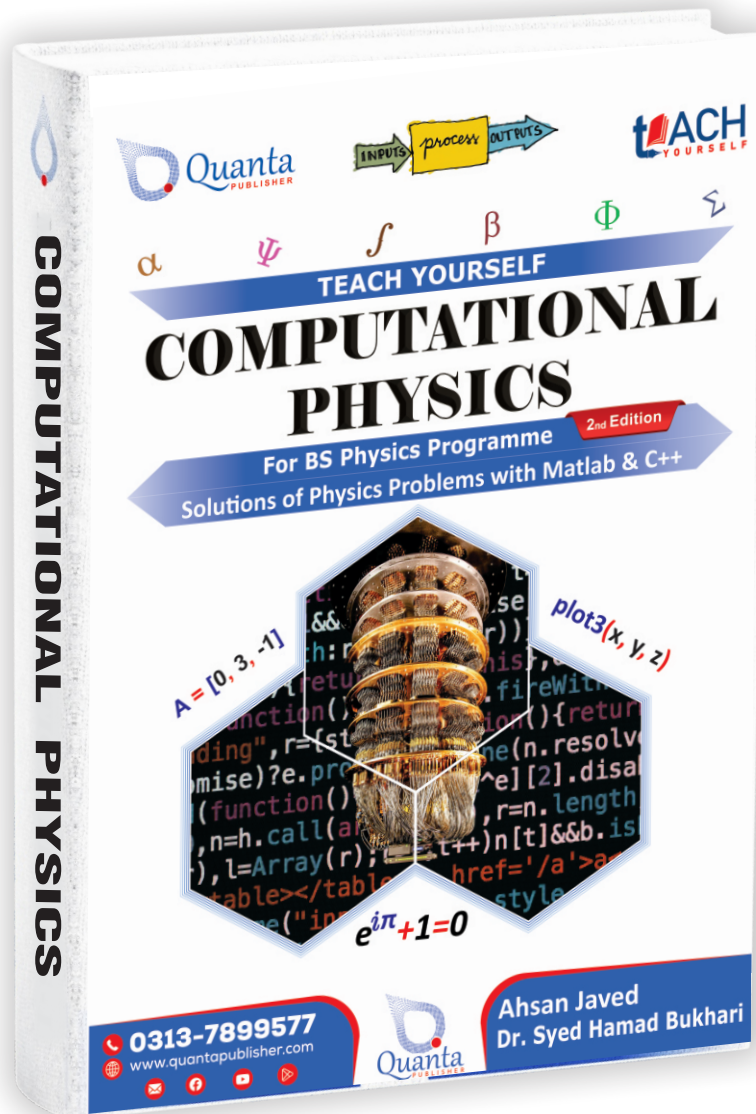




# PAST PAPERS



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## UNIVERSITY OF THE PUNJAB

Roll No.

Sixth Semester - 2017

Examination: B.S. 4 Years Programme

**PAPER: Computational Physics-I**  
**Course Code: PHY-311**

**TIME ALLOWED: 30 min**  
**MAX. MARKS: 10**

*Attempt this Paper on this Question Sheet only.*

## Objective

**Q1:** Each question has FOUR possible answers. Select the correct answer and encircle it.

1x 10 = 10

- i. C++ program statement that is not included in code compilation:  
 a) %      (b) = (c) //      (d) ()
- ii. In C++ what is not a repetition structure:  
 a) if-else-if (b) while (c) for (d) do-while
- iii. C++ language, LIBRARY TYPE that provides power function is called:  
 (a) pow()      (b)  $x^2$       (c) math.h      (d) both (a) & (b)
- iv. Which of the following is a comparison operator in C++?  
 (a) Compare()      (b) =      (c) ==      (d) ++
- v. The number of bytes reserved for char data type in C++ is:  
 (a) 1      (b) 2      (c) 4      (d) 8
- vi. If there is a function factorial() then it is called:  
 (a) Operator      (b) user defined function (c) built in function (d) None
- vii. In C++, a loop with at least one must iterations is:  
 (a) While      (b) do-while      (c) for (d) None
- viii. If  $x = 2$  and  $y = 3$ , then for statement " $y = x$ " which of the following result is true  
 (a)  $x$  equals  $y$  (b)  $x$  is less than  $y$  (c) true (d) false
- ix. If  $a = 2$ . In C++ the expression  $a = 2 * k + 1$  is evaluated to:  
 (a) 5 (b) 5.0 (c) 1 (d) error
- x. Which of the following is not an increment in C++ :  
 (a) a++      (b) ++a      (c) a = a + 1      (d) a = 2 \* a + 1



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2017  
 Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Computational Physics-I  
 Course Code: PHY-311

TIME ALLOWED: 2 hrs. & 30 m  
 MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Subjective		
Q.2.	Write short answers of the following Questions: i. Explain with example the following terms in C++: a) double k; (b) pow ( ) (c) // (d) sqrt() ii. Write syntax with example the following in C++: (a) while ( ) loop (b) if-else-if iii. Explain logical operators in C++?  Write C++ program code segment for the following: (a) to print table of a number enter by the user (b) to print x against f(x) for the equation $f(x) = 7\sqrt{3x^2 - 2x - 22}$ to calculate and display maximum and minimum of f(x) (c) to read (x,y) values from the user and calculate polar coordinates (r, θ)	4 4 4 8
Q.3.	Write C++ program to evaluate the $\int_1^6 \frac{(x^2 + 4)}{5} dx$ by Trapezoidal's rule or by Weddle's rule due to options 1 or 2 respectively (use n=6). Report error message for any other option pressed by the user.	10
Q.4.	Suppose A and B be 3x3 matrices. Write C++ program which reads in entries of A and B and prints out the entries of matrix which is (i) $C = A \cdot B$ , (ii) $D = 2A' + 3B$ and (iii) to print diagonal elements of C. (iv) square of the elements of matrix D (v) square of the matrix C.	2+4+4
Q.5.	Find the roots of the equation $3x - \cos x - 5$ using simple iterative method using $x_0 = 1.5$ . Write C++ program to implement the method correct to 2dp.  Write C++ program for conversions of (i) temperature from F to C (ii) length from m to km	6+4



## UNIVERSITY OF THE PUNJAB

Roll No. ....

Eighth Semester - 2017

Examination: B.S. 4 Years Programme

PAPER: Computational Physics-II

TIME ALLOWED: 30 mins.

Course Code: PHY-422

MAX. MARKS: 10

*Attempt this Paper on this Question Sheet only.***OBJECTIVE**

**Q1:** Each question has FOUR possible answers. Select the correct answer and encircle it.  
MCQs. 1x 10 = 10

- i. Which of the following is not correct to create row vector  $a = [0\ 0\ 0\ 0\ 0]$ :  
a)  $a(1:5) = 0$  (b)  $a = \text{zeros}(1,5)$  (c)  $a = \text{zero}(1,5)$  (d)  $a = [0,0,0,0,0]$
- ii. In  $y = \sin(45)$ , the angle 45 will be in :  
a) degrees (b) radians (c) integers (d) numbers
- iii. If  $x = [6\ 3\ 2]$  &  $y = [3\ 6\ 2]$ , which of the following is true for  $z = \text{sum}(x \times y)$ .  
(a)  $Z=3$  (b)  $Z=[1\ 0\ 1]$  (c)  $Z=2$  (d) none
- iv. Which of the following is used to get input from graph curve?  
a)  $\text{gtext}()$  (b)  $\text{input}()$  (c)  $\text{hold on}$  (d)  $\text{ginput}()$
- v. If  $x = [4\ 2\ 0\ 3\ 6]$  which of the following is true for  $Z = \text{find}(\sim x)$ .  
(a)  $Z=[1\ 2\ 4\ 5]$  (b)  $Z=[0\ 0\ 1\ 0\ 0]$  (c)  $Z=3$  (d) All of (a), (b) & (c)
- vi. The command used to terminate the scope of a **for, while or if** statement is:  
(a)  $\text{break}$  (b)  $\text{stop}$  (c)  $;$  (d)  $\text{end}$
- vii. The following command performs intelligent plotting of function.  
(a)  $\text{plot}()$  (b)  $\text{ezplot}()$  (c)  $\text{fplot}()$  (d)  $\text{subplot}()$
- viii. The following command can draw background lines on the graph axis:  
(a)  $\text{line}()$  (b)  $\text{axis}()$  (c)  $\text{axes}()$  (d)  $\text{grid on}$
- ix. Which of the following is used to plot in three dimensions (x,y,z):  
(a)  $\text{plot}(x,y,z)$  (b)  $\text{plotthree}(x,y,z)$  (c)  $\text{plot3}(x,y,z)$  (d) all
- x. Which of the following is required to create a row vector of n equal spaced values between a and b:  
a)  $\text{equal}(a,b)$  (b)  $\text{linspace}(a,b,n)$  (c) none (d) both (a) & (b)



## UNIVERSITY OF THE PUNJAB

Eighth Semester - 2017

Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Computational Physics-II

TIME ALLOWED: 2 hrs. &amp; 30 mins.

Course Code: PHY-422

MAX. MARKS: 50

*Attempt this Paper on Separate Answer Sheet provided.*

## SUBJECTIVE

Q.2.	Write short answers of the following Questions: i. Give simple example to find index of maximum value of the array? Write syntax with example for the following in MATLAB: ii. (a) for (b) sum() (c) rand() (d) dsolve(), Write MATLAB program code segment for the following: iii. (a) to generate a matrix (8 x 6) with all 1's as entries and plot matrix (b) to give one example to calculate polynomial derivative (c) to x vs y such as $y = 7x^4 - 2x^3 - x + 1$ and $x = [-15 \ 15]$ (d) to define two arrays and determine sum of two array values (e) to evaluate $\int_0^{\pi} \exp(x) \sin(2\sqrt{x}) dx$	2 8 10
Q.3.	If $y = 4x^5$ Write MATLAB symbolic operations to calculate (i) first derivative w.r.t. x (ii) perform integration of your result. If $y=f(x) = x^3 - 6x^2 + 9x + 2$ , Write program to plot x vs y using $x = [-1 \ 5]$ . Find and plot marks at extremes. Find maximum of y. How randomly generated points can be used to show Brownian motion? Write MATLAB program to simulate Brownian motion of a particle. Note: Plot estimate graph if any.	6+4
Q.4. (a)	A mass m is suspended by three cables with tensions $T_1$ , $T_2$ and $T_3$ , which are related by the following equations: $T_1/\sqrt{35} - 3T_2\sqrt{34} + T_3/\sqrt{42} = 0$ $3T_1/\sqrt{35} - 4T_3/\sqrt{42} = 0$ $T_1/\sqrt{35} - 3T_2\sqrt{34} + T_3/\sqrt{42} = mg$ Write MATLAB program to solve for the tensions using three methods. Take $mg=1$ .	4+6
(b)	Write MATLAB program to determine equivalent capacitances of n resistances connected in series (Read capacitances from the user).  Using rand(), create a matrix N (5 x 7). Then i) plot N, plot 3rd row and 5th rows. ii) find maximum of column 6 and iii) sort N. Also find the maximum and mean value of N.	
Q.5. (a)	Write MATLAB program to study the damped harmonic motion (DHM) of a mass attached with a spring using Euler's method under the following conditions: ( $g=9.8 \text{ m/s}^2$ , initial position zero and velocity 15 m/s, time step 0.1 sec. and maximum time 15 sec., $k = 1 \text{ N/m}$ , $m=1\text{kg}$ , damping coefficient = 0.5 N/ms, ). Print and plot values for time, position, velocity and acceleration. How you can change the same program for Simple harmonic motion?	7+3
(b)	Write a program to a 3D plot in matlab. Take three variables as x,y and z.	



# UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. ....

**PAPER: Computational Physics-I**  
**Course Code: PHY-311 Part – I (Compulsory)**

**TIME ALLOWED: 15 Mints.**  
**MAX. MARKS: 10**

**Attempt this Paper on this Question Sheet only.**

**Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.**

Q1: Each question has FOUR possible answers. Select the correct answer and encircle it.

1x 10 = 10

- i. C++ program statement that is not included in code compilation:  
 a) "welcome"      (b) cout<<"welcome";    (c) /\*    (d) void
- ii. In C++ what is not a repetition structure:  
 a) if-else-if    (b) while    (c) for    (d) do-while
- iii. C++ language, HEADER TYPE that provides user read from keyboard is called:  
 (a) iostream.h    (b) conio.h    (c) math.h    (d) both (a) & (b)
- iv. Which of the following is not a comparison operation in C++?  
 (a) X>Y      (b) X<=Y    (c) X==Y    (d) X=Y
- v. The number of bytes reserved for long int data type in C++ is:  
 (a) 4      (b) 8      (c) 12    (d) 16
- vi. main() is a :  
 (a) Operator      (b) user defined function    (c) built in function    (d) None
- vii. In C++, the process of sending an argument to a function is called:  
 (a) sending      (b) email    (c) delivering    (d) passing
- viii. If x = 2 and y = 3, then for statement "y = x" which of the following result is true  
 (a) x equals y    (b) x is less than y    (c) true    (d) false
- ix. If a = 3. In C++ the expression a = 3\*k-3 is evaluated to:  
 (a) 6    (b) 9    (c) -6    (d) 1
- x. Function declaration consists of :  
 (a) function name    (b) return type    (c) parameter    (d) All



## UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Computational Physics-I  
 Course Code: PHY-311 Part – II

TIME ALLOWED: 2 Hrs. & 45 Mint  
 MAX. MARKS: 50

**Attempt this Paper on Separate Answer Sheet provided.**

Q.2.	Write short answers of the following Questions: i. Explain with example the following terms in C++: a) data type (b) user-function (c) /* and */ (d) getch() ii. Write syntax with example the following in C++: (a) for ( ) loop (b) switch() iii. Discuss arithmetic logical operators in C++? iv. Write C++ program code segment for the following: (a) to calculate and print equivalent of two capacitors connected in series, read capacitances from the user (b) to print x, y against f(x,y) for the equation $f(x, y) = x^2 + 77xy - y^2$ read x and y from user (c) to calculate and display minimum of f(x,y) in above	4 4 4 8
Q.3.	Write C++ program to evaluate the $\int_1^9 (x^2 + 4\sqrt{x} + 7)dx$ by Trapezoidal's rule or by Simpson's (1/3) rule due to options 1 or 2 respectively (use n=6). Report error message for any other option pressed by the user.	10
Q.4.	Suppose A and B be 3x3 matrices. Write C++ program which reads in entries of A and B and prints out the entries of matrix which is (i) $C = \frac{11A + 4B}{44}$ , (ii) $D = A - B' + 3$ and (iii) to print off diagonal elements of C. (iv) maximum of the elements of matrix A. (v) square of the elements of matrix B	2+4+4
Q.5.	(a) Write C++ program for the simple harmonic motion (S.H.M) of a mass attached with a spring using Euler's method under the following conditions: ( $g=9.8 \text{ m/s}^2$ , initial position zero and velocity 15 m/s, time step 0.1 sec. and maximum time 15 sec., $k = 1 \text{ N/m}$ , $m=1 \text{ kg}$ ). Calculate and print values for time, position and velocity. Give comment that how you can change the same program for forced H.M.  (b) Write a function circle () which reads in radius values and print out area and circumference values of the circle. Execute the program iteratively for 5 values.	6+4



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Sixth Semester – 2019

Paper: Computational Physics-I

Course Code: PHY-311 Part – I (Compulsory)

Time: 15 Min. Marks: 10

Roll No. in Fig. ....

Roll No. in Words. ....

Signature of S

**ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.**

**Division of marks is given in front of each question.**

**This Paper will be collected back after expiry of time limit mentioned above.**

Q.1. Encircle the correct choice.

(1x10=10)

i. C++ program statement ends with a:

- a) getch()      (b) void main ()      (c) semicolon (d) comma

ii. In C++ what is not a selection:

- a) select (b) if (c) switch (d) if-else

iii. C++ language, LIBRARY TYPE that provides stream oriented input and output is called:

- (a) Header      (b) #include      (c) iostream      (d) both (a) & (b)

iv. Which of the following is an assignment operator in C++?

- (a) ==      (b) =      (c) +      (d) !=

v. Which escape sequence can be used to begin a new line in C++:

- (a) \new      (b) \n      (c) \next      (d) \t

vi. The pow () is a:

- (a) Operator      (b) user defined function (c) built in function (d) None

vii. In C++, a loop with fix number of iterations is:

- (a) While      (b) do-while      (c) for (d) None

viii. If  $x = 23$  and  $y = 32$ , then for statement " $y == x$ " which of the following result is true

- (a) x equals y (b) x is greater than y (c) true (d) false

ix. In C++ the expression  $45\%2$  is evaluated to:

- (a) 2.0 (b) 1 (c) 22.5 (d) error

x. Which of the following is not a Boolean operator for in C++ :

- (a) && (b) || (c) = (d) none





**UNIVERSITY OF THE PUNJAB**

B.S. 4 Years Program / Sixth Semester – 2019

Roll No. ....

Paper: Computational Physics-I  
Course Code: PHY-311 Part – II

Time: 2 Hrs. 45 Min. Marks: 50

**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

<p><b>Q.2.</b></p> <p>i. Explain with example the following terms in C++: a) float x; (b) cos ( ) (c) switch() (d) sqrt()</p> <p>ii. Write syntax with example the following in C++: (a) do-while ( ) loop (b) for ( )</p> <p>iii. Explain arithmetic operators in C++?</p> <p>Write C++ program code segment for the following:</p> <p>(a) to calculate equivalent of two resistors connected in series (b) to print x against f(x) for the equation</p> $f(x) = \frac{5}{\sqrt{2x^3 - 4x^2 - 2x + 4}}$ <p>(c) to calculate and display table of a number (d) to convert grams to kilograms using a function</p>		<p>4</p> <p>4</p> <p>4</p> <p>8</p>
<p><b>Q.3.</b></p>	<p>Write C++ program to evaluate the <math>\int_1^6 \frac{1}{x^3 - 5} dx</math> by Simpson's rule or by Trapezoidal rule due to options 1 or 2 respectively (use n=6). Report error message for any other option pressed by the user.</p>	<p>10</p>
<p><b>Q.4.</b></p>	<p>Suppose A and B be 3x3 matrices. Write C++ program which reads in entries of A and B and prints out the entries of matrix which is (i) <math>7A - 3B</math> , (ii) <math>C = 2A'</math> and (iii) to print diagonal elements of C.</p>	<p>2+4+4</p>
<p><b>Q.5.</b></p>	<p>Write C++ program for the forced harmonic motion (FHM) of a mass attached with a spring using Euler's method under the following conditions: (<math>g=9.8 \text{ m/s}^2</math>, initial position zero and velocity 15 m/s, time step 0.1 sec. and maximum time 15 sec., <math>k = 1 \text{ N/m}</math>, <math>m=1\text{kg}</math>, damping coefficient = 0.5 N/ms, <math>\omega = 0.01 \text{ s}^{-1}</math> and <math>f_0=1.5\text{N}</math>.) Calculate and print values for time, position, velocity and acceleration. How you can change the same program for Simple H.M., Damped. H.M</p> <p>Write C++ program which reads in 10 numbers into an array and display those numbers in reverse order.</p>	<p>7+3</p>



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Eighth Semester – 2019

Paper: Computational Physics-II

Course Code: PHY-422 Part-I (Compulsory)

Time: 15 Min. Marks: 10

Roll No. in Fig. ....

Roll No. in Words. ....

Signature of Supdt.:

**ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.**

**Division of marks is given in front of each question.**

**This Paper will be collected back after expiry of time limit mentioned above.**

**Q.1. Encircle the correct option.**

**(10x1=10)**

- i. Which of the following is used to print text on the graph:  
a) print text (b) disp('text') (c) gtext('text') (d) ginput('text')
- ii. To find out polynomial from the roots:  
a) find() (b) roots() (c) root() (d) poly()
- iii. To remove linear trend of a signal we use:  
(a) deletetrend (b) removetrend (c) detrend (d) notrend
- iv. Which of the following is not used to print out value of g such that g = 125;  
a) >>g (b) >>display(g) (c) >>disp(g) (d) >>g;
- v. If  $x = [7 \ 2 \ 2 \ 9 \ 8]$  for  $[v1, v2] = \max(x)$ ; the value of (v1, v2) is:  
(a) (9,4) (b) (4,9) (c) (9,3) (d) (3,9)
- vi. If  $a$  &  $b$  are vectors, which of the following is used for element by element operations.  
a)  $a.^b$  (b)  $a.*b$  (c)  $a./b$  (d) all of them
- vii. If  $x = [7 \ 0 \ 2 \ 0 \ 8]$  then for output  $[49 \ 0 \ 4 \ 0 \ 64]$  which one is not true:  
(a)  $x*x$  (b)  $x.^2$  (c)  $\text{power}(x,2)$  (d)  $x.*x$
- viii. If  $x = [3 \ 0 \ 0 \ 1 \ 6]$  then for  $z = \text{all}(x)$  what is true :  
(a) 1 (b) 0 (c)  $[1 \ 0 \ 0 \ 1 \ 1]$  (d)  $[0 \ 1 \ 1 \ 0 \ 0]$
- ix. The following command cannot change limits of the graph axis:  
(a) axes() (b) axis() (c) xlim() (d) ylim()
- x. Which of the following is equal to output of  $z = \text{factorial}(5)$ :  
(a) prod(1:5) (b) sum(1:5) (c) 121 (d) all



**UNIVERSITY OF THE PUNJAB**  
 B.S. 4 Years Program / Eighth Semester – 2019

Roll No. ....

Paper: Computational Physics-II  
 Course Code: PHY-422 Part-II

Time: 2 Hrs. 45 Min. Marks: 50

**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

<p>Q.2.</p> <p>i.</p> <p>ii.</p> <p>iii.</p>	<p>Write short answers of the following Questions:</p> <p>Give simple example to find zero index of values in an array?</p> <p>Write syntax with example for the following in MATLAB:</p> <p>(a) ginput() (b) dsolve() (c) gtext() (d) input(),</p> <p>Write MATLAB program code segment for the following:</p> <p>(a) to generate and plot 20 x 20 matrix of numbers</p> <p>(b) to give one example to find out cumulative sum of [2 5 8 7]</p> <p>(c) to find integral of a polynomial: <math>5x^2 - 2x + 20</math></p> <p>(d) to calculate the roots of a polynomial</p> <p>(e) to multiply two polynomial and determine derivative</p>	<p>2</p> <p>8</p> <p>10</p>
<p>Q.3.</p>	<p>Suppose A be a 3x3 matrix. Write <b>MATLAB</b> program which reads in random numbers as entries of the matrix A and calculate (i) sum and average of the all matrix elements, (ii) transpose of the matrix A (also plot the matrix), (iii) also check whether the Matrix A is an identity matrix? (iv) Also sort the matrix elements, (v) divide matrix rows by its row average.</p> <p>Write MATLAB program for a half wave rectifier circuit.</p>	<p>6+4</p>
<p>Q.4.</p> <p>(a)</p> <p>(b)</p>	<p>Write MATLAB program for the forced harmonic motion (FHM) of a mass attached with a spring using Euler's method under the following conditions: (<math>g=9.8 \text{ m/s}^2</math>, initial position zero and velocity 15 m/s, time step 0.1 sec. and maximum time 15 sec., <math>k = 1 \text{ N/m}</math>, <math>m=1\text{kg}</math>, damping coefficient = 0.5 N/ms, <math>\omega=0.01 \text{ s}^{-1}</math> and <math>f_0=1.5\text{N}</math>.) Calculate and print with proper labels the values of time against position, velocity and acceleration. How you can change the same program for the Simple H.M., Damped. H.M. The necessary equations are as follows:</p> <p><math>A = (-k x - b v + f_0 \cos(\omega t)) / m</math>, <math>x = x + v h</math>, <math>v = v + a h</math>, <math>t = t + h</math>,</p> <p>Also draw estimate output graphs with proper curve labels, x &amp; y labels and title.</p> <p>How randomly generated points can be used to show Brownian motion? Write MATLAB program to simulate Brownian motion of a particle for 31 collisions. Also calculate the distance traced by the particle. Note: Plot estimate graph if any.</p>	<p>6+4</p>
<p>Q.5. (a)</p> <p>(b)</p>	<p>Write MATLAB program to calculate and print out factorial of a number taken from the user by using two methods. Implement your program using functions.</p> <p>Calculate and print the series and sum of S, such that: <math>S = 77 \sum_{k=1}^{20} k^3</math></p> <p>How you can improve the answer to evaluate <math>\int_0^{\pi} \sin(x) dx</math></p>	<p>10</p>

**DEPARTMENT OF PHYSICS**  
**Government College University, Faisalabad**

Mid Terminal Exam (Spring 2019)

Class: M. Sc.-Physics 4<sup>th</sup> semester

Course code: PHY-654

Subject: Computational Physics

Total Time: 1:00 hour

Instructor: Dr Muhammad Imran

Total Marks: 18



Name: \_\_\_\_\_

Roll No: \_\_\_\_\_

**Instructions:**

- Attempt all questions.
- Display possible screen output where necessary.
- State correct syntax, header files and proper indentation as applied.

**Q. No. 1:**

- How can you write a program that explains the difference between postfix increment and prefix increment operators used as a part of a large expression? [2]
- How can you write a program that inputs the number of hours? It computes and displays the number of weeks, days and hours within the input number of hours? [3]
- How can you write a program that inputs a year and finds whether it is a leap year or not? [2]
- How can you write a program that inputs the percentage of a student marks and display his grade according to GCUF criteria for Physics students, i.e.? [3]

Grade	Marks (%)
A	80 - 100
B	65 - 79
C	50 - 64
D	40 - 49
F	<40

**Q. No. 2:** Write a program that inputs two floating point numbers and an operator (+, -, \* or /).

It performs the operation and displays the result on the screen.

[4]

**Q. No. 3:** Write a program that inputs numbers until the user enters a negative number. The program calculates the average, maximum and minimum number of all positive numbers.

[4]

## GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

M.Sc Physics  
Course Code: Phy-654

4<sup>th</sup> Semester  
Course title: Computational Physics

Spring 2019

SUBJECTIVE

Time: 02,30 Hours

Marks: 30

- Q.2 a) Show that the Euler method for Newton's equation in computer Algorithms is accurate up to a term on the order of  $(t_{i+1} - t_i)^2$ . Discuss how to improve its accuracy. 3
- b) Discuss the Solution of Nonlinear Equations,  $f(x) = 0$ , by using Bisection Numerical Method with examples and to implement this numerical method by using C++ Language Code. 3
- Q.3 a) What are numerical methods in Computational PHYSICS for solving ODEs and write in details of the Euler Method for Numerical solution of ODEs? 3
- b) What are User-defined and built in Functions? Explain its types with examples each, and also write the importance of Functions in efficient programming? 3
- Q.4 a) What are "if" and "if-else" statements, and its significance for scientific programming in details with examples, along with the syntax for single and block of statements? 3
- b) Let A and B be 3x3 matrices. Write a program in C++ which reads in the entries of A and B and prints out the entries of the matrix which is: (i)  $A + B$  (ii)  $A \cdot B$  3
- Q.5 What are Gauss Seidel Iterative Method and implement this method by using C++ program for a system of Linear equations,  $AX = C$ , where the diagonal elements of A are non-zero? and how this method converges faster than that of Jacoby Method? 6
- Q.6 a) Compute,  $I = \int_0^1 e^{x^2} dx$ , using Simpson's 1/3RD Rule, taking  $n=04$ , write a Computer Program in C++ language to implement this method 3
- b) If initial and Final velocities of a particles are given,  $v_i$  and  $v_f$ , and acceleration of a particles is  $a$ , then find the distance travelled,  $s$ , by a particle by using:  $2as = v_f^2 - v_i^2 / 2a$ .

Name: Aamir Roll No: 8933

## DEPARTMENT OF PHYSICS

Government College University, Faisalabad

Final Terminal Exam (Spring 2019)

Course code: PHY-654

Total Time: 2:00 hour

Total Marks: 50



Class: M. Sc.-Physics 4<sup>th</sup> (F)

Subject: Computational Physics

Instructor: Dr. Muhammad Imran

### Instructions:

- Attempt all questions
- Display possible screen output where necessary.
- State correct syntax, header files and proper indentation as applied

### Q. No. 1:

- Write a C++ program that inputs a number and displays whether it is divisible by 3 or not. [3]
- How can you write a C++ program to perform numerical integration using Trapezoidal rule function  $f(x) = x^2$ ? [4]
- What is bisection method? Describe its graphical implementation. Design an algorithm to describe working of bisection method for a computer program? [4]
- Write a C++ program to implement secant method for solving:  
 $f(x) = \sin(x) - 5x + 2$  [4]

Q. No. 2: What is ordinary differential equation (ODEs), how can we find their numerical solution? Write down a C++ program using 4th order Runge Kutta method for to solve ODE equation

$$\frac{dy}{dx} = x + y \quad [5]$$

Q. No. 3: How can you write a C++ program to implement Gauss Jordan method to find determinant of a matrix? [5]

Q. No. 4: What do you understand about linear data fitting? How it can be implemented in a C++ program. [5]





GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD  
Final Terminal Examination Spring 2020

M.Sc. Physics (4<sup>th</sup> Semester M+E)

Course Code: PHY-654

Maximum Marks: 30 (12+18)

Course Title: Computational Physics

Cr. Hr.: 3(3-0)

Subjective

Subjective Marks: 18

Time Allowed: 1 hr 30 Minutes.

ROLL No.: 5846

Name: M. Danish Jamil

Q. No. 2: Differentiate between the followings?

[3]

Compiler, Interpreter and Assembler

Q. No. 3:

[5]

How can you write a program that will prompt the user to enter number of hours, it computes and display the number of weeks, days and hours within the inputs number of hours?

Q. No. 4:

[5]

Write a program that inputs salary. If salary is 20000 or more, it deducts 7% of salary. If the salary is 10000 or more but less than 20000, it deducts 1000 from the salary. If salary is less than 10000, it deducts nothing. It finally displays the net salary.

Q. No. 4:

[5]

How can you write a C++ program to implement forward elimination for the gauss elimination method.