



**FNU FIJI NATIONAL UNIVERSITY**

**College of Engineering, Science & Technology**

**SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**TRADE DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING**

**EEE561: COMPUTER AND DATA COMMUNICATIONS**

**FINAL EXAMINATION - TRIMESTER 2 - 2019.**

**DURATION: 3 HRS.**

**TOTAL NO OF PAGES: 8**

**DATE: TBA**

**TIME: TBA**

**VENUE: TBA**

**INSTRUCTIONS TO STUDENTS:**

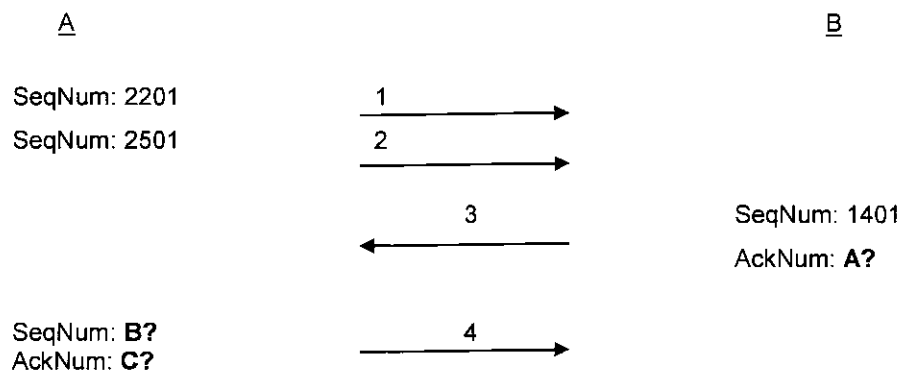
1. You are allowed 10 minutes **EXTRA** as reading time during which you are **NOT** to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscap, graph paper, drawing paper, etc. in their correct sequence and secure well.
5. For all sheets of paper on which rough/draft work has been done, cross it through and attach to your answer scripts.
6. Show all workings where necessary
7. Diagrams and graphs can be drawn in pencil.
8. Non- programmable calculators are allowed.
9. **Attempt all questions!**
10. Check your work before you leave the room!!

**Section A:****MULTIPLE CHOICE****(10 marks)**

**Answer ALL questions by writing down the correct alphabet besides the question number.**

1. What is the long form of DNS:
  - (a). Domain Name Server
  - (b). Data Name Server
  - (c). Domain Name System
  - (d). Domain Naming System
  
2. IP v4 is predominantly used in most networks, how many bits does it have:
  - (a) 16
  - (b) 38
  - (c) 32
  - (d) 42
  
3. The header of a TCP segment has can range from how many bytes?
  - (a) 8 – 20 bytes
  - (b) 20 – 60 bytes
  - (c) 50 – 80 bytes
  - (d) 20 – 60 bits
  
4. The header of a UDP segment has how many bytes?
  - (a) 8 bytes
  - (b) 20 – 60 bytes
  - (c) 50 – 80 bytes
  - (d) 20 – 60 bits
  
5. 2 main protocols used in the Transport Layer are:
  - (a) LLC, MAC
  - (b) TCP, UDP
  - (c) UDP, MAC
  - (d) TCP, LLC

Study the segment flow diagram below and answer the following 3 questions assuming that all segments are 300 octets in size.



6. The AckNum A will be:

- (a) 1701
- (b) 2502
- (c) 1702
- (d) 2801

7. The SegNum B A will be:

- (a) 2801
- (b) 2502
- (c) 1701
- (d) 2802

8. The AckNum C will be:

- (a) 2801
- (b) 1701
- (c) 1801
- (d) 1501

9. 3 general types of congestion control mechanisms are:

- (a) Backwards, forwards and choke
- (b) Implicit congestion signalling, Forward signalling and Backward signalling
- (c) Backpressure, Choke and Explicit congestion signalling
- (d) Choke, Example congestion signalling, Implicit congestion signaling

10. An impulse noise event or a fading event of  $2 \mu\text{s}$  occurs. What will be the error burst at a data rate of 1 Mbps?

- (a) 0.2
- (b) 2
- (c) 20
- (d) 200

## **Section B**

SHORT ANSWERS [2 marks each]

**[30 marks]**

1. Which layer in the OSI reference model does the Transport Layer fall into?
2. The seven layers of the OSI model can be grouped into three. What are these three subgroups called?
3. What are the seven layers in the OSI model?
4. How many bits does an IPv4 address have?
5. Which address values are in the TCP header?
6. What is the Sequence number in TCP headers?
7. What are 3 tasks that the Application Layer can do through UDP?
8. There are 4 general ways to cope with flow control requirements in the Transport Layer, name 2 ways.
9. At low loads (or low traffic) in a data network, which two delay types contribute to total delay?
10. When the load (or data traffic) is close to or exceeds the capacity of a network, which additional type of delay will cause total delay to increase tremendously or approach infinity in an ideal case?
11. When a node experiences saturation with respect to incoming packets, List at least 2 mechanisms for congestion control that may be used?
12. If a data block ( $k$ ) has 32 bytes and the length of the frame ( $n$ ) to be transmitted by the physical medium is 33 bytes. what is the length of the error code in bits?
13. A data link communication protocol uses even parity. If the transmitter is transmitting an IRA character (1110001) what will be the final transmitted character?
14. What are the two sub layers of the Data Link layer identified in the IEEE 802 reference model?
15. List 3 mechanisms that are part of Data Link control

**SECTION C**

**Theory & Explanation**

**TOTAL: [60 marks]**

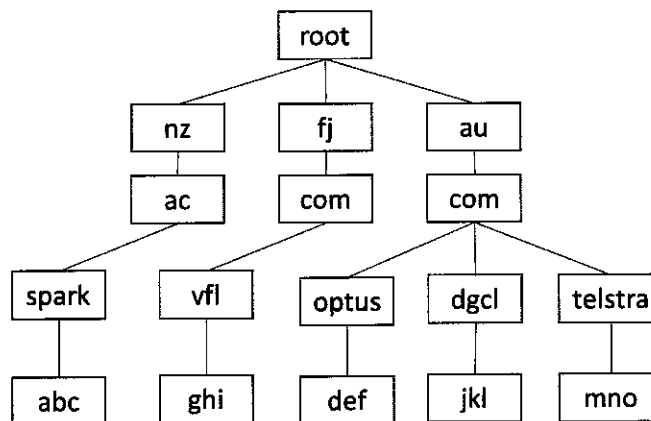
**Question 1. Network Review & OSI Reference Model [15 marks]**

- a) Compare packet switching and circuit switching and explain their differences. (5 marks)
- b) The seven layers of the OSI model can be grouped into three. What are these three subgroups called and briefly describe their functions? (6 marks)
- c) Compare the structure and operations of a LAN and WAN network and explain their differences. (4 marks)

**Question 2. Application Layer Principles [15 marks]**

- a) Discuss and compare the functions of HTTP proxy, gateway, and tunnel used in TCP connection before highlighting their differences. (6 marks)
- b) DNS is an essential part of DNS, Describe DNS, including its functions. (3 marks)
- c) For the domain name space diagrammatically represented below, write the domain names for:
  - a. dgcl
  - b. def
  - c. ghi

(3 marks)



- d) Describe the principles of connectionless transport and give an example of the protocol used  
(3 marks)

**Question 3. Transport Layer & Error Detection [15 marks]**

- a) Describe TCP credit scheme and the sliding-window flow control scheme and highlight the key differences.  
(3 marks)
- b) Describe the two main sources of congestion in a data network  
(2 marks)
- c) Describe and compare the effects of increasing load on a data network in an ideal case and in real life when network congestion reaches moderate congestion and beyond that to severe congestion stages. In your comparison, explain the effects on network throughput in both situations and the reasons for that behavior.  
(4 marks)
- d) Describe Explicit Congestion Signaling including the approaches used.  
(3 marks)
- e) Describe cyclic redundancy check and comment on why it is a better error detection scheme than parity bit.  
(3 marks)

**Question 4. Data Link Control Layer & Queuing Theory [15 marks]**

- a) Describe the responsibilities of the Data Link Layer according to the OSI model. (3 marks)
- b) Describe CSMA/CD access control (3 marks)
- c) Analyse Random Access and CSMA/CD access control schemes, describe their differences and the improvements made to CSMA/CD. (4 marks)
- d) Briefly describe the type of Queuing system that M/M/1 (Kendal's notation) refer to. (2 marks)
- e) Describe Little's law and its relevance to Queuing Theory. (3 marks)

-----**THE END**-----