



NBU-003-020401 Seat No. _____

M. Sc. (Sem. IV) (CBCS) Examination

April / May - 2017

Physics : CT-10

(Numerical Analysis & Computer Programming) (New Course)

Faculty Code : 003

Subject Code : 020401

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

1 Answer any seven questions : **14**

- (a) List the logical controls, its meaning and equivalent FORTRAN statements.
- (b) Draw the flow chart of computational IF statement and explain it.
- (c) Name the file structure supported by FORTRAN.
- (d) Write the FORTRAN statement to solve :
$$5x^3 + 3y^z + 10 - \pi$$
- (e) Write Mathematical form of Fourier series with definition of each coefficients.
- (f) What are the different methods used to solve ordinary differential equations and numerical integrations.
- (g) Explain the meaning of interpolation and extrapolation of data.
- (h) With the help of Pascal triangle rule solve :
$$(x+1)^6 \text{ and } (x-1)^5.$$
- (i) Define linear equation. List the direct and interactive numerical methods for solving simultaneous linear equations.
- (j) What do you mean by curve fitting ? Why it is necessary ?

- 2 Answer any **two** :
- (a) Explain how to implement 'DO' loop in Fortran. Briefly discuss the rules to be followed while implementing 'DO'. 7
- (b) Write FORTRAN program to find the tallest male and female students of the given class using 'DO'. 7
- (c) Write a FORTRAN program to find average value of given 100 numbers. 7
- 3 (a) Explain the importance of flow chart. Draw the symbols and describe the function of each symbols. 7
- (b) Generate the algorithm and draw the flow chart to find the largest among the three numbers. 7

OR

- 3 (a) Fit a parabola : $y = ax^2 + bx + c$, in least square sense to the data : 7

| | | | | | |
|-----|----|----|----|----|----|
| x | 10 | 12 | 15 | 23 | 20 |
| y | 14 | 17 | 23 | 25 | 21 |

- (b) Solve the following set of equations using Cramer's rule : 7

$$2x + 3y + 2z = 14$$

$$5x + y + z = 10$$

$$x + 5y + 3z = 20$$

- 4 Answer any **two** :
- (a) The following data given I , the indicated horse power and V , the speed developed by a ship. Find I when $V = 9$, using Newton's forward interpolation formula : 7

| | | | | | |
|-----|------|------|------|------|------|
| V | 8 | 10 | 12 | 14 | 16 |
| I | 1000 | 1900 | 3250 | 5000 | 8950 |

- (b) Show how Fourier series is used for expansion of Riemann-Zeta function. 7

(c) Solve $\frac{dy}{dx} = y - \frac{2x}{y}$, $y(0) = 1$ in the range $0 \leq x \leq 0.1$, 7

using modified Euler's method take $h = 0.1$.

(d) Evaluate $\int_0^5 \frac{1}{1+x} dx$ by using (i) Trapezoidal rule 7

(ii) Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules (iii) Weddle's rule.

Compare the results with the actual value.

5 Answer any two / Write note on any two :

(a) Logical 'IF' statement. 7

(b) FORMAT Commands, and its applications. 7

(c) Find the value of Δu_x for the following value of u_x 7

(i) e^x (ii) $\log x$ (iii) $x^{1/2}$. Establish relationship between the operators : Δ and E .

(d) Use Lagrange's formula to find the exact form of 7

$f(x)$ and find the value of $f(3)$.

| | | | | |
|--------|-----|-----|-----|-----|
| x | 0 | 2 | 3 | 6 |
| $f(x)$ | 648 | 704 | 729 | 792 |
