



DGG-003-020401

Seat No. _____

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

May / June – 2015

CT-10 : Numerical Analysis & Computer Programing

Faculty Code : 003

Subject Code : 020401

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

[Total Marks : 70

Instructions: (1) Attempt all questions.

(2) The figure on right side indicates marks.

1 Answer Any **seven** of the following.

- (A) What do you mean by least square fitting of experimental data points ? How it is useful ? **2**
- (B) Write mathematical form of a Fourier Series, with definition of each coefficients. What do you understand by sine series and cosine Series ? **2**
- (C) What are different rules of numerical integration and methods of solving ordinary differential equation ? **2**
- (D) Solve the system by direct method : $5x - 7y = 36$ **2**
 $3x + 2y = 3$
- (E) Briefly explain how interpolation and extrapolation of experimental data are useful. **2**
- (F) List the comparative control statements and their FORTRAN code. **2**

- (G) Write names of two valid and two invalid FORTRAN integer variable. 2
- (H) Briefly explain the importance of flow chart. 2
- (I) What are the different types of IF statement ? 2
- (J) Define 'computer', what is the importance of 'operating system' ? 2

2 Answer any two of the following.

- (A) Fit a straight line $y = mx + c$ to the following set of observations : 7

x	0	1	2	3	4
y	1	5	10	22	38

- (B) Fit $y = ab^x$ by the method of least squares to the data given below : 7

x	0	1	2	3	4	5	6	7
y	10	21	35	59	92	200	400	610

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

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

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

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

3 Answer the following :

- (A) Estimate the number of students securing marks more than 48 but not more than 50 by using following data (use Newton's forward difference formula): 7

Marks	upto 45	upto 50	upto 55	upto 60	upto 65
No. of students	447	484	505	511	514

- (B) The velocity 'v' of a rolling ball at distance 'x' from a point on its path is given by the following table : 7

x (meter)	0	10	20	30	40	50	60
v (m/sec)	0.167	0.2	0.25	0.333	0.50	0.75	1.0

Calculate the total time taken by ball to travel 60 meter distance using Simpson's $\frac{1}{3}$ rule and compare the result with Simpson's $\frac{3}{8}$ rule.

OR

3 Answer the followings :

- (A) Discuss in brief with at least one example of each shape used in flow chart. 7
- (B) Write the general statement for the 'DO'. Discuss 'implied do loop' and its implementation. Discuss the rule to be following using 'DO' loop. 7

4 Answer any **two** of the following :

- (A) Using Logical IF statement, write a FORTRAN program to calculate the mean weight of male and female candidates. 7

(B) What do you mean by arithmetic expressions? Briefly explain necessary rules for real expression and integer expression. **7**

(C) Briefly discuss the FORMAT function. List and explain the use of various FORMAT specifiers with appropriate examples. **7**

5 Answer any **two** of the following :

(A) Using IF statement, write the FORTRAN program to find the sum of digits of a given number. **7**

(B) Describe in detail, the method of generating Algorithm. **7**

(C) Solve $\frac{dy}{dx} = 3x^2 + y$ in $0 \leq x \leq 0.3$ by using Euler's method and modified Euler's method taking $h = 0.1$ given that $y(0) = 4$. **7**

(D) Based on Fourier series analysis, prove that full wave rectifier does a fairly good job of approximating direct current. **7**
