

M.Sc. (Physics) Examination Semester II  
Advanced c Programming & Computational Physics (Phys-C204)

Paper Code 4659

Duration : 2Hr 30Min

*April 2016*

Marks:70

Q. (1) Answer the following questions.

- (a) What is the difference between while loop and do....while loop? [2]
- (b) What is the difference between operators “=” and “= =”? [1]
- (c) What does '\0' indicate? [1]
  - (a)comment (b)backslash (c)null character (d)horizontal tab
- (d) Distinguish between (a) actual parameters and formal parameters [4]
  - (b)global variables and local variables
- (e) Write a program to evaluate following series [6]  
$$x + x^2 + x^3 + \dots + x^n$$

**OR**

Q. (1) Answer the following:

- (a) Explain the role of #define and #include directives in C.(6)
- (b) Classify characters used in C. Explain in brief. (6)
- (c) Write the following as C integer constant. (2)
  - (a) -2,348 (b)  $5.176 \times 10^3$  (c)  $7.185 \times 10^2$  (d)  $175538 \times 10^{-4}$  (e)  $-8.75 \times 10^3$

Q. (2) Answer the following:

- (a) Explain or write the rules for subscripted variables(array) and write the general format for one dimensional array declaration. (4)
- (b) Define function and write the structure of a function by giving at least one example. (4)
- (c) Explain the role of the following functions: (2)
  - (a) getchar() (b) scanf() (c) printf() (d) rand()
- (d) Explain the common operations performed on character strings. How to declare and initialize string variables. (4)

**OR**

Q. (2) Answer the following:

- (a) How many times the following for loop will be executed? (2)

```
for { i=1; i<=0; i++}  
{  
    .....  
    .....  
}
```
- (b) Can negative number be assigned as index in for loop? (2)
- (c) Write a note on input and output functions used in C. (5)
- (d) Define structure and write its general format. (5)

Q. (3) Answer the following:

- (a) Discuss the importance of the pointers in C. Explain how they are declared and give its general format structure. (7)
- (b) Explain conditional and comma operators in detail. (7)

**OR**

Q. (3) Answer the following:

(a) Answer the followings: (Each of ONE marks)

- (a) Which operator connects the structure name to its member name?
  - (a) -            (b) <-            (c) .            (d) both (b) & (c)
- (b) Which of the following cannot be a structure member?
  - (a) another structure            (b) function            (c) array            (d) none of these
- (c) Comment on the following pointer declaration?  
 Int \*ptr, p;
  - (a) ptr is a pointer to integer, p is not            (b) ptr and p, both are pointers to integer
  - (c) ptr is a pointer to integer, p may or may not be            (d) none of these
- (d) Relational operators cannot be used on:
  - (a) structure            (b) long            (c) strings            (d) float
- (e) What is the advantage of #define over const?
  - (a) data type is flexible            (b) can have a pointer            (c) both (a) & (d)
  - (d) reduction in the size of the program.
- (f) Which of the following are themselves a collection of different data types?
  - (a) String            (b) structures            (c) char            (d) all of these
- (g) User –defined data type can be derived by
  - (a) struct            (b) enum            (c) typedef            (d) all of these
- (h) Are logical operators sequence points?
  - (a) true            (b) false            (c) depends on compiler            (d) depends on standard
- (i) Does logical operators in C language are evaluated with short circuit?
  - (a) true            (b) false            (c) depends on compiler            (d) depends on standard
- (j) Result of a logical or a relational expression in C is
  - (a) true or false            (b) 0 or 1
  - (c) 0 if expression is false and positive number if expression is true            (d) none of these.
- (b) How do we declare and initialize string variables in “C” .Explain through proper example. (4)

Q. (4) Answer the following:

(a) Write only the answer in the answer book. (each of ONE mark)

- (a) Gauss – Jordan method is similar to
  - (a) Gauss – Seidel method            (b) Iteration’s method
  - (c) Relaxation method            (d) Gaussian elimination method
- (b) \_\_\_\_\_ lies in the category of iterative method.
  - (a) bisection method            (b) regula falsi method            (c) secant method            (d) all of these
- (c) Numerical methods for finding the solution of the system of equations are classified

- as direct and \_\_\_\_\_ methods. Select the correct option.
- (a) indirect (b) iterative (c) Jacobi (d) none of these
- (d) Newton-Raphson method is applicable to the solution of
- (a) both algebraic and transcendental equations (b) algebraic equations only
- (c) transcendental equations only (d) none of these
- (e) The convergence of which of the following method is sensitive to starting value?
- (a) False position (b) Gauss Seidel (c) Newton-Raphson (d) all of these
- (f) Which of the following statement applies to the bisection method used for finding roots of functions?
- (a) convergence within a few iterations
- (b) guaranteed to work for all continuous functions
- (c) is faster than the Newton-Raphson method
- (d) requires that there be no error in determining the sign of the function.
- (g) In which of the following methods proper choice of initial value is important?
- (a) Bisection (b) false position (c) Newton-Raphson (d) Bairsto
- (h) Errors may occur in performing numerical computation on the computer due to
- (a) rounding (b) power fluctuation (c) operator fatigue (d) all of these
- (i) While solving a system of linear equations, which of the following approach is economical for the computer memory? Select the correct option.
- (a) direct (b) iterative (c) analytical (d) graphical
- (j) The root  $x^2 - 2x - 5 = 0$  correct to three decimal places by sing Newton-Raphson method is
- (a) 2.0946 (b) 1.0404 (c) 1.7321 (d) 0.7011
- (b) Discuss and write the algorithm for regula falsi method. (4)

**OR**

Q. (4) Answer the following:

(a) Consider the function given below: (7)

X	0.8	0.9	1.0	1.1	1.2
F(x)	0.717236	0.78333	0.8417	0.92314	0.96356

Evaluate  $\int f(x)dx$  in the interval  $[0.8, 1.2]$ . With  $h = 0.1$  using Trapezoidal rule.

(b) Evaluate the following data: (7)

X	0.4	0.5	0.7	0.8
F(x)	-0.916	-0.693	-0.357	-0.22

Estimate  $f(0.6)$  using Lagrange interpolation.

Q. (5) Answer the following:

(a) Answer the followings directly in the answer book. Write only the answer. ( Each of ONE mark only).

(a) In Simpson's rule, we use parabolas to approximating each part of the curve. This proves to be very efficient as compared to Trapezoidal rule.

(a) True (b) False (c) may or may not be true (d) all of these

(b) Euler's method numerically computes the approximate derivative of a function.

(a) true (b) false (c) may or may not be true (d) all of these

(c) The Trapezoidal rule is a numerical method that approximates the value of a \_\_\_\_.

(a) indefinite integral (b) definite integral (c) improper integral (d) function

(d) The need of numerical integration arises for evaluating the definite integral of a function that has no explicit \_\_\_\_\_ or whose anti derivative is not easy to obtain.

(a) Anti derivative (b) derivative (c) both (a) & (b) (d) none of these

(e) In interpolation is used to represent the d \_\_\_\_\_?

(a) forward difference (b) central difference

(c) backward difference (d) none of these

(b) Consider the function given below:(5)

X	0.8	0.9	1.0	1.1	1.2
F(x)	0.717236	0.78333	0.8417	0.92314	0.96356

Evaluate  $\int f(x)dx$  in the interval  $[0.8,1.2]$ . With  $h = 0.2$  using Simpson's  $1/3^{\text{rd}}$  rule.

(c) Write only the algorithm for Secant method to find the root of quadratic equation.(4)

**OR**

Q. (5) Answer the followings:

(a) Tick the correct one. ((a) to (e) are Each of ONE marks)

(a) \_\_\_\_\_ is used to denote the process of finding the values inside the interval  $(X_0, X_n)$ .

(a) interpolation (b) extrapolation (c) iterative (d) polynomial equation

(b) The simplest method in finding the approximate solutions to the first order equation is

(a) Euler's method (b) modified Euler's method (c) Runge-Kutta (d) none of these

(c) In Runge-Kutta method, we don't need to calculate higher order derivatives and find greater accuracy.

(a) true (b) false (c) may or may not be false (d) none of these

- (d) Runge – Kutta methods refer to a family of one-step methods used for numerical solution of initial value problems.
- (a) true      (b) false      (c) both (a) & (b)      (d) none of these
- (e) Which one of the given following relation is true for Euler's method.
- (a)  $y_{i+1} = y_i + h f(x_i, y_i)$       (b)  $y_i = y_{i+1} + h f(x_i, y_i)$   
(c)  $y_{i+1} = y_i - h f(x_i, y_i)$       (d)  $y_{i+1} = y_i + h f(y_i, x_i)$
- (b) Write an algorithm for Huen's method (second order Runge – kutta) to solve a second order differential equation. (5)
- (c) Explain the linear regression. (4)