

Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination

Fall 2020

3rd Year 1st Semester

Course Code: CSE 303

Course Title: Data Communication

Credits: 3

Full Marks: 120* (Written)

Duration: 2 Hours

* Total Marks of Final Examination: 150 (Written: 120 + Viva: 30)

Instructions:

1. There are **Four (4)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

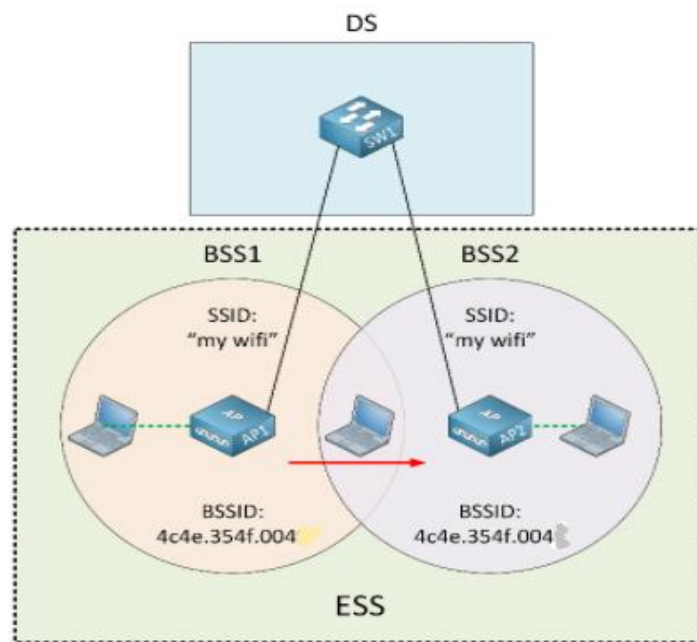
1. a) Define the type of the following destination addresses:

3*3=
9

- i. 4C:30:10:21:10:1A
- ii. 49:20:1B:2E:08:EE
- iii. FF:FF:FF:FF:FF:FF

b)

3*5=
15



The above picture shows an ESS topology setup. Answer the following questions:

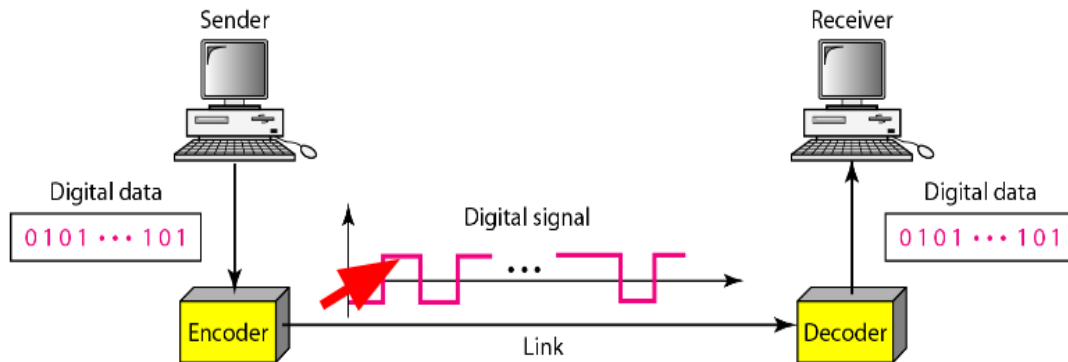
- I) Discuss two limitations of BSS that are addressed by ESS.
- II) Do you see any abnormalities in the figure above? Support your answer with a proper explanation.

- III) BSS 1 and BSS 2 have the same names and they are overlapped. What might be the benefit of this setup?
- c) Suppose a company is manufacturing a smartphone. The phone will have WIFI capabilities and must have the properties such as support at least two frequency bands, MIMO, frame aggregation, etc. Which wireless standard would you choose and why? 6
2. a) An address in a block is given as 200.11.8.45. Find the number of addresses in the block, the first address, and the last address. 6
- b) A bit stream Y is transmitted using the standard CRC method. The generator polynomial is x^4+x+1 . What is the actual bit string transmitted? You need to show the full calculation **for the sender side only**. 12
- Here Y is the most significant 10 bits of the binary representation of your student ID number. If your student ID is 14101142, the binary representation will be: 110101110010101010010110 Taking the leftmost 10 bits, we have $Y = 1101011100$
- c) Suppose the third bit of Y , from the left, is inverted during transmission in previous question “b”. How will the receiver detect this error? You need to show the full calculation **for the receiver side only**. 12
3. a) In Australia, each summer there is an outbreak of bushfire hazard on an enormous scale. The 2019–20 Australian bushfire season, colloquially known as Black Summer, was a period of unusually intense bushfires in many parts of Australia. As a wireless technology expert, you are being asked to monitor a vast forest area for possible fire outbreaks before it occurs in large scale. 3*4=12
- i) From your experience, what type of solution you can propose and why?
- ii) State the advantages and disadvantages of your solution.
- iii) Discuss design challenges that you might face during and after the setup.
- b) The first address in a range of addresses is 14.11.45.96. If the number of addresses in the range is 32, what is the last address? 5
- c) There are two ranges 5+8=13
- 10.0.0.0 – 10.255.255.255
- 11.0.0.0- 11.255.255.255
- Answer the following:
- i) From your point of view, is there any significance of these two IP ranges?
- ii) Mention key differences between these two ranges.
4. a) Explain how the Bipolar Scheme handles the following concerns: 2*5=10
- i) Self-synchronization
- ii) DC component
- b) In digital transmission, the receiver clock is 0.5 percent slower than the sender clock. If the data rate 5

is 1 kbps and 1 Mbps, calculate bits per second at the receiver side.

c)

15



You have to send a data packet X consisting of 8 bits to your friend using the Polar Biphas encoding scheme (“1” symbol inverts the polarity a “0” does not.).

Here X is the least significant 8 bits of the binary representation of your student ID number.

If your student ID is 14101142, the binary representation will be

110101110010101010010110

Taking the rightmost 8 bits, we have $X = 10010110$

* Note: you can get the binary representation of your student ID easily by searching “14101142 in binary” in the google search bar.

Draw the digital signal diagram for both Manchester and differential Manchester encoding that you will send to your friend.

OR

4. a) “Digital data is very different from the digital signal, and the goal is to increase the data rate whilst reducing the signal rate.” elaborate this statement from the point of signal element and data element with proper examples.

12

b) Compare between the following:

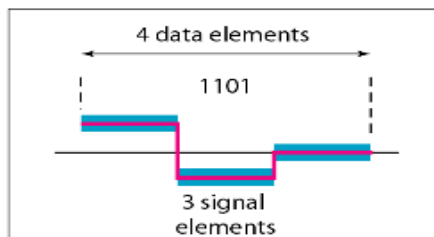
6*2=

a) Serial transmissions and Parallel transmissions.

12

b) Single bit errors and Burst errors

c)



6

A signal is carrying data in which four data elements are encoded as three signal elements. If the bit rate is 1000 kbps, calculate the average value of the baud rate if c is between 0 and 1?