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(6th Semester)

MATHEMATICS

Paper : MATH–364(B)

(Computer Programming in FORTRAN)

Full Marks : 55

Time : 2½ hours

(PART : A—OBJECTIVE)

(*Marks* : 20)

SECTION—A

(*Marks* : 5)

Each question carries 1 mark

Tick (✓) the correct answer in the brackets provided :

1. Which one is valid FORTRAN integer variable name?

(a) RATU   (   )

(b) PUKPUI   (   )

(c) MAITE   (   )

(d) SESAWNG   (   )

2. The correct form of arithmetic IF statement is

(a) IF(n1,n2,n3, ...,nm), i   (   )

(b) IF(J), 10,20,30   (   )

(c) IF (D J) 11,22,33   (   )

(d) IF (I K) 11,22,33   (   )

3. Which one is valid FORTRAN real variable name?

(a) DELHI   (   )

(b) KOLKATTA   (   )

(c) MUMBAI   (   )

(d) CHENNAI   (   )

4. Choose the valid data statement.

(a) DATA/A,B/3.2, 1.2/   (   )

(b) DATA A,B,/3.2, 1.2/   (   )

(c) DATA A,B/2 3·2/   (   )

(d) DATA/A/B/3.2/1.2/   (   )

5. Which one is valid DIMENSION statement?

(a) DIMENSION A(I,J)   (   )

(b) DIMENSION, A(10, 10),B(6)   (   )

(c) DIMENSION A(20),C(10)   (   )

(d) DIMENSION A(10, 10),B(6)   (   )

SECTION—B

(*Marks* : 15)

Answer **all** questions

Each question carries 3 marks

1. Convert the following FORTRAN expression into mathematical expressions :

    SQRT(SIN(1.+X 2) 2+1.)

2. Find the value of I in the expression I=J 2/3 + K/4 + 6 – J 3/8, taking J=2, K=5.

3. Write the general form of computed GOTO statement.

4. Write a program which will read a matrix *B* with two-dimensional arrays of *m* rows and *n* columns in row-wise using implied DO notation.

5. Write arithmetic statement function to find the area of a triangle.

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

Answer **five** questions, selecting **one** question from each Unit

Each question carries 7 marks

UNIT—I

1. *(a)* Write an algorithm to find the factorial of a positive integer.   3

    (b) Convert into FORTRAN expression :   2

$$1 \quad \dfrac{\dfrac{a}{b}}{1 \quad \dfrac{c}{b}}$$

    (c) What will be the final value of K from the following program segment?   2

```
K = 5
I = 3
IA = 252
M = I  1000 + IA  10
K = M/1000 + K
```

2. *(a)* Write a FORTRAN program to find the LCM of two integers.   4

    (b) Write a flowchart to find the sum of the first 30 natural numbers.   3

UNIT—II

3. *(a)* What will be the printout of the following program?   4

```
        DATA A,J/3.253,111/
        WRITE( ,22)A,J
22      FORMAT(1X, "FIRST", F5.2/1X, "NOW",I5)
        STOP
        END
```

    (b) If I = 1, J = 2; what values the following logical expressions have?   3

((I.GT.0).AND.(J.LT.0)).OR.(.NOT.(J.GT.0).AND..NOT.(I.LT.0))

4. *(a)* Write short notes on any *two* of the following : 2×2=4

   (i) DATA statement

   (ii) Unformatted and formatted outputs

   (iii) Logical variable

   (b) Correct the following program segment : 3

```
        RADIUS = 7.
        AREA = 154.0
        WRITE( , 10) R,A
10      FORMAT(1X, "RADIUS=",I4,1X,"AREA=",I5)
```

UNIT—III

5. *(a)* Write the general form of DO statement. Correct the following program segment : 1+2=3

```
        IF (N.LT.10) GOTO 10
        DO 10 I = 1,  40
        SUM = SUM + I
10      CONTINUE
```

   (b) Write the general form of IF-THEN-ELSE statement. Suppose the value of Y is given by the equation

$$Y \quad \begin{cases} \sin^5 x & , \text{ if } x \quad 1\ 5 \\ x^3 \quad \log x & , \text{ if } x \quad 1\ 5 \end{cases}$$

Write a FORTRAN program to evaluate Y. 1+3=4

6. *(a)* Write a program to find the sum of the following series using DO loop : 4

$$\text{Sum} \quad 1 \quad x \quad x^2 \quad x^3 \quad \cdots \quad x^k$$

   (b) Write a FORTRAN program which will read the principal, rate of interest and time of several accounts and write the simple interest and compound interest at the expiry of the time. Use unconditional GOTO and formatted input/output statements. 3

UNIT—IV

7. *(a)* Write a program which will find the total number of even integers in a given set of 100 integers. 4

(b) Show the printouts of the following print statements :

Given a matrix

$$A \quad (A_{ij}) \quad \begin{matrix} 1 & 2 & 3 & 4 \\ 2 & 0 & 0 & 6 \\ 7 & 8 & 9 & 5 \end{matrix}$$

(i)   DO 2 I=1,3
    2   WRITE (,) (A (I, J), J = 1, 4)

(ii)   WRITE (,) ((A(I,J), J = 1. 4), I = 1, 3)

(iii)   WRITE (.,) ((A (I,J), I = 1, 3), J = 1, 4) 3

8. *(a)* A Fibonacci sequence is defined as follows :

The first term and the second term of the sequence are 0 and 1 respectively. The third and subsequent terms in the sequence are found by adding the preceding two terms of the sequence. A part of the sequence is

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

Write a program to obtain the first 200 terms of this sequence. 3

(b) Given marks obtained by 50 students in mathematics. If this mark array is denoted by MARK(I), write a complete program that will arrange marks in descending order. 4

9. *(a)* Write a FUNCTION subprogram which calculates the area of a triangle in terms of its 3 sides *a*, *b* and *c*.   2

(b) Use this subprogram in a main program.   1

(c) Can the same thing be done by using an arithmetic statement function too? If so, how?   2

(d) Write the same thing in the form of a SUBROUTINE subprogram also and show how you will CALL the SUBROUTINE.   2

10. Write a simple but complete program which illustrates the use of SUBROUTINE and COMMON statements. Mention the objective of your program.   6+1=7

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