networking infrastructure.
(6 marks)

Question 2: (20 marks)

- (a) For a bit stream: 10110011 01101110 11101101 00010011, calculate with detailed steps the checksum at the sender's end and the receiver's end. (5 marks)
- (b) Briefly describe the ARP (address resolution protocol), and explain how ARP works in the Ethernet. (5 marks)
- (c) Flag byte with byte stuffing is sometimes used for framing. Can we use just 1 flag byte for both the ending of a frame and the beginning of the next? Why or why not? (5 marks)
- (d) The stop-and-wait protocol is used for flow control between two switching nodes. The one-way propagation delay between the nodes is 10 msec. What should be the transmission data rate of the link in order to achieve a Throughput of 40 frames-per-second (fps) if each frame is of 2000 bits? Assume that the time for processing the frame and transmitting acknowledgement frame is negligible, and there are no transmission errors on the link. (Please note that the throughput required here is NOT the Normalized Throughput which is unit less.) (5 marks)

Question 3: (20 marks)

- (a) An IT company has been allocated all the IP addresses in the range of 193.27.10.XXX, and needs to create 3 subnets. The first subnet needs to be twice the size of the other 2.

- (i) What is the IP address range of each subnet?
- (ii) Write the subnet masks for the following IP addresses in CIDR notation, and state which subnet they are in.
- 193.27.10.123
 - 193.27.10.210

(5 marks)

- (b) List two (2) similarities and two (2) differences between the Distance-Vector Routing and the Link-State Routing protocols.

(5 marks)

- (c) (i) Draw the topology of the network described in the following link state table:

	A		B		C		D		E		F	
links	B	2	A	3	A	2	B	3	A	2	C	6
links	C	1	D	7	F	6	E	3	B	5	D	1
links	E	2	E	1	-	-	F	5	D	8	E	2
links	-	-	-	-	-	-	-	-	F	1	-	-

(4 marks)

- (ii) Use the Bellman-Ford algorithm to determine, with detailed steps, the shortest path from A to D and the cost of this path.

(6 marks)

Question 4: (20 marks)

- (a) For the transmission of real-time audio or video streams, should TCP or UDP be used? Justify your answer. (6 marks)
- (b) Describe the operation of *Jacobson's algorithm* for timer management in TCP. (6 marks)
- (c) One of the objectives of both the Data Link Layer and the Transport Layer is flow control. Discuss in detail the reasons behind this service being necessary at both layers, and include in your discussion the differences between the services in the two unconnected layers. Hint: You should discuss the protocol for achieving this in the TCP/IP model. (8 marks)

Question 5: (20 marks)

- (a) The Domain Name System (DNS) can be used for mapping host names to IP addresses.
- (i) Describe the hierarchical organisation of the DNS name space. You can use a diagram if you wish. Why should the DNS name space be divided into smaller non-overlapping zones?
(4 marks)
 - (i) Assuming that a recursive query method is used, describe the action taken at a name server when it receives a domain name query.
(3 marks)
 - (i) In a DNS resource record, what is the time-to-live field for?
(2 marks)
- (b) In BitTorrent protocol, a tracker is used to track all peers participating in the torrent. Does the existence of tracker make BitTorrent a hybrid system, rather than peer P2P? Why or why not? Briefly describe how data is exchanged between peers in a torrent.
(6 marks)
- (c) A World Wide Web server is usually set up to receive small messages from its client but to transmit potentially very large files for them. Explain then which type of TCP flow control protocol, the go-back-N or the selective repeat, would provide less burden to a particularly popular WWW server.
(5 marks)

END OF EXAMINATION