RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
First Year - Semester I Examination – June/ July 2018

COM 1201 – PRINCIPLES OF PROGRAM DESIGN

Time: Two (2) hours

Examination Index No: _____

Important Instructions:

- This paper has 4 questions in 16 pages.
- Answer all questions (25 marks each).
- Write your answers in English using the space provided in this question paper.
- Do not tear off any part of this question paper.
- Note that questions appear on both sides of the paper.
- If a page is not printed, please inform the supervisor immediately.

To be completed by the examiners:

	Question number				Total Marks
	1	2	3	4	
Marks					

Question 1

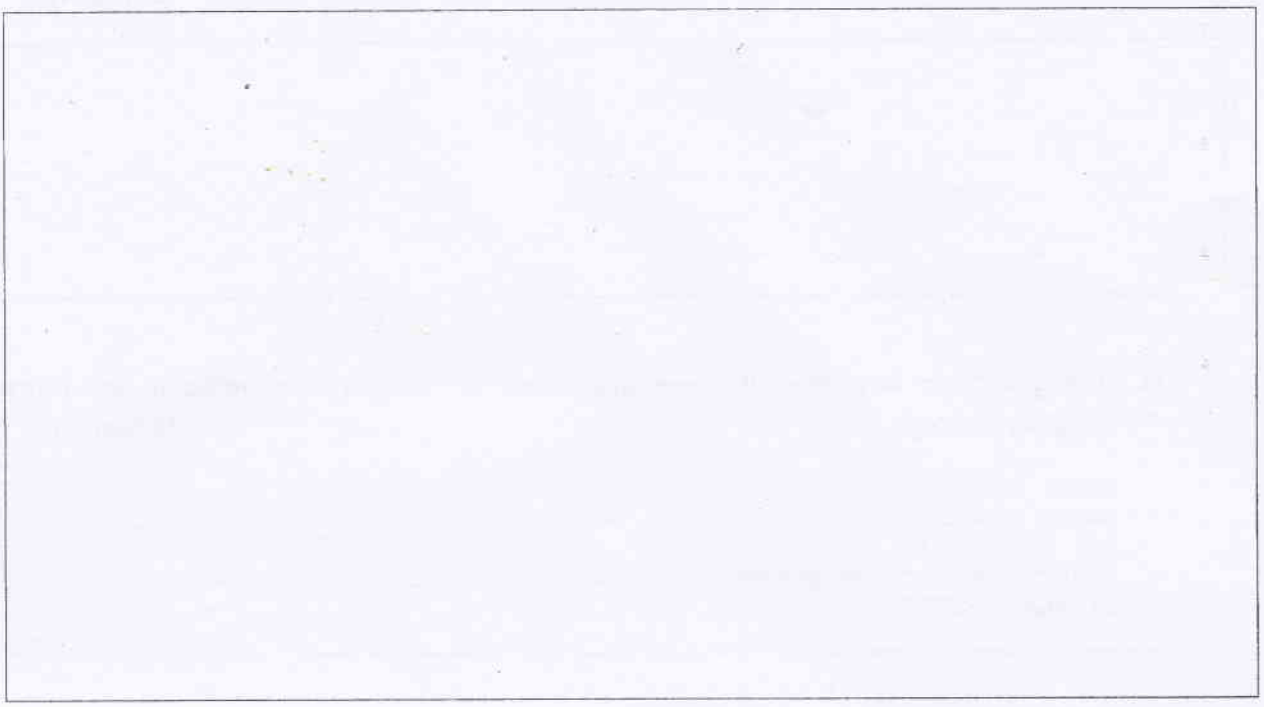
a) Compare the difference between Machine Language and Computer Programming Language? (4 Marks)

Machine Language	Computer Programming Language

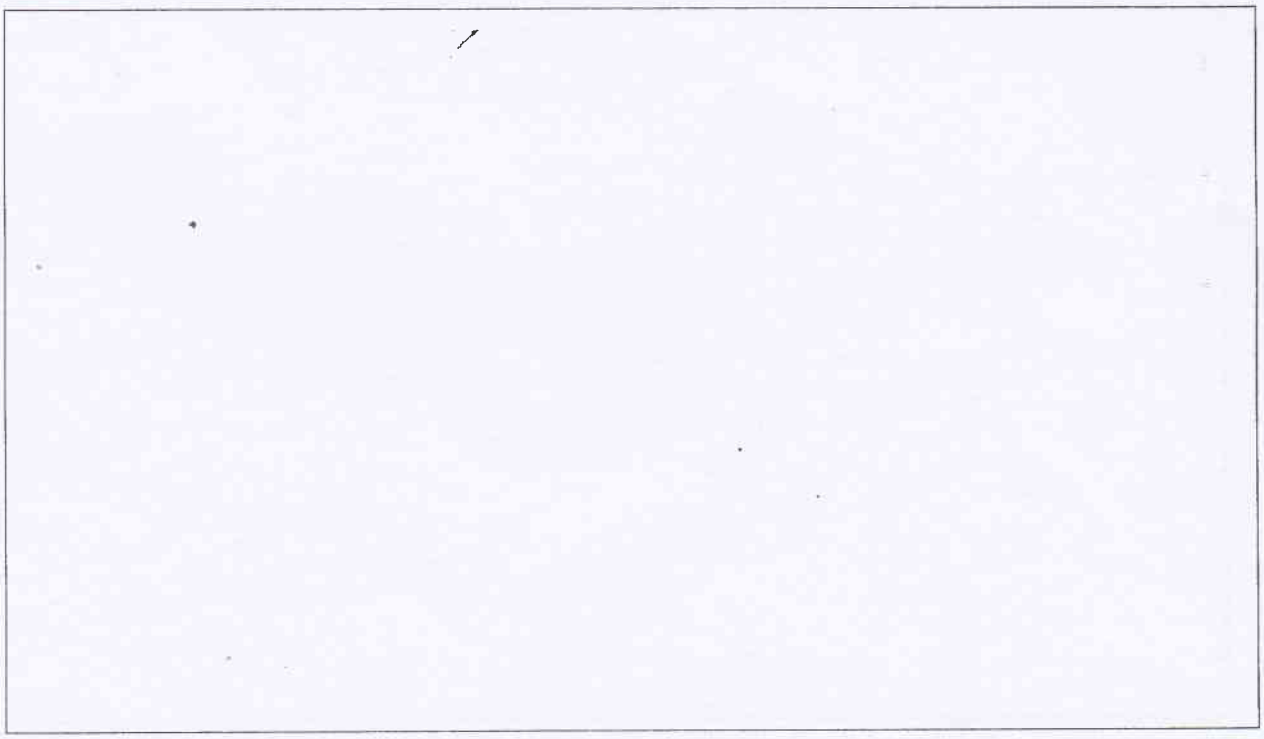
b) Identify the Data and Information with respect to the following requirements and fill the blanks in following table. (6 Marks)

Application	Data	Information
Cashier system for customer handling.		
Automated Teller Machine for withdrawal.		
A ticket reservation using an E-ticket reservation system.		

c) Sketch a diagram of Von Neumann Architecture and label all the components and data flows on it. (4 Marks)



d) State the main function of each and every component in the Von Neumann Architecture. (5 Marks)



e) What is meant by Stored Program Concept used in Von Neumann Architecture? (2 Marks)

f) Briefly explain how the following instruction set executes according to the Stored Program Concept. (4 Marks)

```
INPUT NUMBER1
INPUT NUMBER2
SET RESULTS TO 0
COMPUTE RESULTS as 2 TIMES of NUMBER1 ADD NUMBER2
DISPLAY RESULTS
```

5

Question 2

a) What are the objectives of High Level Programming Languages? (3 Marks)

b) Briefly explain the following terms? (3 Marks)

Assembler	
Interpreter	
Algorithm	

c) What is the difference between Major Task and Sub Task used in informal program design? (2 Marks)

d) Justify the following statement. "Desk checking saves the time in coding."

(5 Marks)

e) Mark the major tasks and sub tasks given in the following list. Note that 0.25 Marks will be deducted for the incorrect answers. (10 Marks)

#	**Task**	**Major Task**	**Sub Task**
1	Calculate GPA.		
2	Compute the total marks.		
3	Sort the heights of the candidates.		
4	Swap two numbers		
5	Calculate the area of a circle using PI* radius * radius		
6	Get the Y value at X=2 where M = 0.5 and C= 1		
7	Print the value of result		
8	Read volume		
9	Compute Average using given total of 100 units sold.		
10	Find maximum out of the data set		
11	Fill the data sheet which contains 10 rows and 10 columns		
12	Calculate the age		
13	Find the frequent item to be sold		
14	n = 200*(500/3.5)+300		
15	m = 0		
16	Extract the student record where student_id = 2001		
17	Find triangles out of given set of shapes		
18	Add 1 to counter		
19	Print "*"		
20	Change password		

f) State why the Maintenance phase is required in program design process?

(2 Marks)

Question 3

a) Write a task list to swap two values stored in two different variables. (5 Marks)

b) Write a task list to input marks of five subjects such as Physics, Chemistry, Biology, Mathematics and Computer Science. Then calculate the percentage based on the average marks and grade the student according to following grading system. (9 Marks)

- Percentage >= 90% : Grade A
- Percentage >= 80% : Grade B
- Percentage >= 70% : Grade C
- Percentage >= 60% : Grade D
- Percentage >= 40% : Grade E
- Percentage < 40% : Grade F

10

c) An envelope manufacturing company hires people to make envelopes. They provide all the raw material needed and pay at the following rates. Write a task list to input the number of envelopes made and print the amount due. (6 Marks)

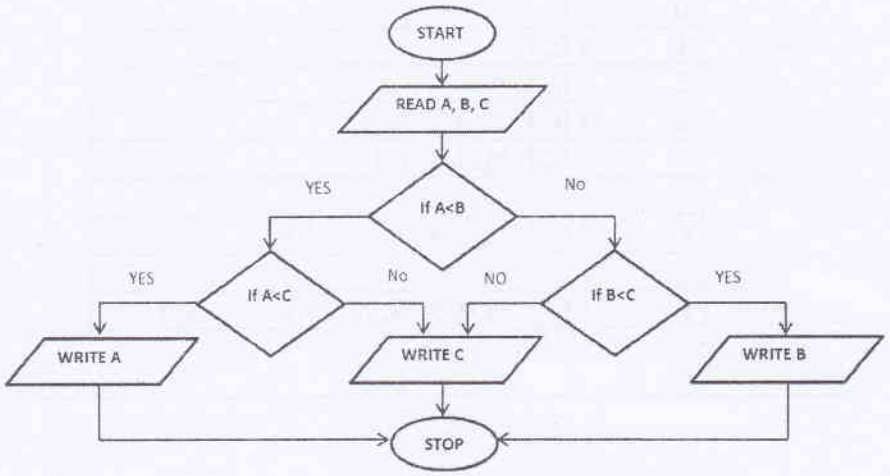
Envelopes	Rate
1-1000	75 cents
1001-1500	1 rupee
1501-2000	1 rupee and 15 cents
> 2000	1 rupee and 25 cents

d) Write a task list to obtain the expected sequence for a given input as shown below.
(5 Marks)

Input	Expected Sequence
0	0
1	0, 1
2	0, 1, ½
3	0, 1, ½, 1/3
4	0, 1, ½, 1/3, 1/4
...	...
i	0, 1, ½, 1/3, ¼, ..., 1/i
...	...
n	0, 1, ½, 1/3, ¼, ..., 1/i, ..., 1/n

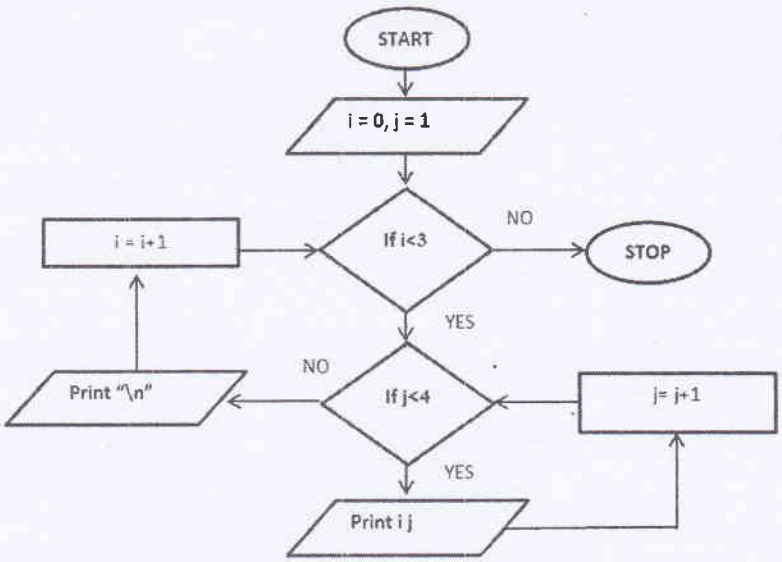
Question 4

a) State the output of following flow chart according to the values given for the A, B and C. (2 Marks)



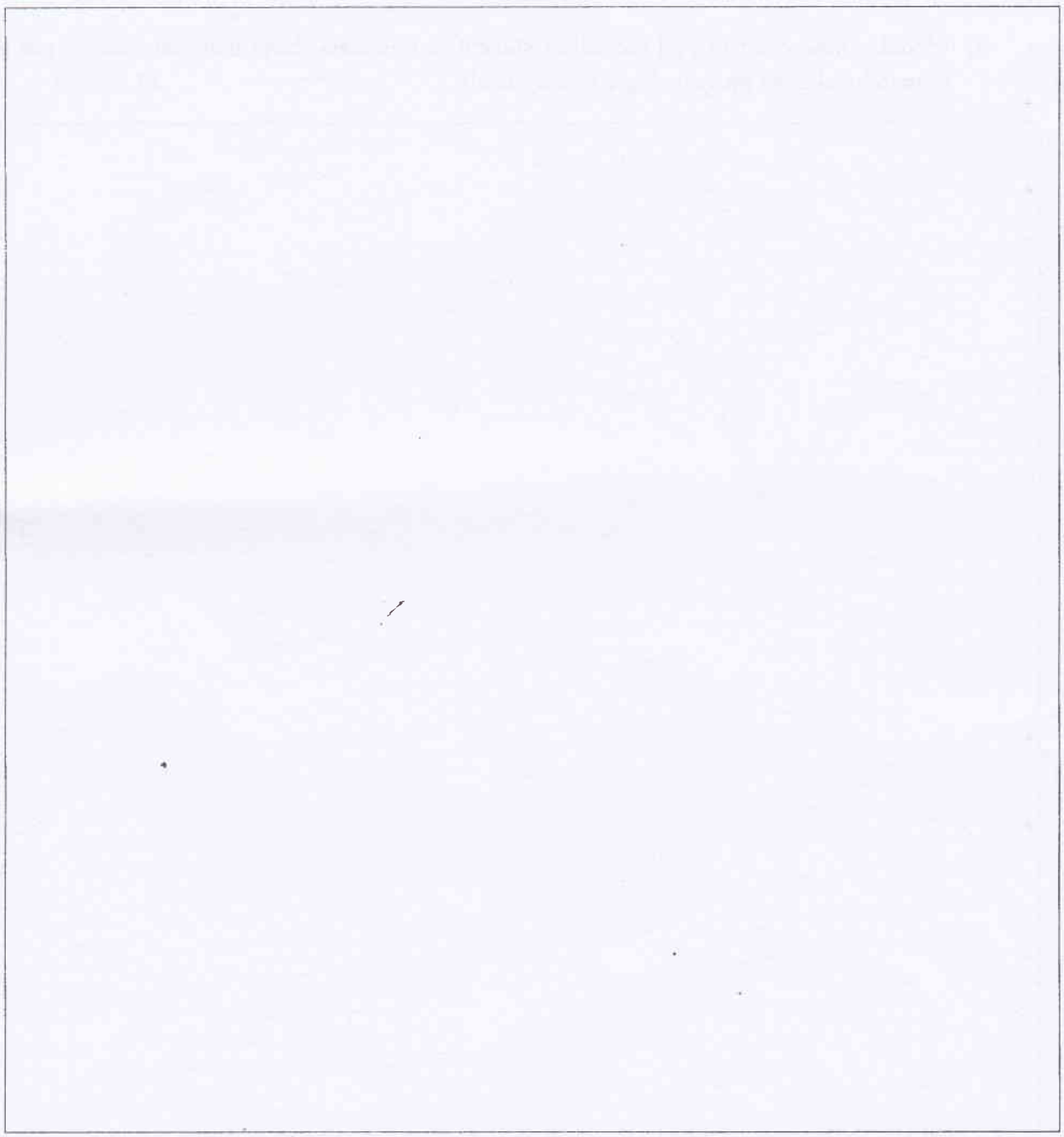
A=5, B=5, C=5	
A=5, B=4,C=5	
A=4, B=5, C=5	
A=4, B=6, C=4	

b) Write the output of following flow chart. Note that "\n" gives new line. (4 Marks)



c) Modify the flow chart given in Question 4 part (b) in order to obtain the following output.
(4 Marks)

01020304
11121314
21222324



Following data set lists the heights of 10 students in a class. Draw flow charts for the Question 4 part (d) to (f) by using this data set.

Data set: Heights in (cm)

160	165	163	160	159	162	158	155	157	161

d) Model a flow chart to find the tallest student in this class. Note that you have to use a loop to handle the program logic appropriately. (7 Marks)

e) Modify the flowchart modeled in Question 4 part (d) to compute the average height of the class. (5 Marks)

f) If the average height of the class is known, model a flow chart to display a message "Above average" if the given student's height is above the average height otherwise display "Below average". (3 Marks)

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