2022

(CBCS)

(5th Semester)

MATHEMATICS

EIGHTH (C) PAPER

(Computer Programming in FORTRAN)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A—OBJECTIVE)

(*Marks* : 8)

Tick (✓) the correct answer in the brackets provided : 1×8=8

1. Which of the following is the correct real variable name?

(a) ELSE ( ) *(b)* ZOMBIE ( )

(c) DO ( ) *(d)* OPPOSITE ( )

2. In a flowchart, diamond-shaped box is used for

(a) start/end ( ) *(b)* decision ( )

(c) processing ( ) *(d)* input/output ( )

3. The final value of *F* in the following program

```
    F   15 1
    F   F *3
   JF   F
    F   JF
    F   (F   JF) / 10
```

is

(a) 10· ( ) *(b)* 10 ( )

(c) 4·5 ( ) *(d)* 4 ( )

4. Which of the following is a valid DO statement?

(a) DO 10 *C* 1.2,2.1,.7 ( ) *(b)* DO 15 *M* 0, 3,8 ( )

(c) DO 30 *A* 5.8 ( ) *(d)* DO 50 *J* 9 ( )

5. Which of the following is a valid subscripted variable?

(a) LAN (*J* 2, *M* 1) ( ) *(b)* INK (*J* 1 / 8) ( )

(c) A (2*J*) ( ) *(d)* LEM (0) ( )

6. Which of the following is called specification statement?

(a) Library functions ( )

(b) DO statement ( )

(c) DIMENSION statement ( )

(d) GO TO statement ( )

7. The general form of CALL statement is

(a) CALL (name) arguments ( )

(b) CALL (arguments) name ( )

(c) CALL arguments (name) ( )

(d) CALL name (arguments) ( )

8. Which of the following is a valid EQUIVALENCE statement?

(a) EQUIVALENCE(*A*(*J*), *B*) ( )

(b) EQUIVALENCE(*X*, *Y*, *Z*) ( )

(c) EQUIVALENCE(*X*, *Y*, *Z*) (*A*, *B*, *C*) ( )

(d) EQUIVALENCE(*A*(*I*), *B*(*J*), *C*) ( )

(SECTION : B—SHORT ANSWER)

(*Marks* : 15)

Answer any *five* questions taking at least *one* from each Unit : 3×5=15

UNIT—I

1. Find the value of *I* in the following expression :

I *J* *2 / 3 *K* / 4 6 *J* **3 / 8 (take *J* 2, *K* 5)

2. What is the final value of *K* in the following program?

```
K  5
I  3
IA  252
M  I *1000  IA *10
K  M / 1000  K
```

UNIT—II

3. Write the general form of DATA statement. Give one example each for valid and invalid DATA statements.

4. Write a short note on arithmetic IF statement.

UNIT—III

5. Write a program to find sum of digits of a number using DO loop.

6. Detect the errors from the following DO loops :

(a)
```
DO 20 J = 1,5
  REAL M
.....
20 CONTINUE
```

(b)
```
DO 10 J = 1,5
  J  J  1
.....
10 CONTINUE
```

UNIT—IV

7. Write a short note on DIMENSION statement.

8. Write a program which will read two-dimensional array *B* with array of 5 rows and 10 columns in row-wise and column-wise using implied DO loop.

(SECTION : C—DESCRIPTIVE)

(*Marks* : 52)

Answer the following : 13×4=52

UNIT—I

1. *(a)* What are algorithm and flowchart? Write an algorithm and a flowchart to find the sum of the digits of a five-digit number. 2+4=6

(b) What are library functions? Calculate the following library functions : 1+4=5

(i) AMOD (–34·56, 13·01)

(ii) FLOAT (1534)

(iii) IDIM (26, 52)

(iv) MAX0 (3, 8, 1, 7)

(c) Write a program to find the circumference and area of a circle. 2

OR

2. *(a)* Write a flowchart to find factorial of a positive integer *n* 1. Also write a complete FORTRAN program for this. 2+4=6

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

(i) Complex variable

(ii) Double precision statement

(iii) Logical variable

(c) Write the FORTRAN expression of the following : 3

(i) $\dfrac{2x^2}{x^2 \quad y^2 \quad \frac{3}{2}}$

(ii) $s \quad \log \sin \sqrt{u^2 \quad v^2 \quad 2w\sqrt{3}}$

(iii) Kappa $(k) \quad \sin^3 x \cos 2y \quad 3\sqrt{\cos x}$

UNIT—II

3. *(a)* Write a FORTRAN program to find the sum of the squares of first n natural numbers, where

$$\text{sum} \quad \frac{n(n \quad 1)(2n \quad 1)}{6}$$ 5

(b) Write a FORTRAN program using DO loop that reads an integer $N \quad 2$ and determines if N is a prime by testing if N is divisible by any of the integers 2, 3,....., $N / 2$. 4

(c) Write short note on logical IF and IF-THEN-ELSE statements. 4

OR

4. *(a)* Write a FORTRAN program to evaluate the roots of a quadratic equation $ax^2 \quad bx \quad c \quad 0$ using IF-THEN-ELSE statement. 6

(b) Write the general form of DO statement. Correct the following program segments : 1+2+2=5

(i)
```
IF (N.LE.9) GO TO 25
DO 20 I = 1,50
  X = N*10
25 SUM = SUM + X
20 CONTINUE
```

(ii)
```
IF (N.LT.10) GO TO 20
DO 20 I = 1,40
    SUM = SUM + I
20 CONTINUE
```

(c) What will be the final value of NERD at the end of the following program segment if NERD = 5, JOCK = 10? 2

```
IF (2*JOCK.LE.3*NERD) GO TO 10
      NERD = NERD + 1
      GO TO 20
10 NERD = JOCK
20 NERD = NERD + JOCK
```

UNIT—III

5. *(a)* In the matrix

$$A \quad [A_{ij}] \quad \begin{matrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 6 & 7 & 8 \end{matrix}$$

(i) What are the values of i and j in case of the element 6?

(ii) Write the print statement in FORTRAN to display all the elements of A. 1+3=4

(b) Write a program to arrange a given set of numbers in decreasing order using DO loop. 5

(c) Write a program to find the trace of an m n matrix A. 4

OR

6. *(a)* Write a program to find the sum of two matrices A and B of same order. 6

(b) Use a DO loop to write a program which will find the total number of even integers in a set of 100 integers. 4

(c) Write a program to find if a square matrix is symmetric. 3

UNIT—IV

7. *(a)* Write the general form of function subprogram. Write a function subprogram to find the factorial of a number. 2+3=5

(b) A function $f(x)$ is defined as follows :

$$f(x) \quad x \quad 2, \text{ if } x \quad 2$$
$$2x \quad 1, \text{ if } \quad 2 \quad x \quad 2$$
$$3x \quad \text{if } x \quad 2$$

Write a function subprogram to find and evaluate the function. 5

(c) Write short notes on the following : 1½+1½=3

(i) Subroutine subprogram

(ii) Common statement

OR

8. *(a)* Use a function subprogram to evaluate the HCF of two numbers *M* and *N*. 6

(b) The relationship between the rectangular coordinates (x, y) and polar coordinates r, is $x \quad r\cos$, $y \quad r\sin$. Write a subroutine subprogram to convert rectangular coordinates of a point to its polar coordinates. 4

(c) What are the different classifications of functions and subroutines? 3

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