Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination **Spring 2021** **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) Find the error, if any, in the following addresses by applying existing rules of IPV4 format. You must support your answer with proper explanation. If there is an error, rewrite it correctly, you may use any valid number in the wrong octet. If there is no error, justify whether it is a usable IP address or not. [6*2= 12]

i) 111.086.45.78

ii) 1A.23.14.67

iii) 0.0.0.0

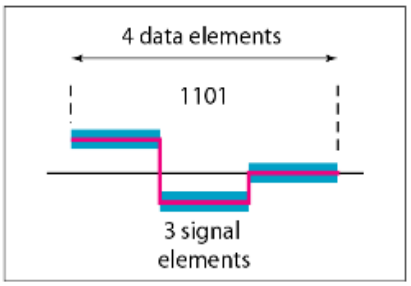
iv) 75.45.31.50.314

v) 121.34.7.0

vi) 255.255.255.255

b) Different levels of Addresses are used in the Internet employing the TCP/IP protocols. Each address is related to a layer in the TCP/IP architecture. **Describe** the characteristics, significance of these addresses and mention the corresponding layer name where they are dealt with proper figures and outlines. [12]

c) [6]



A signal is carrying data in which four data elements 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?

2. a) Say, we have three rooms each having 3 PCs in a room, total of 9 PCs. Now choose a hybrid topology where you will use one kind of topology to connect the three PCs in each room and another kind of topology (as a backbone topology) to connect the three rooms. You need to draw the whole figure outlining different topologies. [8]

b) Draw a MAC frame outlining all its fields and discuss in brief. Explain why we need a minimum/ maximum length of frame? [8+4= 12]

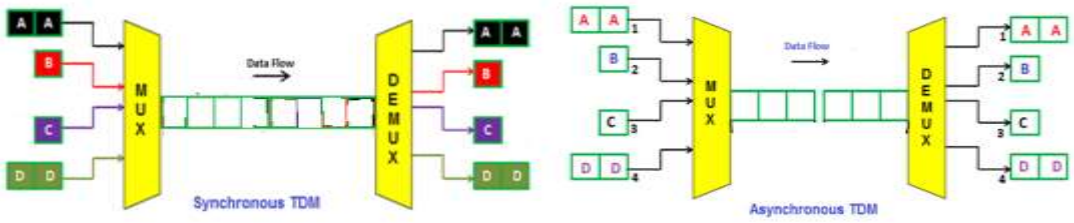
c) "ISPs advertise bandwidth to the customers, because that value is known, and it represents the best-case scenario. But their hype about "game-changing super speeds blazing into town" may be misleading." According to this statement **explain** the concept of Bandwidth, Latency and Throughput, and What Is Right for Your Business? (Your answer must have an example) [10]

3. a) On the basis of the following points, **list** the differences between FDM and TDM: [12]

	FDM	TDM
How the Bandwidth Is Occupied		
Signal Types		
Flexibilities		
Interferences		
Efficiencies		
Latencies		
Constructions		
Required Inputs		

b) Five channels, each with a 200-kHz bandwidth, are to be multiplexed together. **Identify** the minimum bandwidth of the link if there is a need for a guard band of 20 kHz between the channels to prevent interference? [6]

c) [12]



The above schematic figure depicts two types of TDM transmission. According to the figure, **analyse** how data (e.g., AA, B, C, DD) will pass form sender to receiver frame by frame.

4. a) Compare between amplitude modulation and frequency modulation. [5]

b) A complex low-pass signal has a bandwidth of 500 kHz. Identify the minimum sampling rate for this signal? [5+5= 10]

Illustrate a scenario where you cannot find a minimum sampling rate. Use necessary figures to visualize the case.

c) You have to send a data packet X of 12 bits to your friend using 4B/5B block coding. [15]

Here X is the most significant 12 bits of the binary representation of your student ID number.

If your student ID is 19101089, the binary representation will be

10010001101110101101000 01

Taking the most significant 12 bits, we have X = 100100011011

Note: you can get the binary representation of your student ID easily by searching online "19101089 in a decimal to binary calculator.

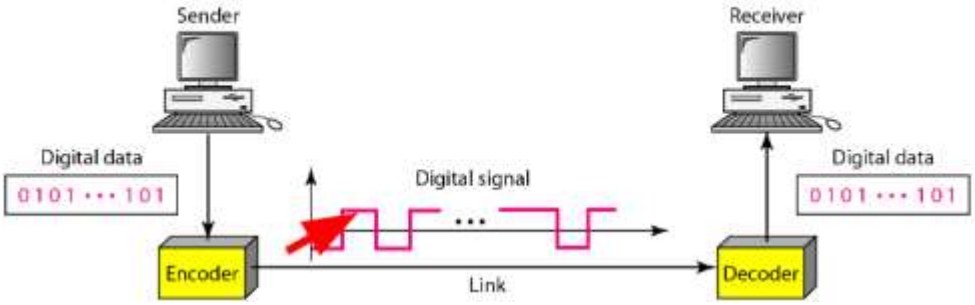
Apply 4B/5B block coding to identify the encoded sequence of bits that you will send to your friend.

4B/5B mapping codes are given below:

Data Sequence	Encoded Sequence	Data Sequence	Encoded Sequence
0000	11110	1000	10010
0001	01001	1001	10011
0010	10100	1010	10110
0011	10101	1011	10111
0100	01010	1100	11010
0101	01011	1101	11011
0110	01110	1110	11100
0111	01111	1111	11101

OR

4. a) [3*4= 12]



You want to send a data packet Z, consisting of 8 bits to your friend.

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

If your student ID is 19101089, the binary representation will be

10010001101110101101000 01

Taking the right most 8 bits, we have Z = 10100001

Construct the digital signal diagram that you will send to your friend.

Implement (if your ID is odd)

i. Manchester

ii. 2B1Q

iii. NRZ-I

or, Implement (if your ID is even)

i. Differential Manchester
ii. AMI
iii. Pseudoternary

b) Compare among the three line coding schemes that you have solved in 4(a) and write down which one seems better to you? [5]

c) A bit stream Y is transmitted using the standard CRC method. The generator polynomial is x^4+x+1. Apply CRC method to identify the actual transmitted bit string. You need to show the full calculation for the sender side only. [5+8= 13]

Hints: Here Y is the most significant 10 bits of the binary representation of your student ID number. If your student ID is 19101089, the binary representation will be: 10010001101110101101000 01
Taking the left most 10 bits, we have Y = 1001000110

Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination | **Spring 2021** | **3rd Year 1st Semester**

Course Code: CSE 305 | **Course Title: System Analysis and Design** | **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 Return on Investment (ROI). [5]

   b. How is ROI beneficial for an investment, explain? [10]

   c. The cost summary of business includes facilitation fees of Tk.100, 000 materials costing Tk.70, 000, salaries of staffs amounting Tk.170, 000. The total annual benefit results as Tk.460, 000. Calculate ROI. [15]

2. Suddenly A, B, and C have come to visit D's house. As they met after a long time they wanted to enjoy their time together and decided to visit a historical place. Hence, they decided to go the historical place by Uber. Uber is the most popular 'transport service providing app' in our country. To get service uisng the app we need to register in the app using our location, mobile number and email address. Uber app has to collect users' information. Uber provides the services through drivers and received the payment from us. As the driver was experienced, so 'A' was satisfied with the services. So 'A' gave him positive feedback.

   a) Discover the purpose of the use case diagram. [5]

   b) Distinguish between the use case diagram and the class diagram. [5]

   c) Analysis and design Uber's system using use case diagram. [20]

3. After the dullness of Covid-19, Cox's Bazar came up with a New Normal tourist place with

highly maintained Covid-19 protocols. Two friends X and Y decided to cut the boredom of the lockdown and go to Cox's Bazar as soon as the lockdown ended. Furthermore, Hotel Cox at Cox's Bazar is offering buy 1 get 1 hotel room for the students. So 'X' decided to surprise 'Y' with hotel cox reservation for them. To avail this opportunity, every student must have to register at their website. X's login information will be stored in the database. 'X' selected two rooms as of hotel's offer. After selecting everything 'X' paid the total amount with his/her credit card. This information's are all stored in the database.

a) Differentiate between use case diagram and sequence diagram. [5]
b) Explain the Sequence Diagrams Notation briefly. [10]
c) Design a sequence diagram based on the above requirements. [15]

4. a. A planning of a customer oriented computer project is given in the following Table. Construct a Gantt chart using the data presented in the following Table. [30]

Task	**Earliest start**	**Length**	**Type**	**Dependent on...**
A. High level analysis	Week 0	1 week	Sequential	
B. Selection of hardware platform	Week 1	1 day	Sequential	A
C. Installation and commissioning of hardware	Week 1.2	2 weeks	Parallel	B
D. Detailed analysis of core modules	Week 1	2 weeks	Sequential	A
E. Detailed analysis of supporting modules	Week 3	2 weeks	Sequential	D
F. Programming of core modules	Week 3	2 weeks	Sequential	D
G. Programming of supporting modules	Week 5	3 weeks	Sequential	E
H. Quality assurance of core modules	Week 5	1 week	Sequential	F
I. Quality assurance of supporting modules	Week 8	1 week	Sequential	G
J. Core module training	Week 6	1 day	Parallel	C,H

K. Development and QA of accounting reporting	Week 5	1 week	Parallel	E
L. Development and QA of management reporting	Week 5	1 week	Parallel	E
M. Development of Management Information System	Week 6	1 week	Sequential	L
N. Detailed training	Week 9	1 week	Sequential	I, J, K, M

OR

b. In the following example there are seven tasks, labeled *A* through *G*. Some tasks can be done concurrently (*A* and *B*) while others cannot be done until their predecessor task is complete (*C* cannot begin until *A* is complete). Additionally, each task has three time estimates: the optimistic time estimate (*o*), the most likely or normal time estimate (*m*), and the pessimistic time estimate (*p*). Calculate the expected time (*et*) using the data of the following Table. [30]

Activity	Predecessor	Time estimates			Expected time (et)
		Optimistic (*o*)	Most likely or Normal (*m*)	Pessimistic (*p*)	
A	—	2	4	6	
B	—	3	5	9	
C	*A*	4	5	7	
D	*A*	4	6	10	
E	*B, C*	4	5	7	
F	*D*	3	4	8	
G	*E*	3	5	8	

Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination	**Spring 2021**	**3rd Year 1st Semester**
Course Code: CSE 307	**Course Title: Theory of Computation**	**Credits: 3**
Full Marks: 120* (Written)		**Duration: 2 Hours**

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

Instructions:

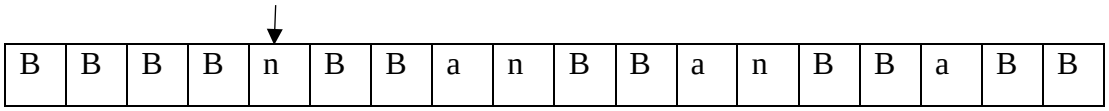
1. There are **Four (4)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.
3. ***Use your own name, id in the answer script whenever required as instructed in the classroom.***

1. **a)** Let, my name is **n**isha **a**min. The first letter of first name and last name are: n and a. 15

Design a Turing Machine for the following expression:

$L = (n(Blank)(Blank)a)^p$ where $p>0$

i.e., it looks in the tape:



B	B	B	B	n	B	B	a	n	B	B	a	n	B	B	a	B	B

(In the above, the example is given for p = 3 for your understanding where 'B' stands for a Blank)

b) Suppose, my name is **n**adia **a**kter. 15

Design a Turing Machine for the following expression:

$L = a^*n$

2. **a)** If my name is **a**tia **b**oshir. (Take first two letters of both first and last names).

Design Pushdown Automata (PDA) that recognizes 12

i) $\{a^{2n}b^{3n} \mid n >= 0\}$

ii) $\{w \in \{0, 1\}^* \mid$ w contains **at least (the length of your last name)** 0's including empty string$\}$ 12

2. **b)** Suppose my name is **b**ijon **r**ay. 3+3 =6

Then, $\sum$ = {the letters/symbols of my name}

You have to construct the following language using your own name:

"The set of all strings having a substring of your last name ('**ray'** for this example)

i) Write the regular expression for this language.

ii) Draw the corresponding NFA.

3. **a)** If my name is **Shah Abu Bakar**. 6*4 =24

Begin with the grammar:	Begin with the grammar:
S → ASA | aB A → B | S B → b | ϵ	(fn cl) → (mn cl)(fn cl)(mn cl) | (mn sl)(ln cl) (mn cl) → (ln cl) | (fn cl) (ln cl) → (ln sl) | ϵ fn = first name, mn = middle name, ln = last name cl = capital letter, sl = small letter

i) Eliminate ϵ-productions.

ii) Eliminate any unit productions in the resulting grammar.

iii) Eliminate any useless symbols in the resulting grammar.

iv) Put the resulting grammar into Chomsky Normal Form.

b) What is an ambiguous grammar? Let my name is **a**hmed **b**aki. The first letter of first and last names are: a and b. 6

Prove that below grammar is an ambiguous.

A -> A b A
A -> a

(Hint: Try to find out a string and then prove the grammar is ambiguous).

4. **a)** Write a regular expression for a class **C** IP address. Class **C** IP address range is 15

[192.0. 0.0 to 223.255. 255.0]

b) What is the purpose of the *pumping lemma* in case of regular language? 15

Let my name is **a**hmed **b**aki. The first letter of first and last names are: a and b.
Use the *pumping lemma* to show that $\{a^p b^q \mid p,q > 0\}$ is not regular.

OR

a) Write a regular expression for a class A IP address. Class A IP address range is [0.0.0.0 to 127.255.255.255] 15

b) What is the purpose of the *pumping lemma* in case of regular language? 15
Let my name is **a**hmed **b**aki. The first letter of first and last names are: a and b.
Use the *pumping lemma* to show that $\{a^n b^{2n} \mid n > 0\}$ is not regular.

Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination	**Spring 2021**	**3 Year 1st Semester**
Course Code: CSE 309	**Course Title: Object Oriented Programming II: Visual and Web Programming**	**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. Programmable calculators are not allowed.

1. **a)** i. Take a 4-digit number as year (example 2021) from user. 2+5+5+8

ii. Check if the input year is leap year or not. [Use nested if]

iii. Write the same program using multiple conditions. [do not use nested if]

iv. Write the same program in 2 using shorthand if statement.

b) i. Write a function which takes 3 integers as user input and returns the summation and multiplication of these integers. 5+5

ii. Write a Lambda function which takes 3 numbers as input and returns the summation of these 3 numbers.

2. **a)** Explain the concept of Association, Aggregation, Composition in your own language and draw appropriate diagrams. 5+5+5

b) Suppose we have 4 classes named Car, Owner, Wheel, License. What is the relation between the following pair of classes according to the concept of Association, Aggregation, Composition? Explain your co-responding answer. 5+5+5

i. Car and Owner
ii. Car and Wheel
iii. Car and License

3. **a)** Suppose Point class has 3 private variables x, y, z which represent the x, y, z axis components of a point in 3D co-ordinate system. To add two points (object of Point class), we have to add the x, y, z axis components of them. Define the class constructor and write a function to overwrite the __add__ function so that we can add the two object of Point class. 15

	b)	Which one has more access ability between static method and class methods? Explain your answer briefly.	7
	c)	Which one is faster between abstract class and interface? your answer briefly.	8
4.	**a)**	Explain each type of inheritance by drawing appropriate diagram. [No need to write any code] i. Multiple Inheritance ii. Multilevel Inheritance iii. Hierarchical Inheritance iv. Hybrid Inheritance	20
	b)	What is Method Resolution Order? Explain with a code.	10
		OR	
	a)	Suppose we have a class named Car which has a private variable called model. Now write a setter, getter, and deleter methods for model variable.	20
	b)	What is Diamond Problem? Explain with a diagram. [No need to write any code]	10

Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination	**Spring 2021**	**3rd Year 1st Semester**
Course Code: CSE 311	**Course Title: Microprocessors and Assembly Language**	**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)** Write on your own words about the pipelining feature to speed up microprocessors. How is it implemented in 8086 architecture? Is there any drawback? Mention. 15

b) 8086 has 16-bit data bus but the memory is organized in byte form. How does this problem is solved? Explain from memory bank concept with proper diagram. 15

2. a) Find out the addressing modes of the operands present in the following instructions (Both Source and Destination) and calculate the physical address of the memory operands: 15

i. ADD AX, [BX]
ii. CMP AX, DX
iii. MOV AX, A[SI]
iv. COMPSB
v. INT 21h

where, SS=0123h, DS=0124h, ES=0987h, CS=0678h, IP=0956h, SI= 0456h DI= 0378h, BX=0567h, A=09h.

b) What are the three control flags in 8086? How do they play role during program execution? 10

c) CF, OF and SF has no effect on logic instructions- Why? 5

3. **a)** Write a program to Input three integer values (Byte form) X, Y, C from user where 0 <= X, Y <= 9, and C = 0 or 1. 15
If C=0 then compute X*Y
if C = 1 then compute X/Y

b) Write a program to input a character and find out whether it is an alphabet or digit. 10

c) Write the logic instructions to do the followings
   i. Clear LSB of AL
   ii. Set MSB of AL
   iii. Complement AL

4. **a)** What are the benefits of maximum mode configuration of 8086 over minimum mode? Why 8086 is using multiplexed address/data lines. 10

b) Discuss the utility of the following pins: 20
   i. DEN
   ii. $\overline{ALE}$
   iii. $M/\overline{IO}$
   iv. $RQ/\overline{GT_0}$
   v. $QS_1, \overline{QS_0}$
   vi. $DT/\overline{R}$
   vii. CLK

OR

a) If 8086 clock speed is 8MHz then calculate the bus speed and timing. 10

b) Draw the bus timing diagram for memory read operation and specify the different control signals that are generated in different clock periods with the purposes those serve during the cycle. 20

University of Asia Pacific
Department of CSE
Final Semester Examination, Spring 2021
Program: B.Sc. (Honors) in CSE
Year: 3rd Semester: 1st

Code: HSS 301 Course Title: English II-English for Communications Course Credit: 2.00
Time: 1.5 hour Total Marks: 30

*Answer all the questions
* Marks are given beside the questions

1. Cite the followings using APA style: (3×2=6)
    a) *Coping: The psychology of what works* (1999). Oxford University Press. C. R. Synder(Ed.)
    b) Cancer Death Rate in U.S. sees largest one-year drop ever. (8 January, 2020). M. Stobbee. Chicago Tribune.
    c) C. Ruxton, Tea: Hydration and other health benefits. *Primary Health Care*, (2016). *26*(8), https://doi.org/10.7748/phc. 34-42.
2. Suppose a company named Grey has circulated a vacancy for the post of 'Software Developer' on bdjobs.com online portal on 10th of November, 2021. Now, write a cover letter and a resume for the post of 'Software Developer' addressing the HRM of the company to the following address: Garib-E-Newaz Avenue, Uttara, Dhaka-1230 (7+7=14)
3. Write a short film review on *Life is Beautiful.* 10