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.

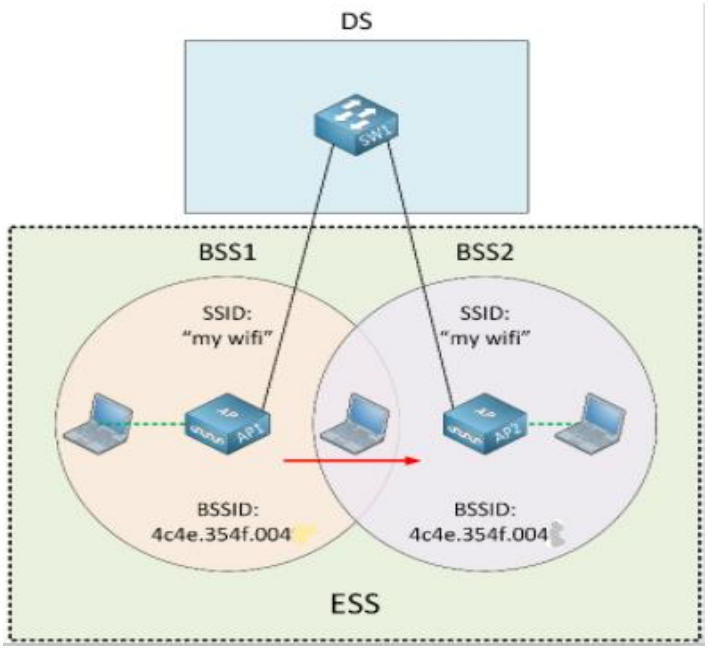
1. **a)** Define the type of the following destination addresses: 3*3= 9

i. 4C:30:10:21:1O: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: 11010111001010101010010110

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

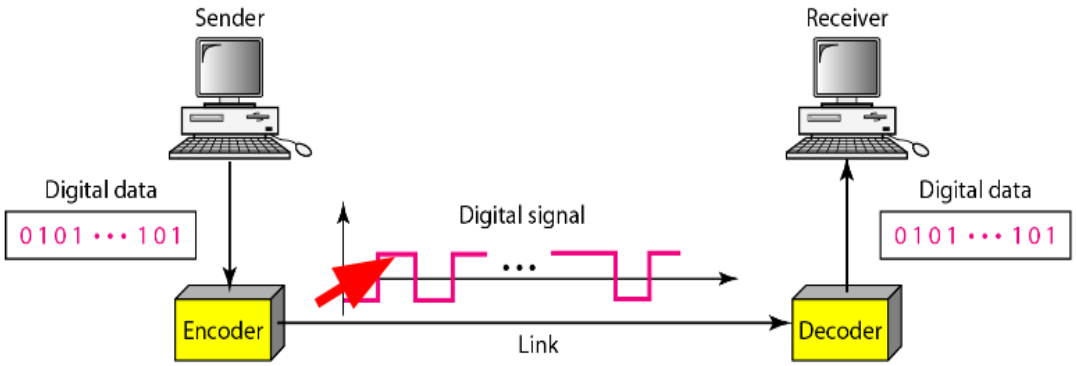
i) Self-synchronization

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 Biphase 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

11010111001010101010010110

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

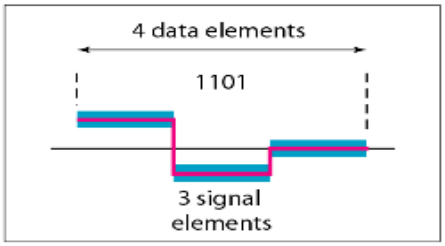
4. **a)** "Digital data is very different from the digital signal, and the goal is to increase the data rate whilst reducing the signal rate." elaborate this statement from the point of signal element and data element with proper examples. 12

b) Compare between the following: 6*2= 12

a) Serial transmissions and Parallel transmissions.

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?

Department of Computer Science & Engineering
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Final Examination **Fall 2020** **3rd Year 1s Semester**

Course Code: CSE 305 **Course Title: System Analysis and Design** **Credits: 3**

Full Marks: 120 **Duration: 2 Hour**

* 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. "Mr. X wants to build a user support system for his company. So he collects all necessary data and user requirements for the system. Then he formed three different teams to find out if the proposed system is safe and sound technically and economically and strategically aligned with the business. After a few weeks these teams responded positively and Mr. X recruited an experienced manager Mr. Y for overall project control and direction." 20
- All these steps indicate a particular phase of SDLC. Which one is it? Briefly describe its' steps.

b. Though Mr. X preferred Waterfall model for the user support system development, Mr. Y said as the system is completely user based it would be wise to follow any RAD technique. Do you agree with Mr. Y? Justify your answer with proper explanation. 10

2 a. Draw a use case diagram for a library management system. Assume four actors: 20
- General Member: does not have access to the original copies of books
- Librarian: tasks like selecting, developing, cataloguing and classifying *library* resources, answering readers' enquiries, using *library* systems and specialist computer applications, management of staff, including recruitment, training and/or supervisory *duties* etc.
- Vendor: supplies books
- Elite Member: has access to the original copies of books.

b. Discuss the 'Extend' and 'Include' relationships that are used in use case diagrams with proper examples 10

or

a. The software solution company 'ABCD' has got the tender for a complete hospital management system for a famous hospital. Tough they were supposed to establish the complete system by April 2018, project manager Mr. Z has recently observed that the project is running behind the proposed schedule. So he decides to recruit ten more staffs, who would work parallel with the current staffs. If you think he has made the right decision, then justify your answer. Otherwise propose a better solution so that the project can run on schedule. 20

b. What are the core values of XP? Discuss under which conditions XP works fine. Write the names of five most commonly used requirements elicitation techniques — 10

3. a. Draw the corresponding class diagram for the system described in question 3 (b). And discuss the importance about coupling and cohesion among classes or Process. — 20

b. The figure below shows the level 1 DFD, which is the decomposition (i.e. break down) of the securities trading platform process from level 0 DFD. — 10

i) Explain in which phase and how DFD help you to develop a system.

ii) Draw level 0 DFD from this Level 1 DFD.

iii) Also draw level 2 DFD for this example by decomposing process 5(place order).

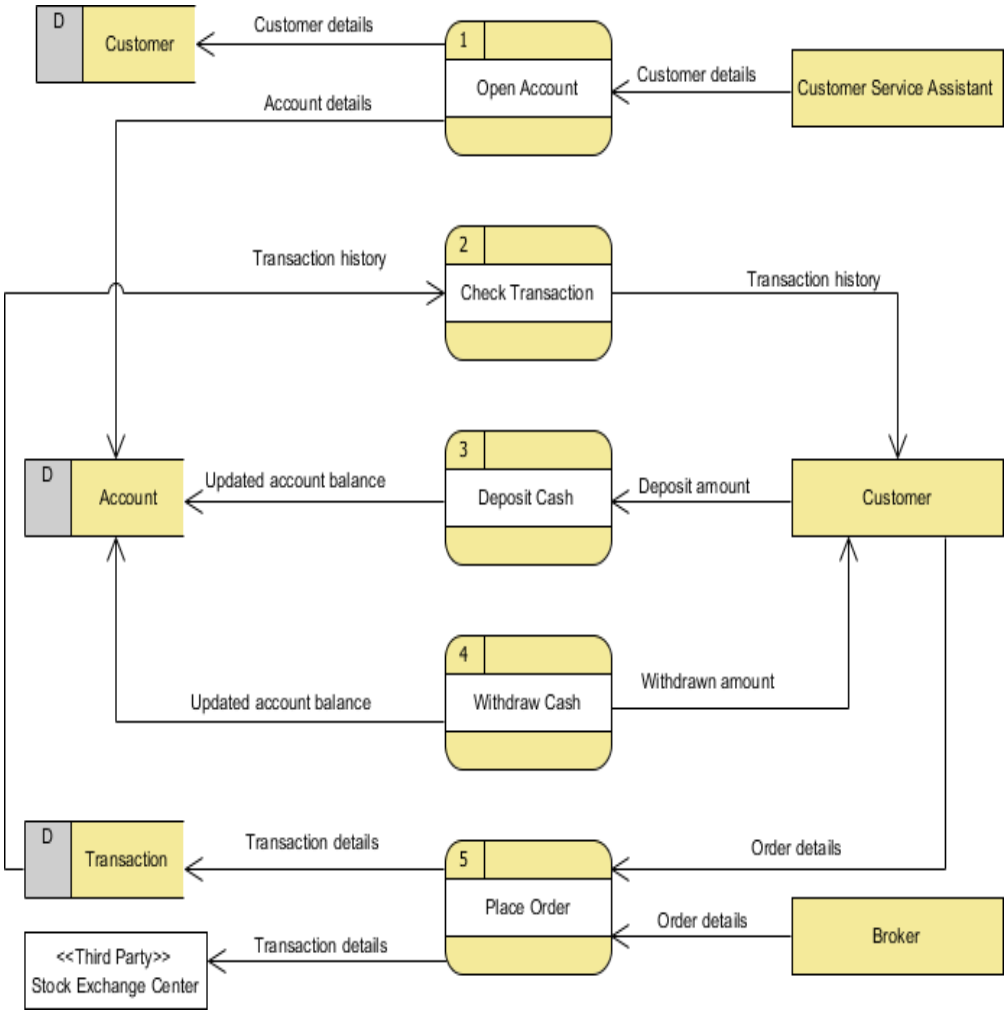

Fig: level 1 DFD.

4. a. Following is the activity list for a construction company's project. Find ES, EF, LS, LF and critical path of the project. — 20

[NOTE: ES= Earliest start time, EF= Earliest Finish time, LS= Latest start time and LF= Latest finish time]

Activity	Immediate Predecessors	Estimated Duration
A	None	I+5 weeks
B	None	I+10 weeks
C	A, B	I+20 weeks
D	C	I+5 weeks
E	C	I+10 weeks
F	E	I+5 weeks
G	D	I+15 weeks
H	E	I+7 weeks
Where I = last digit of your ID Number.		

b. How will the project schedule be affected if 10

i. A is delayed by 2 weeks

ii. C is delayed by 1 week

Explain your answer.

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Program: B.Sc. in Computer Science and Engineering

Final Examination | **Fall 2020** | **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:

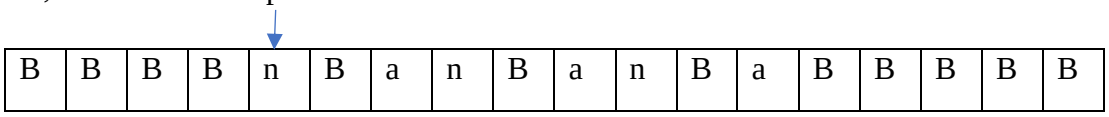
1. There are **Four (4)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.
3. ***Use your own name, id in the answer script whenever required as instructed in the classroom.***

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

Design a Turing Machine for the following expression:

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

i.e., it looks in the tape:



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

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

b) Suppose, my name is **n**adeem **a**hmed. 15

Design a Turing Machine for the following expression:

$L = na^+n$

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

Design Pushdown Automata (PDA) that recognizes 12

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

ii) $\{w \in \{0, 1\}^* \mid w$ contains **at most (the length of your first name)** 1's $\}$ 12

2. **b)** Let $\sum$ = {the letters/symbols of your own name} 6

Suppose you want to construct the following language:

"The set of all strings that either start with *your first name* or *last name*."

i) Write a regular expression for this language.

ii) Draw a corresponding NFA.

3. **a)** If my name is **<u>S</u>hah <u>A</u>bu <u>B</u>akar**. 24

Begin with the grammar:	Begin with the grammar:
$S \rightarrow AAA \mid B$ $A \rightarrow aA \mid B$ $B \rightarrow \epsilon$	(fn cl) → (mn cl)(mn cl)(mn cl) | (ln cl) (mn cl) → (mn sl) (mn cl) | (ln cl) (ln cl) → 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) Suppose, my name is **n**adeem **a**hmed. The first letter of first and last names are: <u>n</u> and <u>a</u>. 6

Write a context-free grammar for the following languages:

$L = n^n a^{2n}$

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

[128.0.0.0 to 191.255.255.255]

b) What is the purpose of the *pumping lemma* in case of regular language? Use the *pumping lemma* to show that $\{a^{p+1}b^{q+2} \mid n > 0\}$ is not regular. Here p, q is the respective length of your own first and last name. 15

OR

a) Write a regular expression for a class E IP address. Class E IP address range is [240.0.0.0 to 255.255.255.255] 15

b) What is the purpose of the *pumping lemma* in case of regular language? Use the *pumping lemma* to show that $\{0^n1^{2n} \mid$ n is the multiple of your first name length$\}$ is not regular. 15

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 Title: Object Oriented Programming II: Visual and Web Programing

Course Code: CSE 309 **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) You and your friends love gardening. So you plan to design a web application where people can upload their plants' photos with description and they can also buy or sell plants from the website. When a user is uploading his plants' details, he can choose either the plant is for sale or not. He can also set the price. The necessary model is already created as follows to store the details of the plants. **[2 + 6 + 6 + 6 = 20]**

models.py

```python
from django.db import models
from django.contrib.auth.models import User

# Create your models here.


class Plant(models.Model):
    photo = models.ImageField(upload_to='photos/images/',
                              blank=False,null=False)
    plant_name = models.CharField(max_length=100)
    description = models.TextField(blank=True)
    date_of_upload = models.DateField(auto_now=True)
    is_for_sale = models.BooleanField(default=False)
    price = models.IntegerField(default=None,null=True)

    user = models.ForeignKey(User,on_delete=models.CASCADE)


```

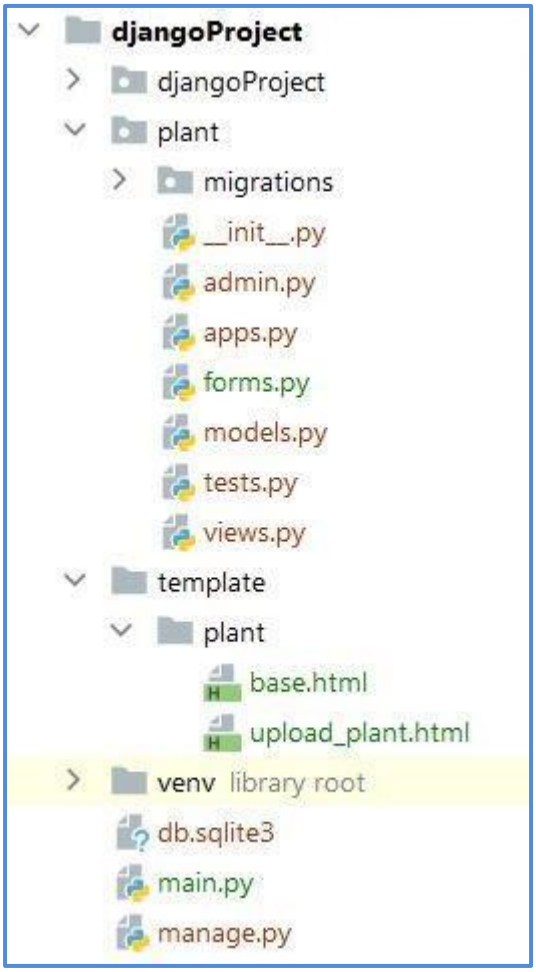
Now you have to implement the necessary urls, forms, views and templates so that a user can upload the mentioned details of his plant (**using Django forms**)

Now mention your changes to the following files-

i. urls.py
ii. plant/forms.py
iii. plant/views.py
iv. template/plant/upload_plant.html (assuming there is a base.html already implemented)

Add all the necessary imports to your files.

For your convenience, the project structure is given below.



b) After each successful upload of a plant's details, you want to send an email to the user telling that the data has been uploaded successfully. **[7+3 = 10]**

Now mention the code you need to write with necessary imports and the location where you will add this code. For your convenience, put line no in the file from **Q1.a** where you will add

this code. For example you can write, "the code will be added in between line no X and line no Y in A.py file." If you have not answered Q1.a then you do not have to mention the location of the code. You will get partial marks.

Assume that, ***User*** model has the email of a user as the ***"email"*** field. The necessary settings have already been added in the **settings.py** file as follows-

```
EMAIL_BACKEND = 'django.core.mail.backends.smtp.EmailBackend'
EMAIL_HOST = 'smtp.gmail.com'
EMAIL_PORT = 587
EMAIL_USE_TLS = True
EMAIL_HOST_USER = os.environ.get('EMAIL_HOST_USER')
EMAIL_HOST_PASSWORD = os.environ.get('EMAIL_HOST_PASSWORD')
```

NB: You do not need to write the whole code again. Only the code to send the email mentioning the location of the code.

2. a) As you are developing a site where users can upload, buy and sell their plants (as question no 1), now you need to add a feature where other users can rate a particular plant of a user and add comment(s) below it. **[10 +10 =20]**

Assume that the ***Plant*** model contains the information of **plants** and the ***User*** model contains the information of **users**.

To implement this feature, you need to write the following two models. Add appropriate keys while implementing the models.

i. ***Rating*** – this model will contain the ratings given to a plant and the user who gave it. This model will have many to one relationship with ***Plant*** model and many to one relationship with ***User*** model. (each row will store individual rating, not average ratting)

ii. ***Comment*** - this model will contain the comments given to a plant and the user who gave it. This model will have many to one relationship with ***Plant*** model and many to one relationship with ***User*** model.

b) Based on the models you wrote in **Q2.a** and the ***Plant*** model from **Q1.a** write necessary codes to extract the following data from the database- **[5 + 5 = 10]**

i. Get all the comments given to a plant having id = ***X***

ii. Get all the plants that have ***"cactus"*** in their name (case insensitive) and have a price lower than ***Y*** taka.

Here,
X = last two digits of your role +1
Y= X * 11
If your roll is ***18201002*** then, ***X = 3 , Y = 33***

3. a) Suppose you and your younger brother went to an animal store to get two **pets**. There were different sections of **cats** and **dogs**. From there, you got a cat and named it **"Garfield"**. Your brother got a dog and named it **"Odie"**. **[5 x 4 = 20]**

Now according to the concept of object oriented programming, categorize the terms – ***Pet, Cat, Dog, Garfield*** and ***Odie*** into **abstract class**, **class** and **object** with a **brief explanation**.

b) Describe the concept of method overloading and method overriding in object oriented programming (OOP) and how it is handled in python OOP with short examples. **[5 + 5 = 10]**

4. a) In universities, a teacher teaches the class and the students take lessons from teachers. But if you are a teaching assistant, you will have to act as a teacher while assisting your professor and also act as a student while working under your professor. Furthermore, both the teachers and students are persons as well. **[4 x 5 = 20]**

Now write the following classes giving them accurate attributes and inheritance relations. No need to add the getter setter methods of the attributes. Only show the constructors of each class.

i. Person
ii. Teacher
iii. Student
iv. TeachingAssistant

Mention the types of inheritance relations between the classes.

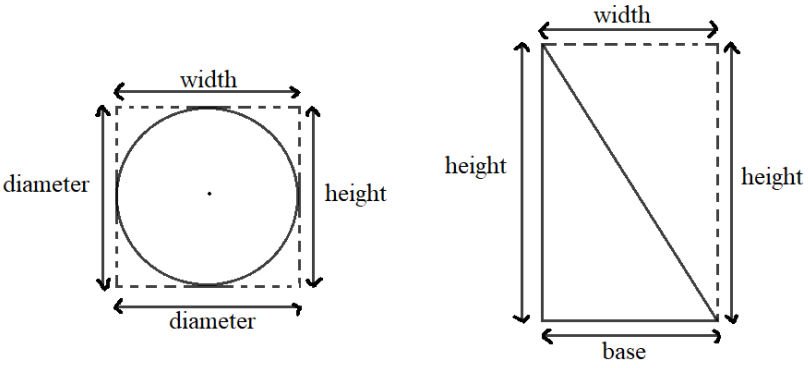
or,

We have an abstract class **Shape** which has two private variables – height and width, has two abstract methods **getArea()** and **getPerimeter()** and two getter methods – **getHeight()** and **getWidth().** **[4 x 5 = 20]**

We have three more non-abstract classes – **Circle**, **Triangle** and **Rectangle** which inherit the **Shape** class. These classes do not have any additional attributes. Assume that, the triangle will always be a right-angled triangle.

The constructors will have the parameters as follows –
Shape – height, width
Circle – diameter
Rectangle – height, width
Triangle – height, base

Now implement all four of the above classes.



NB: the dotted lines (- - -) represent the shape

b) Write a function that will take a list of integer numbers as a parameter and return the number from the list which has the maximum square value. Here the list may contain both positive and negative numbers. **[10]**

or,

Write a function that will take two lists as parameters. The first list will contain some persons' names and the second list will contain the ages of those persons in order. The function will return a dictionary containing only the persons who are 18 years old or more. Here the persons' names will be the keys of the dictionary and ages will be the values of those keys. **[10]**

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 311	**Course Title: Microprocessors & 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)** Why microprocessor is called brain of a computer? We are habituated with which processor family? Mention the basic characteristics that can distinguish the different generations of processor. Explain from Intel processor family. 15

b) Compare the following terms: 15

i. Stack Segment Vs. Code Segment
ii. LIFO Vs. FIFO
iii. SP Vs. IP

2. **a)** Calculate the Physical address of the memory operands in the following instructions also mention the addressing modes of both source and destination operands of each instruction using a table: 15

i. MOV AX, [BX}
ii. MOV DX, A [BX+SI]
iii. JMP L

Where, BX=0012H, SI= 0034H, A=0024, L= 0056H, DS= First 4 digits of your registration ID, CS= Last 4 digits of your ID (consider all in Hexadecimal form)

b) Suppose AL= 80H and BL= Last 2 digits of your Phone number(consider in Hexadecimal form), then compute the following operations and find out the status of the conditional flags : 15

i. DEC BL

ii. NEG BL

iii. ADD AL,BL

3. **a)** Write an assembly code to do the following actions: 15

i. Input a character
ii. Display a prompt message “Have a Good Day!!!”
iii. Display First character of your Name.

b) Write an Assembly program to solve the expression: 10
X= Y+2Y

c) Write code to swap two memory variables. 5

4. a) Define the followings: 15

i. Clock generator
ii. Data Transceiver
iii. Address Latch
iv. RESET Signal
v. INTR

b) Draw the block diagram of 8086 in minimum mode configuration. Why 8086 is using Multiplexed Address/Data Bus? 15

OR

a) Write a program to input a character, check whether it is an alphabet or not. If it is an alphabet change it into its opposite case. 15

b) Discuss on the following issues: 15

i. SMALL and LARGE Model.
ii. 8086 segment size is 64 KB.
iii. 8086 needs 16 byte boundary to start a new segment.

University of Asia Pacific

Department of Computer Science and Engineering

Final Semester Examination, Fall 2020

Program: B.Sc. in Computer Science and Engineering

3rd Year 1st Semester

Course Code: HSS 301 (A& B) Course Title: English for Communication Credit: 2.00

Time: 30 Minutes Full Marks: 10

Instructions:

* Marks are indicated in the right margin.
* Answer the following questions.

1. Fill in the blanks with appropriate pronouns. (5×.5=2.5)

She finally confessed that she a) _____ made the plan of that robbery. The cops finally found out the motives of b) ____. She also exposed the names of other criminals c) _____ accompanied her. She said, "I don't know d) _____ could I plan such a heinous act! I am ashamed of what I have done". e) _____ are four people in the list of the criminals.

2. Cite the followings using APA style: (3×.5=1.5)

a) *Australian cinema in the 1990s*. In I. Craven (Ed.), (pp. 175-188). K. Ferres, (2001). Idiot box: Television, urban myths and ethical scenarios. Frank Cass.

b) E. Barley. *Health psychology in nursing practice.* (2016). https://amzn.to/2QBXtxF SAGE Publications.

c) N. C. Andreasen,(2001). Oxford University Press. Brave new brain: Conquering mental illness in the era of the genome.

3. Write a report for your departmental magazine describing the inter department chess tournament which was held online in the department of Computer Science and Engineering, University of Asia Pacific on February 26, 2021.

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