



FOUNTAIN UNIVERSITY, OSOGBO, NIGERIA.

P.M.B.4491, OSOGBO, OSUN STATE.

COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2021/2022 SESSION

CPS201: COMPUTER PROGRAMMING I

Credit Unit/Status3(C)

Time Allowed:2 HOURS

Date: 25/03/2022

INSTRUCTIONS: Answer All questions in Section A and any other 2 questions in Section B

SECTION A

1. Rewrite the following declarative statements correctly:

1. *Integer*; mean rainfall, *DIMENSION*(120)
2. *Integer*, price of goods, unit bundle, bonus
3. Character :: residential address (len =120)
4. Real, student score, no of units, weight
5. Total mark:: integer(300)

[5marks]

2. In Tabular form, Predict the output of the following codes

```
N=10
DO
PRINT *,N,N**2
IF(N<4) EXIT
N=N-2
END DO
```

[5marks]

3. Write valid FORTRAN expressions for the following formulae

- (a) $t^2 = m.(1 + 0.3326x)$
- (b) $E = C.V^2/2$
- (c) $mx = e^x.(kx)^{1/2}$
- (d) $r = 2\pi.p.\log_{10}(-0.5x^2)$
- (e) $\Phi(x) = 0.5 - r(a.t + b.t^2 + c.t^3)$

[5marks]

4. What is the output of the following code fragment?

```
int x = 405;
int y = 402;
int z = 0.5*x + 3 *y
if ((x > 400 .and. y >= 350) .or. (y < z)) Then
print *, 2*x,y ,2*(x + y)
else
print *, 3* x, y , (x**2 - 5*y), z*y
```

[5 marks]

5. Write a program to compute the volume of a cylinder using the formula

$$V = \pi r^2 h$$

[5 marks]

SECTION B

(Answer any 2 questions in this section)

B1 a) Discuss the structure and the various components of a Fortran program

[3 ½ marks]

a(ii) Write a program that can be used to convert a given set of values in feet to Metre. Marking out the different components of a Fortran program

Please Note: a foot = 0.3048 Metre

[5 marks]

b) Consider the following equation for the calculation of the twist factor of a yarn
Twist Factor, T_f , of a yarn if given by:

$$T_f = N \sqrt{\left(\frac{m}{1000} \right)}$$

where N = (turn/m) is the number of twist of a yarn per unit length and m is measured in tex (a yarn count standard) that is mass in grams of a yarn whose length is 1 km.

Using a do loop, Write a Fortran program to calculate twist factor of a yarn for the given various values of N and m

[9 marks]

B2. (a) The following program is meant to be used to compute the salary of 20 employees of Fountain University. The program is badly written and laid out. Correct the errors by re-writing the programs so that it works.

```

DEDUCTION = DEV-FEE + TAX
PROGRAM SALARY
PARAMETER DEV-FEE = 2000
REAL::BASIC PAY, ALLOWANCE, DEDUCTION, NET PAY
ALLOWANCE = RENT + HOUSING + TRANSPORT
TAX = 0.05 * BSIC PAY
READ(*,*) BASICPAY, ALLOWANCE, DEDUCTION
PRINT(*,*) NETPAY
DO J = 1, 50
NETPAY = BASIC PAY + ALLOWANCE - DEDUCTION
END DO
END SALARY
    
```

[7 ½ marks]

b. In computing the payroll for a small organization consisting of 10 staff, the following formula is used

NetPay = Basicpay + Allowances – Deductions

Allowances are made up of the rent, dressing, transport and hazard

Deductions are made up of payee tax which is 15% of Basicpay plus ₦2500 as Dev fee

If the basicpay and all components of allowances listed above are taken as input values,

(i) write a program which computes the NetPay of the staff. Generate an appropriate output for the program

[10 marks]

- B3.a) (i) What are arrays? [1 mark]
 (ii) List the features of an array [4 marks]
 (iii) Draw a graphical representation of a one dimensional 9 elements array AZ and write a declarative statement for the array [3 marks]
 (iv) Write a declarative statement for a 4 by 4 two dimensional array X whose elements are all integers [2½ marks]

- b.) The factorial of any positive number k can be computed using the following
 $K! = 1.2.3....(K-1)K$ if $K > 1$
 Or $K! = 1$ if $K = 0$
 e.g. $0! = 1$ and $4! = 1.2.3.4 = 24$
 Write a program that can be used to find the factorial of any inputted non negative integer [7 marks]

- B4 a) (i) What are do loops and what are they used for in Fortran programming? [3 marks]
 (ii) List at least 3 types of do loops and give the general format for each with an example [6 marks]
 b) Fountain Ventures opens shop 6 times a week. The daily sales made on 4 different categories of goods namely: Recharge cards, drinks, biscuits and writing materials are kept separately for easy accountability. Using the concept of arrays, write a program which reads the daily sales figure on each category of goods and compute total daily and weekly as well as mean daily and weekly sales figure on each category of goods. Your program should compute the weekly income for fountain ventures and predict monthly sales figure. Generate an appropriate output for your program [8 ½ marks]

- B5. a) (i) What is a subprogram? [2 mark]
 What are the benefits that a programmer stand to gain from adopting subprogramming as a programming methodology? [3 marks]
 b.) Discuss the classification of External procedures and give general format for each class [4 marks]

c) Consider the following function

$$F(x) = \begin{cases} x + y & \text{if } x \geq 0 \text{ and } y \geq 0 \\ x + y^2 & \text{if } x \geq 0 \text{ and } y < 0 \\ x^2 + y & \text{if } x \leq 0 \text{ and } y > 0 \\ x^2 + y^2 & \text{if } x \leq 0 \text{ and } y \leq 0 \end{cases}$$

- (i) Develop an algorithm **OR** a flowchart for the above function [3 ½ marks]
 (ii) write a Fortran program to implement the above [5 marks]