

B.SC. 4th Semester (Honours) Examination, 2019 (CBCS)**Subject : Physics****Paper : SEC-2 (OR)****(Computational Physics Skill)****Time: 2 Hours****Full Marks: 40**

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

1. Answer *any five* of the following questions: 2×5=10

- (a) Write the flowchart for conversion from Cartesian to spherical polar co-ordinates.
- (b) Draw and mention the purpose of any four flowchart symbols.
- (c) Explain the difference between 'stop' and 'end' statements in FORTRAN?
- (d) What is the difference between GOTO and assigned GOTO statements in FORTRAN?
- (e) How do you change the font size using LaTeX command?
- (f) What are the codes used in LaTeX to produce coloured text.
- (g) Write down the basic GNU plot commands for plotting data from a file.
- (h) What is subprogram statement in FORTRAN?

2. Answer *any two* of the following questions: 5×2=10

- (a) Write down the algorithm to find the trajectory of a projectile thrown at an angle with horizontal.
- (b) Discuss how variables and constants are used in FORTRAN. How are the relational operator expressed in FORTRAN? 3+2=5
- (c) Write code in LaTeX to produce the following table:

X	Y	X.Y
0	0	0
0	0	0
1	0	0
1	1	1

- (d) Write the GNU plot commands to plot the $\sin x$ curve. Also write the command to plot the data by solid line and dashed curve for two different values of x . How to fill an area between two curves: $f(x) = \sin x$ and $g(x) = x$, using GNU plot. 2+2+1=5

3. Answer any two of the following questions:

(a) Write LaTeX codes to produce the following equations:

(i) $\frac{y}{\frac{3}{x}+b} = 5$

(ii) $\int_a^b x^2 dx = \frac{1}{3}(b^3 - a^3)$

Write and explain the command to insert a figure in LaTeX. How one can scale the size of the figure in the LaTeX document? 4+4+2=10

(b) What are the LaTeX commands for inserting bibliography and citing references? Hence discuss in detail the management of bibliography using BibTex. (2+3)+5=10

(c) What is sorting? What are the different sorting algorithms? Write a FORTRAN program to rearrange the 10 elements in ascending order. 2+3+5=10

(d) Write a program to evaluate sum of finite series: $1 + 3 + 5 + \dots + 19$. Write a program to calculate the Euler number using $\exp(x)$ series evaluated at $x = 1$. 5+5=10
