

KASNEB

CICT PART II SECTION 3

STRUCTURED PROGRAMMING

PILOT PAPER

September 2015.

Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- (a) Using examples, explain two main preprocessor directives used in C language. (4 marks)
- (b) Using a diagram, highlight six key stages of the C compilation model. (6 marks)
- (c) (i) Write a function named "max" which returns the largest of three numbers. (4 marks)
- (ii) Write a main () function which asks a user for any three numbers and calls the max function in c (i) above and outputs the largest of the three numbers. (4 marks)
- (d) Give a c statement that evaluates the following expression:

$$x = \sqrt{(a+b)^2 c}$$

(2 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Outline two advantages of structured programming. (2 marks)
- (b) Explain the output of the following program:

```
#include <stdio . h >
int main ( )
{
    int time;
    for (time = 20; time >= 0; time --)
        printf ("%d", time);
    printf ("\n\n LIFT OFF! \n\n");
    return 0;
}
```

(4 marks)

- (c) (i) Define the term "algorithm". (1 mark)
- (ii) Explain five properties of an algorithm. (5 marks)
- (d) (i) Using an illustration, differentiate between 'while' and 'do while' loop. (4 marks)
- (ii) Rewrite the following program using SWITCH statement: (4 marks)

```
#include <stdio . h >
int main ( )
{
    char color;
    printf ("enter the color of light R, G or Y");
    scanf ("%c ", & color);
    If (color == 'r' || color == 'R')
        printf ("STOP!\n");
}
```

```

else if (color == 'y' || color == 'Y')
printf ("CAUTION!\n");
else if (color == 'g' || color == 'G')
printf ("Go!\n");
else
printf ("Invalid color!\n");
return 0;
}

```

(Total: 20 marks)

QUESTION THREE

- (a) Explain why variables must be declared before use. (2 marks)
- (b) (i) Using an example, describe two ways in which arguments can be passed to a function. (6 marks)
- (ii) Differentiate between formal parameters and actual parameters. (4 marks)
- (c) Suppose that price is an array of doubles giving the price of Gold for the years 1980 to 1991.

Required:

Write two lines of code that will print a two column table of these prices, with the years in the left hand column and prices in the right hand column. (4 marks)

- (d) Consider the program below:

```

#include <stdio . h >
int main ( )
{
const int max = 5;
int i;
for (i = 0; i < max; i ++ )
print f (" % d", i);
return 0;
}

```

Required:

Draw a flow chart for the loop statement.

(4 marks)

(Total: 20 marks)

QUESTION FOUR

- (a) The fibonacci numbers are numbers in the following integer sequence:

0 1 1 2 3 5 8 13 21 34 55.....

By definition, the first two fibonacci numbers are 0 and 1 and each subsequent number is the sum of the previous two i.e

$$F_n = F_{n-1} + F_{n-2}$$

with seed values

$$F_0 = 0 \quad F_1 = 1$$

Required:

Write a recursive function to print n fibonacci numbers.

(5 marks)

- (b) (i) Define a pointer. (2 marks)
- (ii) Write a program that performs the following:
- I Declares a pointer variable. (1 mark)
- II Assigns the address of a variable to the pointer. (2 marks)
- III Finally accesses the value at the address available in the pointer variable. (2 marks)

- (c) Describe the following string functions:
- (i) Strchr (S1, ch); (2 marks)
 - (ii) Strchr (S1,S²); (2 marks)
- (d) Distinguish between the following data structures:
- (i) Union.
 - (ii) Structure. (4 marks)
- (Total: 20 marks)**

QUESTION FIVE

- (a) Identify four types of file operations in C programming. (4 marks)
- (b) Differentiate between “static memory allocation” and “dynamic memory allocation” in C programming. (4 marks)
- (c) Explain three benefits of collaborative application development. (6 marks)
- (d) Write a program that repeatedly asks a user for marks obtained by a student in seven subjects and inputs the marks into an array. The program then calculates the grade of the student and displays it.

Use the following grading system:

Marks	Grade
70-100	A
60-69	B
50-59	C
40-49	D
Below 40	F

(6 marks)
(Total: 20 marks)

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