



UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2015/2016

FIRST YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR SCIENCE
IN ELECTRICAL AND ELECTRONIC ENGINEERING

FEE 132 COMPUTER SCIENCE II

DATE: 2ND JUNE 2016

TIME: 9:00 – 11:00 A.M.

INSTRUCTIONS

1. Attempt any **THREE** questions
2. All questions carry equal marks

Question 1

- (a) In developing computer programs, describe:
- (i) Interpreted Program **(2 marks)**
 - (ii) Compiled Program **(2 marks)**
- (b) In the C Program in Figure Q1, describe the meaning of each of the following two lines:
- (i) `#include <stdio.h>` **(2 marks)**
 - (ii) `#include <math.h>` **(2 marks)**
- (c) A user compiles then executes the program in Figure Q1 on a particular computer, using as input a number that is 6 digits. Explain why there will be an error in the result printed. [Hint: You may refer to the data types provided at the end of this paper] **(4 marks)**
- (d) Which line of the program would you modify, and to what will you change it, to accommodate numbers that have 6 digits? **(4 marks)**
- (e) In Figure Q1, if the last line `return 0;` is deleted, will the program still run? If yes, what will be the result if the user inputs the number 64? If no, explain why. **(4 marks)**

```
#include <stdio.h>
#include <math.h>

main()
{
    int n;
    double y;
    printf("Key in a and press ENTER\n\n");
    scanf("%d", &n);
    if(n<0)
        printf("No sqrt for negative number \n\n");
    else
    {
        y = sqrt(n);
        printf("Square Root of %d is %f\n", n, y);
    }
    return 0;
}
```

Figure Q1

✓ Question 2

- (a) Define pseudocode, and describe the advantage that the programmer gains in using pseudocode prior to using a programming language. (4 marks)
- (b) After using pseudocode to develop an algorithm, why is a programming language still needed to produce an executable program? (4 marks)
- (c) Describe the terms correct program and program specification, and explain why a correct program does not necessarily guarantee correct results when it is executed (4 marks)
- (d) Regarding the methods of discovery and development of algorithms, define:
- (i) Top-down design by stepwise refinement (2 marks)
 - (ii) Bottom-up approach (2 marks)
- (e) Compare the two methods in (d) and state which one is better for the development of algorithms (4 marks)
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Question 3

- (a) In Figure Q3(a) the list of names is to be sorted in ascending alphabetical order using the insertion sort algorithm. Describe and illustrate the steps, indicating the results after each insertion, clearly demarcating the sorted and unsorted parts of the list, until the list is fully sorted. (8 marks)

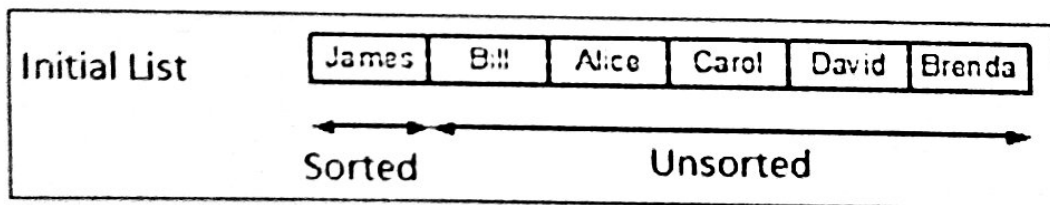


Figure Q3(a): List to be Sorted Using Insertion Sort

- (b) In Figure Q3(b) the numbers are to be sorted in ascending order using the bubble sort algorithm. Give the results after each step of the bubble sort algorithm by indicating by arrows the movement of the list elements, until you reach the final ordered list. (8 marks)
- (c) Since there are six(6) items in both lists in (a) and (b) above, which of the sorting methods takes a longer time? Explain (4 marks)

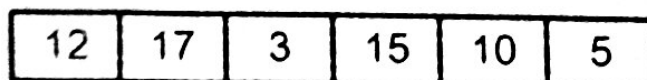


Figure Q3(b): List to be Sorted Using Bubble Sort

Question 4

(a) In problem-solving using computers, describe briefly what is meant by each of the following:

- (i) Run-time Error (2 marks)
- (ii) Logic Error (2 marks)
- (iii) Syntax Error (2 marks)

(b) In the definition of an algorithm what is the meaning of each the following:

- i. an ordered set of steps (2 marks)
- ii. unambiguous steps (2 marks)
- iii. executable steps (2 marks)
- iv. terminating activity. (2 marks)

(c) Table Q4, shows marks obtained by *four* students in *seven* subjects. An array variable `marks []` is used to represent the marks.

Table Q4: Student Marks

Student_ID	Subject Index						
	0	1	2	3	4	5	6
0	56.7	55.6	76.7	77.5	78.7	76.6	86.5
1	57.6	65.3	87.6	67.6	72.6	76.4	79.4
2	61.2	54.3	66.2	77.2	68.2	61.2	87.1
3	55.4	71.0	85.4	88.4	65.4	65.4	77.4

(i) In specifying (declaring) the array variable, what are the minimum values of the row index, and column index, respectively, needed to hold the class marks? (2 marks)

(ii) If each array index starts at 0, what value is represented by the array element `marks [3, 2]`? (explain your answer) (2 marks)

(iii) In the following C line of code
`printf("Subj_ID = %d Subj Average = %f \n", subj_index, subj_avrg);`
 what are the functions of the character sequences `%d`, `%f`, and `\n`? (3 marks)

C Variable Types For a Particular Computer System

Declaration	Signed?	Bytes	Range
char	signed	1	-128 to 127
int	signed	2	-32,768 to 32,768
short	signed	2	-32,768 to 32,768
short int	signed	2	-32,768 to 32,768
long	signed	4	-2,147,483,648
long int	signed	4	-2,147,483,648
unsigned char	unsigned	1	0 to 255
unsigned	unsigned	2	0 to 65,535
unsigned int	unsigned	2	0 to 65,535
unsigned short	unsigned	2	0 to 65,535
unsigned long	unsigned	4	0 to 4,294,967,295
enum	unsigned	2	0 to 65,535
float	signed	4	3.4E + -38 [7 digits accuracy]
Double	signed	8	1.7E+ -308 [15 digits accuracy]