

Madras University

**M.C.A FORTRAN Question paper**

Time: Three hours

Maximum: 75 marks

**PART A - [5 x 5 = Marks 25]**

Answer ALL questions.

All questions carry equal marks.

1. (a) (i) When do you use type declaration statement? Give examples.  
(ii) Describe the general syntax of computed GOTO statement with an example.

Or

- (b) (i) Discuss briefly about different kinds of variables in FORTRAN.  
(ii) What do you mean by mixed mode expression? Give example.

2. (a) (i) What are subscripted variables? Give the rules with example.  
(ii) Discuss how to handle logical constants and variables in FORTRAN.

Or

(b) (i) Determine the number of times and for which values of the running variable, will the loop be repeated in :

(1) DO 10 I = 1, 10, 2

(2) DO 100 I = 8, 50, 5

(ii) When do you use COMMON statement? give example.

3. (a) Write a note on : Numerical Instability.

Or

(b) Find all the roots of the polynomial  $x^3 - 4x^2 + 5x - 2 = 0$  using the Graeffe's root squaring method.

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33.$$

Or

(b) Compare the Gauss Elimination and Gauss-Seidal Iteration methods.

5. (a) Write the steps in the Algorithm for Simpson's rule.

Or

(b) Apply the fourth order Runge-Kutta method, to find an approximate value of  $y$  when  $x = 0.2$ , given that  $y' = x + y$ ,  $y(0) = 1$ .

**PART B - [5 x 10 = Marks 50]**

Answer any FIVE questions.

All questions carry equal marks.

6. (a) Explain any four Format specifications used in FORTRAN with examples.

(b) Describe how to evaluate logical expression with examples.

7. (a) Write a FORTRAN program to find the greatest integer among three given integers.

(b) Explain the general syntax of DO-LOOP with examples.

8. (a) Explain the use of statement function with an example FORTRAN program.

(b) Define a one-dimensional array A having 200 elements. Write a program to calculate the sum of values stored in odd numbered array locations.

9. (a) Write a FUNCTION subprogram to compute

$1 + xn$  for  $n = 1$

$1 + x/n$  for  $n = 2$

$1 + nx$  for  $n = 3$

$1 + x$  for  $n > 3$  or  $n < 1$

(b) Explain about the general syntax of EQUIVALENCE statement with examples.

10. (a) Discuss the different types of Errors with examples.

(b) Find a root of the equation  $x^3 - 4x - 9 = 0$  correct to 3 decimal palces by using Bisection method.

11. Solve by Gauss-Jacobi method of iteration the equations.

$27x + 6y - z = 85$

$6x + 15y + 2z = 72$   $x + y + 54z = 110$

12. (a) Find the inverse of the matrix 2 using the iterative method, given that its approximate inverse

Perform two iterations.

(b) Solve by Euler's method,  $y' = -y$  given  $y(0) = 1$  and find  $y(0.04)$ .  $y(x, n) = \{ \}$

13. (a) Divide the range into 10 equal parts, find the approximate value of  $\sin x$  by trapezoidal rule.

(b) Use Taylor series, solve numerically

$\frac{dy}{dx} = x^2 - y$ ,  $y(0) = 1$

Tabulate  $y$  for  $x = 0.1, 0.2$ .

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