

M.Sc. 1st Semester Examination, 2010

PHYSICS

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

PAPER—PHS-103(A)

Time : 1 hour

[Marks : 20]

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

1. Answer any *five* questions : 2 x 5

- (a) What do you mean by input/output devices ?
Give two examples of input and output devices.

(Turn Over)

- (b) Which technology is used in fourth generation computer ?
 - (c) What is CPU ? Name different components of the CPU.
 - (d) What are the differences between source program and object program ?
 - (e) What is the fundamental unit to measure memory ?
 - (f) How a string of 30 characters be declared in FORTRAN ? Suppose S1 and S2 are two strings. How you join these two strings ?
 - (g) What are the advantages of machine language ?
 - (h) Draw the four symbols along with their purposes which are used to draw a flowchart.
2. Write a program in FORTRAN to find the product of two matrices.

3. Write a function in FORTRAN to find the value of factorial of a positive integer n . Use this function to find the value of ${}^n C_r$, which is equal to 10

$$\frac{n!}{r!(n-r)!}$$

PAPER—PHS-103(B)

Time : 1 hour

[*Marks* : 20]

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

1. Answer any *five* questions : 2 x 5

- (a) Construct the finite difference table of $f(x) = (x + 2)^2$ for $x = 1, 2, 3, 4$ and find $\nabla^2 f(3)$
- (b) Define absolute and percentage error.
- (c) Derive a relation between shift operator (E) and Δ operator.

- (d) What are the direct and iterative methods of solving a system of linear equations? Distinguish between them.
- (e) Find the relative error in the computation of $y - x$ for $y = 12.05$ and $x = 8.02$, having absolute errors $\Delta x = 0.005$ and $\Delta y = 0.001$.
- (f) Give the geometrical interpretation of trapezoidal formula.
- (g) Write a set of sufficient conditions for the convergence of Gauss-Seidal iteration method.
2. (a) Establish Newton's forward interpolation formula for equispaced data points. When does the formula predict exact values? 5
- (b) Compute $\int_2^{10} \frac{dx}{1+x}$ using
- (i) Trapezoidal rule and
- (ii) Simpson's 1/3 rd rule
- taking $h = 1.0$ and compare the results with the exact value. 5

3. (a) Describe Newton-Raphson method for computing a simple real root of an equation $f(x) = 0$. Give a geometrical interpretation of the method. 5

- (b) Determine the largest eigenvalue and the corresponding eigenvalue of the following matrix 5

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$
