



BBA-003-1204001

Seat No. _____

M. Sc. (Sem. IV) Examination

June / July - 2021

CT-11 : Physics

(Numerical Analysis & Computer Programming)

(New Course)

Faculty Code : 003

Subject Code : 1204001

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

[Total Marks : 70

Instruction : Attempt any five questions.

- 1 (a) What do you mean by curve fitting ? 14
 (b) List the methods used to solve linear equations.
 (c) Establish the relation between operators : Δ and E.
 (d) With the help of Pascal triangle rule find the expansion of :
 $(x-1)^5$.
 (e) What do you understand by interpolation and extrapolation of data ?
 (f) What are the different rules of numerical integration ?
 (g) How one can define Fourier series ?

- 2 (a) Explain the importance of flow chart. 14
 (b) Draw the flow chart to pick-up largest among the three numbers.
 (c) Describe the procedure to be followed to solve a problem using computer.
 (d) What are the different types of 'IF' statement ?
 (e) Discuss 'implied do loop' and its implementation.
 (f) Describe how the integer variable name can be written ?
 (g) Name the file structure supported by FORTRAN.

- 3 (a) Fit a straight line, $y = ax + b$, in least square sense to the data : 7

x	0	5	10	15	20	25
y	12	15	17	22	24	30

- (b) By the method of least squares obtain a relation of the form, $y = ab^x$, for the following data: 7

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.4

- 4 (a) Solve the system of linear equations, $3x + y - z = 3$, $2x - 8y + z = -5$ and $x - 2y + 9z = 8$ using direct method. 7
- (b) Using method of Gauss elimination solve the following set of equations. 7
- $$28x + 4y - z = 32$$
- $$x + 3y + 10z = 24$$
- $$2x + 17y + 4z = 35$$
- 5 (a) Obtain the exact form of $f(x)$ by using the following data : 7
- | | | | | |
|------------|---|---|---|----|
| x | 0 | 1 | 2 | 3 |
| $y = f(x)$ | 1 | 3 | 7 | 13 |
- (b) Evaluate $\int_0^5 \frac{1}{1+x} dx$ by using (i) Trapezoidal rule 7
- (ii) Simpson's 1/3 and 3/8 rule
- (iii) Weddle's rule. Compare the results with the actual value.
- 6 (a) Given $dy/dx = x^2 + y^2$, $y(0) = 0$, find $y(0.4)$ using Runge-Kutta method of second order, assume $h = 0.2$. 7
- (b) Discuss application of Fourier series for square wave analysis; Show that square wave contains large number of high frequency components. 7
- 7 (a) Draw and describe the symbols used in flow chart. 7
- (b) Define arithmetic expressions. Write and explain the rules for real and integer expressions. 7
- 8 (a) Using logical IF statement, write FORTRAN program to calculate the mean weight of boys and girls. 7
- (b) Briefly discuss the FORMAT function. List and explain the use of various FORMAT specifiers with appropriate examples. 7
- 9 (a) Using IF statement, write the FORTRAN program to find the sum of digits of a given number. 7
- (b) List the control statements. Using the flow chart explain the various logical IF statements. 7
- 10 (a) Describe in detail, the method of generating algorithm. 7
- (b) Write FORTRAN program to find the tallest male and female students of the given class using 'DO'. 7