

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)

CLASS: IMSc  
BRANCH: PHYSICS

SEMESTER : III  
SESSION : MO/2022

SUBJECT: SEC303 COMPUTATIONAL PHYSICS SKILLS

TIME: 3:00 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) Draw a flowchart to find the largest integer among a given set of integers. [CO1][BL3] [5]
- Q.1(b) Write an algorithm to generate data for  $x=\cos(t)$  and  $y=\sin(t)$  for different values of the parameter  $t$ , and then plot  $y$  vs.  $x$ . [CO1][BL3] [5]
- Q.2(a) What are the different variable types that can be declared in fortran? Give an example of each. [CO2][BL1] [5]
- Q.2(b) Explain the significance of the "parameter" statement in fortran. [CO2][BL2] [2]
- Q.2(c) Describe how to read from and write into a data file. [CO2][BL2] [3]
- Q.3(a) Explain the IF-THEN-ELSE loop using an example. [CO3][BL2] [5]
- Q.3(b) Use the DO loop to add up the first 10 prime numbers. [CO3][BL3] [5]
- Q.4(a) A file 'sine.dat' contains data for plotting the function  $\sin(x)$ . What is the Gnuplot command to plot this function with a line width of 2 and having the legend "f(x)=sin(x)" ? [CO4][BL1] [2]
- Q.4(b) What is the command used to set the terminal of Gnuplot to PDF, and produce the output "mygraph.pdf"? [CO4][BL1] [3]
- Q.4(c) Write a complete Gnuplot script to plot  $f(x)=\exp(-x/a)$  for three different values of 'a' in the same graph. [CO4][BL2] [5]
- Q.5(a) What do you mean by the "preamble" in a Latex code? [CO5][BL2] [2]
- Q.5(b) Mention any 3 commands that are required to be placed in the preamble. [CO5][BL1] [3]
- Q.5(c) Write the following mathematical statement in Latex: [CO5][BL3] [5]
- $$y(x) = \frac{xe^{-x} + 3\cos(x) - 1}{2x^2 + 9}$$

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