THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME : LEVEL 03
CPU1141/CSU3200 - INTRODUCTION TO COMPUTER PROGRAMMING
FINAL EXAMINATION – 2017/2018

DURATION:Two Hours (2 Hours)

Date: 02.10.2018	Time: 1.30 p.m. – 3.30 p.m.

ANSWER FOUR QUESTIONS ONLY.

QUESTION 01

a) Briefly describe the **postfix** and the **prefix** operators that are used in the C language.

b) The following is an expression of a C program. What is the value of 'X' after this expression is executed?
      X=4/2+8*4*(5+2) %3;

c) State the purpose of using each of the following header files in a C program.
      1) stdio.h
      2) stdlib.h

d) What is the output of the following program?

```
#include<stdio.h>
#include<string.h>
int main( )
{
char source[ ] = "Folks!" ;
char target[30] = "Hello" ;
strcat ( target, source ) ;
printf ( "\nsource string = %s", source ) ;
printf ( "\ntarget string = %s", target ) ;

return 0;
}
```

QUESTION 02

a) What are the **four** main storage classes used in the C language?
b) Describe the process of **getchar()** function and **putchar()** function.
c) State the process of a **compiler** and a **translator**.
d) Write a complete C program to read your name in full and print it under the heading 'My name is...'

      E.g   My name is...
            Sunil Perera

QUESTION 03

a) · What are the **three** main repetition statements used in the C language?

b) What are the **four** statements that perform an unconditional branch in the C language?

c) Describe the difference in between **malloc()** and **calloc()** functions.

d) Write a complete C program to print the following design on your screen by using 'for' loops.

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

QUESTION 04

a) State the meaning of each conversion characters mention below.
   1) %c
   2) %d
   3) %s
   4) %x
   5) %h

b) If the variable x=2 and variable y=3, write the values of x, y and z after the execution of each of the following statements separately.
   1) z = ++x + y++;
   2) z = x++ + --y;
   3) z = ++x * ++y;
   4) z = ++y / x;

c) Describe the process of **gets()** and **puts()** functions.

d) Give line by line explanation for the following program. (Assume that you input the value 10 as **radius**.)

```c
#include<stdio.h>
#define pi 3.14159
int main()
{
 float r;
 printf("\n Enter the radius  in mm :");
 scanf ("%f", &r);
 printf("\n The perimeter is  %.2f" ,2*pi*r) ;
 return 0;
}
```

QUESTION 05

a) What is an **Union**?

b) Suppose you want to store data about a mobile phone. You want to store its **brand** (a string), its **model** (a string), its **color** (a string) and its **price** (a float). Create a structure to hold the above information.

c) State the meaning of each format modifiers mention below.
1) %6d
2) %6f
3) %.2f
4) %4s

d) Convert the following **switch** statement into nested **if/else** statements.

```
switch(rank) {
        case 1:
        case 2:
            printf("Lower division \n");
            break;
        case 3:
        case 4:
            printf("Upper division \n");
            break;
        case 5:
            printf("Graduate student \n");
            break;
        default:
            printf("Invalid rank \n");
}
```

QUESTION 06

a) State the main difference between a **while** loop and a **do while** loop.

b) Convert the following statement into **if else** statement.
   C = (A == B) ? (A + B) : (A * B);

c) Describe the **two** methods of constant declaration in the C language with **one** example for each.

d) What would be the outputs of the following program if we enter the following values as **basic salary**?
1) 8000
2) 15000

3) 25000

```c
#include <stdio.h>
int main()
{
        float Basic, HRA, DA, Gross_Salary;

        printf("\n Please Enter the Basic Salary of an Employee  :   ");
        scanf("%f", &Basic);

        if (Basic <= 10000)
        {
                HRA = (Basic * 8) / 100;
                DA = (Basic * 10) / 100;
        }
        else if (Basic <= 20000)
        {
                HRA = (Basic * 16) / 100;
                DA = (Basic * 20) / 100;
        }
        else
        {
                HRA = (Basic * 24) / 100;
                DA = (Basic * 30) / 100;
        }
        Gross_Salary = Basic + HRA + DA;
        printf("\n Gross Salary of this Employee  =  %.2f", Gross_Salary);

        return 0;
}
```

QUESTION 07

a) Which of the following words are **invalid identifiers** in Pascal? Give reasons.

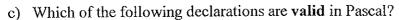|			
1)	Samounts	5)	End
2)	Gravity	6)	Int-rate
3)	2Force	7)	Main
4)	Force 123	8)	Begin

b) Write a Pascal Program to display the following text on the screen.

Sarasavi Book Shop
51/9, Highlevel Road,
Maharagama

c) Which of the following declarations are **valid** in Pascal?

    1)   CONST
            gravity =32 ;
            force = gravity ;
            thrust = -force;

    2)   CONST
            Pi   = 22/7 ;
            Asterisk = ' * ';

d) Write the data type of each of the following identifier in Pascal?

    1) total, where total = 113.25
    2) number, where number =13
    3) singleletter, where singleletter = D
    4) value, where value = True

e) Write arithmetic expressions for the following formulae using Pascal. Use 'SQRT' for square root.

    1) $-b + \sqrt{b2\ 4ac}$

    2) $\sqrt{s(s-a)(s-b)(s-c)}$

    3) $\frac{pv}{rt}$

f) The following declaration is given in Pascal;

    VAR
     Cloudy, Sunny, Rain, Funnyweather : BOOLEAN;
    BEGIN
        Sunny := True;
        Rain := False;

Write down the output of the following,

    1) Funnyweather   := Sunny **AND** Rain ;
    2) Funnyweather   := Sunny **OR** Rain ;
    3) Funnyweather   := Sunny **AND NOT** Rain ;
    4) Funnyweather   := **NOT** Sunny **AND** Rain ;

g) Determine following statement is **true** or **false** in Pascal.

    1) The body of the WHILE loop is executed at least once.
    2) The body of the REPEAT loop, when it contains more than one statement, doesn't have to be included between BEGIN and END.
    3) The body of the WHILE loop, when it contains more than one statement, doesn't have to be included between BEGIN and END

h) Consider the following case statement written in Pascal.

```
CASE GradePercentage DIV 10 OF
        9, 10   : WRITELN ('Distinct');
        8       : WRITELN ('Very Good');
        7       : WRITELN ('Good');
        5, 6    : WRITELN ('Passed');
    0,1,2,3,4   : WRITELN ('Failed');
END;
```

What is the message displayed when you input each of the following grades?

a). 84   b). 63   c). 52   d). 33   e). 99

QUESTION 08

a) Identify the syntax errors in the following program and write the corrected program using Pascal.

```
PROGRAM student (INPUT, OUTPUT)
VAR
    x, y, z, tot : INTEGER;
FUNCTION total ( )  : INTEGER
BEGIN
    Total  : =  a + b+ c;
    return total;
END ;
BEGIN
    WRITELN ('Enter three marks');
    READLN (x, y, z) ;
    tot := total (x, y, z);
    WRITELN (Total Marks : tot);
END.
```

b) Write a function to calculate the temperature in centigrade for a given temperature in Fahrenheit using Pascal.

temperature in centigrade = 5/9 (temperature in Fahrenheit - 32)

c)
```pascal
PROGRAM  one (input, output ) ;
    VAR
        x, y, min : REAL;
    PROCEDURE find-minimum (a, b :REAL ; VAR min :REAL);
    BEGIN
        IF    a <b   THEN
        min  := a
        ELSE
        Min  := b
    END;

BEGIN
    WRITE ('ENTER value for x :   ');
    READLN (x);
    WRITE('Enter value for y :   ');
    READLN (y);
    find_minimum (x, y, minimum);
    WRITE ('Minimum of the two number is   :' ,min);
END.
```

In the above Pascal program, there are three parameters **a, b** and **min**. Explain the type of each parameter giving reasons.

d)
```pascal
PROGRAM two (INPUT, OUTPUT);
    VAR
     x: INTEGER;
    PROCEDURE change;
    VAR
     x: INTEGER;
    BEGIN
     x: 1;
    END;

BEGIN
    x: 0;
    change;
    WRITE(x);
END.
```

In the above Pascal program, the variable x has been declared in two places. Explain the difference between these two.

e) (1), (2) and (2) are three statements of a Pascal program. Describe the behavior of each of them.

    1) letter   = ARRAY[1..100] OF CHAR;
    2) gradetable = ARRAY [year, course] OF grade;
    3) sequence = PACKED ARRAY[1..20] OF CHAR;

f) Determine following statements are valid or invalid in Pascal:
    1) VAR
            YourArray :ARRAY[1..4] of INTGER;

            BEGIN
            FOR I:= 1 TO 4 DO
                WRITE(YoureArray[I]);
            END.

    2) TYPE
            Size = 1..100 DIV 2;
            Size1 = 1..200;
            Size2 = 1..100/2;

g) A program in Pascal segment is given below;

    TYPE
        iptr = ^INTEGER;
        cptr = ^CHAR;
        aptr = ^a;
        a   = array[i..10] OF REAL;

    Give a line by line explanation for each of the above

h) Given the following type and variable declarations in Pascal:

TYPE
    PI = ^INTEGER;
    PR = ^REAL;
    PS = ^PACKRD ARRAY [1..20];
VAR
    P1, P4 :PI;
    P2 :PR;
    P3 :PS;
    I : INTEGER;

Determine which of the following statements are valid and which are not:

1) NEW (P1);
2) NEW (P4);
3) NEW (I);
4) P3^ := 'Hello there!';
5) WRITELN (P1^:4, P2^;4:00, P3^:15);