2020

M.Sc.

1st Semester Examination

PHYSICS

Paper – PHS-196

Full Marks: 40

Time: 2 Hours

The figures in the right hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Computer Practical)

Marks Distribution:

Program coding, Compilation and Run – 15+15

Accurate output for sample input – 5+5

Discussions on two programs - 5+5

> **Total = 50**

Perform any *one* from the following experiments and give answers to the corresponding questions.

1. (i) Write a program in FORTRAN to find the roots of an algebraic equation by Newton-Raphson method.
   SAMPLE INPUT: x=2sinx
   (ii) Write a program in FORTRAN to calculate the factorial of an integer.
   SAMPLE INPUT: find the value of 9!, 0! And 1!.

2. (i) Write a program in FORTRAN to calculate the following integration by Simpson $\frac{1}{3}$ rule.
   SAMPLE INPUT: $\int_0^1 (x^2 + 1)dx$
   (ii) Write a program in FORTRAN to calculate the factorial of an integer.
   SAMPLE INPUT: find the value of 12! And 2!.

3. (i) Write a program in FORTRAN to change a binary number into a decimal number.
   SAMPLE INPUT: $(1011010)_2 = ($? $)_{10}$
   (ii) Write a program in FORTRAN to calculate the transpose of a matrix. Program should be well documented and preferably with formatted output statement.
   SAMPLE INPUT:
   $$\begin{bmatrix} 5 & 1 & 0 & 4 \\ 3 & 2 & 5 & 6 \\ 4 & 0 & 7 & 2 \end{bmatrix}$$

4. (i) Write a program to find the sum of the digits of a n digit number.
   SAMPLE INPUT: n=7
      5240019
   (ii) Write a program to find the trigonometric series cosx.
   SAMPLE INPUT: cos60°, cos90° and cos0°

5. (i) Write a program in FORTRAN to calculate the average number in a one-dimensional array. Program should be well documented and preferably with formatted output statement.
   SAMPLE INPUT: 5 0 -12 0.1 7.2 -8.5 12.5 0 4.7 -5.6 8.7 4.2 0
   (ii) Write a program in FORTRAN to find a number is whether Armstrong number or not.
   SAMPLE INPUT: 22, 153, 250 and 4521

6. (i) Write a program to find the trigonometric series sinx.
   SAMPLE INPUT: sin60°, sin90° and sin0°
   (ii) Write a program in FORTRAN to form two 3×3 matrix and find the product of the two.

   SAMPLE INPUT: $\begin{bmatrix} -1 & 2 & 0 \\ 4 & 0 & 6 \\ 1 & 5 & 2 \end{bmatrix}, \begin{bmatrix} 4 & 5 & 1 \\ 7 & 5 & 0 \\ 4 & -1 & 7 \end{bmatrix}$

7. (i) Write a program in FORTRAN to check whether a year is leap year or not. Program should be well documented and preferably with formatted output statement.
   SAMPLE INPUT: 1984, 2080 and 3000
   (ii) Write a program in FORTRAN to find a number is whether prime number or not.
   SAPLE INPUT: 83, 91 and 33

8. (i) Write a program in FORTRAN to form a 4×4 matrix and to modify all of its elements by adding 7. Program should be well documented and preferably with formatted output statement.

   SAMPLE INPUT: $\begin{bmatrix} 1 & 4 & 5 & 7 \\ 0 & 2 & 3 & 4 \\ 4 & -1 & 2 & 8 \\ 6 & 2 & 5 & 7 \end{bmatrix}$

   (ii) Write a program in FORTRAN for arranging the numbers in descending series.
   SAMPLE INPUT: 6.2 7.2 -8.2 -1.6 1.0 4.5 -4.8 6.1 5.8

9. (i) Write a program in FORTRAN to find the transpose of the following matrix.

   $[A]= \begin{matrix} 3 & 4 & 8 \\ 5 & 9 & 2 \\ 1 & 6 & 2 \end{matrix}$

   Also verify Tr(A)= Tr(A^T).
   (ii) Write a program in FORTRAN to for arranging the numbers in ascending series.
   SAMPLE INPUT: -5.2 -1.2 0.3 4.5 9.6 -7.2 9.3 7.4

04/PG/1S/PHS/196/20

10. (i) Write a program in FORTRAN using the Newton–Raphson method to determine the roots of the given equation.

SAMPLE INPUT: f(x)=x^3-x^2-2x+1

(ii) Write a program in computer to find sin(x) through infinite series.

SAMPLE INPUT: sin45°, sin30 and sin40°.

11. (i) Write a program in FORTRAN to calculate the following integration by trapezoidal rule.

SAMPLE INPUT: $\int_0^1 (x^2 + 1)dx$

(ii) Write a program in FORTRAN to find the highest number of an array. Program should be well documented and preferably with formatted output.

SAMPLE INPUT: 50.2, -40.9, 63, 21, 7.1, -84.9, 45.0, 63.8, 0.01, -64.7

12. (i) Write Program to find the addition of two matrices. Program should be well documented and preferably with formatted output statement.

SAMPLE INPUT:
$$\begin{matrix} 1 & 4 & -2 \\ 0 & 5 & 7 \\ 4 & 2 & 8 \end{matrix} \qquad \begin{matrix} 2 & 0 & 7 \\ 6 & -7 & 8 \\ 5 & -1 & 2 \end{matrix}$$

(ii) Write a program in FORTRAN to calculate the average number of a one-dimensional array.

SAMPLE INPUT: 5 0 -12 0.1 7.2 -8.5 12.5 0 4.7 -5.6 8.7 4.2 0