

University of Swaziland  
**Department Of Computer Science**  
Supplementary Examination  
JULY 2014

*Title of paper:* *C under Unix*

*Course number:* *CS344*

*Time Allowed:* *Three (3) hours*

*Instructions:*

- *Answer question 1.*
- *Answer any other three (3) questions from questions 2 to 6*
- *Each question carries 25 marks*

*This paper may not be opened until permission has been granted by the invigilator*

### Question 1-25 marks - Compulsory

(a) State whether each of the following is true or false. If false explain [6 marks]

- (i) All variables must be declared before they are used.
- (ii) All variables must be given a type when they are declared.
- (iii) C++ considers the variables **number** and **Number** to be identical.
- (iv) Variable declarations can appear almost anywhere in the body of a C++ program.
- (v) The default case is required in the **switch** selection structure.
- (vi) An array may store many different types of values.

(b) Write a C++/C#/Java statement(s) to accomplish each of the following

- (i) Declare variables **c**, **thisnumber**, **q234** and **number** to be of type integer.  
2 marks
- (ii) Declare a double precision pointer **y**, set it to point to some arbitrary memory location, and initialize the value of this location to be 7.4  
2 marks
- (iii) Print the value 333.546372 in a field of 15 characters with precision of 3.  
3 marks
- (iv) Sum the odd integers between 1 and 99 using a **for** loop;  
2 marks
- (v) Declare an array of 10 integers called **scores** and initialize the first 5 components to 8, 10, 12, 100, 56  
2 marks
- (vi) Print the sum of all elements of a floating-point array **c** of 100 elements.  
4 marks
- (vii) Determine and print the sum of all integers contained in array **w**.  
4 marks

**Question 2-25 marks**

(a) Using a function template, write a function **Min** that takes two values and returns the largest value. *5 marks*

(b) Write a function **QualityPoints** that takes an student's average and returns 4 if average is 90-100, 3 if average is 80-89, 2 if average is 70-79, 1 if average is 60-69 and 0 if average is lower than 60. *10 marks*

(c) Write a recursive Power function that computes and returns the value of  $X^n$ .

$$\begin{aligned} X^n &= 1 && \text{if } n = 0; \\ &X * X^{n-1} && \text{if } n > 0; \\ &1/X^{-n} && \text{if } n < 0; \end{aligned}$$

*10 marks*

**Question 3-25 marks**

A parking garage charges E2.00 minimum fee to park for up to three hours. The garage charges an additional E0.50 per hour for each hour or *part thereof* in excess of the three hours. The maximum charges for any given 24-hour period is E10.00. Assume that no car parks for longer than 24 hours at a time. Write a program that calculates and prints the parking charges of several customers who parked their cars in the garage yesterday. You should enter the hours parked for each customer. Your program should print the results in a neat tabular format and should calculate and prints the total of yesterday's receipts. The program should use the function **CalculateCharges** to determine the charge for each customer. Your outputs should appear in the following format.

Car	Hours	Charge
1	1.5	E2.0
2	4.0	E2.50
3	24.0	E10.0
TOTAL	29.5	E14.50

*Show all your working from analysis to design and implementation.* *20 marks*

### Question 4 – 25 marks

- (a) Write a C++ structure definition of a *Single Un-Ordered Linked List*.  
3 marks
- (b) Using your structure definition in (i) above, write the suitable function definitions for the following
- *init (L)* – Initializes list L to an empty list. 4 marks
  - *IsEmpty (L)* – returns true if list L is empty and false otherwise. 4 marks
  - *Insert (e,L)* – inserts element e into list L. 7 marks
  - *Delete (e, L)* – deletes element e from list L. 7 marks

### Question 5– 25 marks

- (a) Define a name structure containing a string field for a **name**, an integer for **feet**, and another integer for **arms**.  
5 marks
- (b) Use the new structure to define an array of 6 items of the structure defined in (a) above.  
5 marks
- (c) Write a function that will print out all the data in the array declared above in the following format (*assuming appropriate assignments for, name, feet and arms, have been made for each data item in the array*).
- ```
A Human being has 2 legs and 2 arms  
A dog has 4 legs and 0 arms
```
- 7 marks
- (d) Write code segments to illustrate how these values (human being, 2, 2) would have been assigned to the corresponding variables by using a loop that reads all corresponding values (name, feet and arms) from standard input.  
8 marks

