MAY 2016 **P/ID 17405/RBE**

Time : Three hours Maximum : 75 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

1. (a) Given the values $I = 2$, $J = 3$, $K = 4$, $A = 2.0$, $B = 5.0$, find the value of the expression $A + J * K * * I / J / B$.

Or

(b) With a flowchart, explain computed GO TO statement with an example.

2. (a) What is subscripted variable? If subscripted variable is used, State the roles of a Dimension statement?

Or

(b) Differentiate between a function sub program and subroutine subprogram.

3. (a) What are the different types of errors encountered while performing numerical calculations? Explain with examples.

Or

(b) Use Bisection method to find a real root of the equation $f(x) = x^3 - x - 1 = 0$ between 1 and 2 correct to four decimal places.

4. (a) Solve the following system of equations using Gauss elimination method.

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

Or

(b) Find the inverse of the matrix $\begin{bmatrix} 5 & -2 \\ 3 & 4 \end{bmatrix}$ using iterative method.

5. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using Trapezoidal rule with $h = 0.2$ correct to four decimal places.

Or

(b) Use Euler's method to solve the differential equation $\frac{dy}{dx} + xy = 0,\ y(0) = 1$, from $x = 0$ to $x = 0.25$. Take $h = 0.05$.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

6. Write the general form of the DO statement and explain the rules to be followed in utilising DO loops.

7. (a) Write short notes on FORTRAN coding form. (5)

   (b) Write a program in FORTRAN to pick the largest of three numbers. (5)

8. (a) Write a program in FORTRAN to find the reverse of a string. (5)

   (b) Illustrate the use of COMMON statement with an example. (5)

9. Use Newton's Raphson method to find the root of $\cos x = xe^{+x}$ by taking $x_0 = 0.5$ correct to four decimal places.

10. Use synthetic division and perform two iterations by Birge – Vieta method to find the smallest positive root of the equation $x^4 - 3x^3 + 3x^2 - 3x + 2 = 0$ by taking initial approximation $p_0 = 0.5$.

11. Solve the following system of equations

$$4x + 2y + z = 14$$
$$x + 5y - z = 10$$
$$x + y + 8z = 20$$

Using Gauss – Seidal iteration method.

12. Given $\frac{dy}{dx} = 1 + y^2$, where $y = 0$ when $x = 0$, find $y(0.2)$ and $y(0.4)$ using Runge – Kutta fourth order method by taking $h = 0.2$.

13. Dividing the range into 6 equal parts, find the approximate value of $\int_0^{\pi/2} \sin x \, dx$ by Simpson's $\frac{1}{3}$ rule and compare the result with its actual value.
