

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
DECEMBER EXAMINATIONS 2004

SUBJECT: INTRODUCTION TO COMPUTER SCIENCE
[ENGINEERING STUDENTS]
CODE: SCS1101

INSTRUCTION TO CANDIDATES

Answer a total of 5 questions, any 2 from Section A and any 3 from Section B.
Each question carries 20 marks

Time: 3 hours

SECTION A

QUESTION ONE

- a) Explain with examples, the following terms
- (i) Hardware
 - (ii) Software
 - (iii) Firmware
 - (iv) ROM
 - (v) RAM
- [10]
- b) What are the advantages of networking computers? [5]
- c) State and explain the benefits and drawbacks that are associated with the use of Personal Computers (PCs). [5]

QUESTION TWO

- a) (i) Convert 13.5625 to its equivalent in binary. [1]
- (ii) Simplify the hexadecimal arithmetic **CAD x B0D** [1]
[Give your answer in hexadecimal]
- b) Describe the computer generations. [8]
- c) You have been requested to assemble a computer from scratch. What components would you require? Explain the function(s) of each component that you state. [10]

QUESTION THREE

- a) How are Indexed Sequential files accessed? [2]
- b) Compare and contrast laser printers and dot matrix printers. [4]
- c) What is a computer virus? What are some of the symptoms of a viral infection? [4]
- d) With examples, explain the **five** types of high-level programming languages. [10]

SECTION B

QUESTION FOUR

- a) Suppose a, b and c are integer variables that have been assigned values a = 8, b = 3 and c = -5. Determine the value of each of the following expressions.

- (i) a % b
(ii) a * b / c
(iii) a * (b / c)
(iv) 2 * b + 3 * (a - c)
(v) a / c [5]

- b) Write a C program that prompts the user to enter a string. Your program should then read the string and print the string in reverse as well as give the length of the string. [5]

- c) Consider a sequence of floating- point numbers, x_i , $i=1,2,3,\dots,m$. The mean is defined as

$$\bar{x} = (x_1 + x_2 + x_3 + \dots + x_m) / m$$

the deviation about the mean is

$$d_i = (x_i - \bar{x}), \quad i = 1,2,3,\dots,m$$

and the standard deviation is

$$s = \sqrt{(d_1^2 + d_2^2 + d_3^2 + d_4^2 + \dots d_m^2) / m}$$

Write a C program that reads in **m** elements of a one-dimensional floating-point array. The program should then calculate and output the sum of these elements, the mean, the deviations and the standard deviation. [10]

QUESTION FIVE

- a) Write a C program that reads the necessary dimensions for each of the following geometric figures and outputs the perimeter in each case:
- (i) Square (one dimension)
 - (ii) Rectangle (two dimensions)
 - (iii) Circle (one dimension)
 - (iv) Right-angled triangle (two legs – adjacent and opposite sides)

The program must satisfy the following conditions

- (i) It is to be interactive in the sense that conversational kinds of comments and questions are presented to the user for his response.
- (ii) Display a program menu that prompts the user to choose one of the available figures. Determine the expected input from the user once he/she has selected the figure.
- (iii) When the processing of one figure is complete, have the program ask if the user wants to stop or continue. If the choice is to continue, present to the user the complete list of option search time.
- (iv) It is to make use of functions that are called in the main.

Include a flow chart for your program. [20]

QUESTION SIX

- a) Explain, with an example, the term semantic error. [2]
- b) Write the syntax of the switch statement. [3]

c) State whether the following statements are valid or invalid C statements.

- (i) `V = 2R;`
- (ii) `print("I am in Bulawayo");`
- (iii) `scanf("%f",y);`
- (iv) `if(choice=2) printf(" Play Chess");`
- (v) `++k;` [5]

d) Write a program that reads a sequence of not more than 10 positive integers and then finds the maximum of the sequence, outputs its value, the number of times it occurs, and the positions in which it appears. The process is then repeated to find the next largest value, and so on. For instance,

Sample input: 7 10 143 10 52 143 72 10 143 7

Sample output: 143 occurs 3 times, at positions 3, 6, 9

.....
.....
7 occurs 2 times, at positions 1, 10 [10]

QUESTION SEVEN

a) What is an infinite loop? Give an example. [2]

b) Given that **a** and **b** are declared as integers. What would be the output from the following program segment?

```
for(a=1; a<=4; a++)  
  { for(b=1; b<=4-a; b++)  
    printf("%c", 'w'+ b );  
    printf( "\n ");}
```

 [3]

c) Write a simple program in C that prompts the user to enter the length and the width of a rectangle. The program should calculate and output the area of the rectangle. In your program, make use of pointers and include the necessary comments. [5]

- d) Write a C program that is to assist a child in counting. The program should ask the child to input an integer between 0 and 20 inclusive and go on to display the corresponding number of asterisks (*). The program should present the child with another opportunity to enter another integer until the child no longer wishes to continue. The program should output an appropriate error message if an integer outside the required range is entered by the child. [10]

END OF QUESTION PAPER

GOOD LUCK!