

Total Pages—5

PG/IS/PHS - 103/13

**M.Sc. 1st Semester Examination, 2013**

**PHYSICS**

**PAPER— PHS - 103(A & B)**

*Full Marks : 40*

*Time : 2 hours*

*The figures in the right-hand margin indicate marks  
Candidates are required to give their answers in their  
own words as far as practicable*

*Illustrate the answers wherever necessary*

**GROUP – A**

**[ Marks.: 20 ]**

*Time : 1 hour*

**Answer Q. No. 1 and 2 and any one from the rest**

**1. Answer any *three* bits : 2 × 3**

**(a) What is the difference between source  
program and Object program.**

*( Turn Over )*

( 2 )

- (b) Give at least three rules for naming a Real variable in FORTRAN 77.
- (c) Write the following algebraic expression into an equivalent FORTRAN statement

$$\log_{10} x + e^{|x+y|} + \frac{a}{b}(1 - x^{1/3} + y^{1/2})$$

- (d) If  $A = 2.5$ ,  $B = 8.25$ ,  $I = 5$  then find the value of  $L = A/5.0 + 8/5 + B/I$
- (e) Explain Random Access Memory and compare it with Read Only Memory.

2. Answer any *one* bit :

4

- (a) Find the output of the FORTRAN program after the following statement is executed.

```
K = 5
DO 101 = 2, 4
K = K + 1
DO 9 J = 4, 7, 2
IF (K.GT.17) GO TO 11
K = K + J
```

( 3 )

```
9 CONTINUE
10 CONTINUE
11 WRITE (*, 20) I, J, K
20 Format (2x, 3(15, 2x))
STOP
END
```

- (b) Consider a particle falling down freely under the gravity with initial velocity  $u$ . The displacement  $s$  at any time  $t$  is given by

$$s = ut + \frac{1}{2}gt^2$$

where  $g = 9.8 \text{ m/sec}^2$ . Write a program to calculate  $s$  for  $u = 1 \text{ m/s}$  and for values of  $t$  from 0 sec to 2 sec increment 0.5 sec. 4

3. (a) Write a FORTRAN program to multiply all integers divisible by 7 between two numbers  $N1$  and  $N2$  (input  $N1$  and  $N2$ ).
- (b) Write a program to form a  $(5 \times 5)$  matrix 'A' whose elements  $A_{ij} = i + j$ . 5 + 5

( 4 )

4. Write a function subprogram to find the value of  $n!$ . Use this function to find the value of  ${}^n C_r$  for given values of  $n$  and  $r$ . 10

GROUP-B

[ Marks : 20 ]

Time : 1 hour

Answer any *four* questions : 5 × 4

1. Establish Lagrange's polynomial interpolation formula (No remainder necessary).
2. Solve the following system of equation by Gauss-elimination method

$$2x + 3y + z = 9$$

$$x + 2y + 3z = 6$$

$$3x + y + 3z = 8.$$

3. Compute the integral.

$$\int_0^1 \frac{dx}{1+x^2}$$

( 5 )

by Simpson's  $\frac{1}{3}$  rule and then use it to compute the value of  $\Pi$ .

4. Find by the method of least squares a formula of the type  $f(x) = a + bx$ , which fit the following data

$x$	2	4	6	8	10
$f(x)$	1.00	3.85	6.50	9.35	12.05

5. Find the largest magnitude eigenvalue of the matrix

$$\begin{bmatrix} 1 & -3 & 2 \\ 4 & 4 & -1 \\ 6 & 5 & 5 \end{bmatrix}$$

Find also the corresponding eigenvector.

6. Using Runge-Kutta method, find  $y(1.1)$  given

$$\frac{dy}{dx} = 3x + y^2, \quad y(1) = 1.2$$

---