

G-2/240/21

Roll No.

[2]

M.Sc. II Semester Examination, 2021

PHYSICS

Paper II

(Computational Methods and Programming)

Time : 3 Hours]

[Max. Marks : 80

Note : *All questions are compulsory. Question Paper comprises of 3 sections. Section A is objective type/multiple choice questions with no internal choice. Section B is short answer type with internal choice. Section C is long answer type with internal choice.*

SECTION A

1 × 8 = 8

(Objective Type Questions)

Choose the correct answer :

- 1.** C is type of programming language.
(a) Object oriented (b) Procedural
(c) Bit level language
(d) Functional.
- 2.** Loops in C Language are implemented using :
(a) While block (b) For block
(c) Do while block (d) All the above.

- 3.** An array elements are always stored in memory location.
(a) Sequential (b) Random
(c) Sequential and Random
(d) None of the above.
- 4.** A string that is a formal parameter can be declared :
(a) An array with empty braces
(b) A pointer to character
(c) Both (a) and (b)
(d) None of the above.
- 5.** The Bisection method is also known as :
(a) Binary chopping
(b) Quaternary chopping
(c) Tri-region chopping
(d) Hex-region chopping
- 6.** Gauss-Elimination method is well adopted for :
(a) MATLAB operations
(b) Computer operations
(c) Telecommunication operations
(d) Network circuit operations.

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7. The highest order of polynomial integrand for which Simpson's $\frac{1}{3}$ rule of integration is exact, is :

- (a) First (b) Second
(c) Third (d) Fourth.

8. The Fourth order Runge-Kutta (RK) method has following :

- (a) One predictor and two corrector steps
(b) One predictor and three corrector steps
(c) Two predictor and two corrector steps
(d) Three predictor and one corrector steps.

SECTION B $6 \times 4 = 24$

(Short Answer Type Questions)

Note : Attempt one question from each unit.

Unit-I

1. Explain branching and looping in C.

Or

Explain the rational and logical expressions.

Unit-II

2. Explain the use of break and continue statement with example.

Or

What is function ? Also define library function and users defined functions.

Unit-III

3. Use the method of false position find the fourth root of 32 correct to three decimal places.

Or

Evaluate the $\sqrt{28}$ correct to four decimal places by Newton's iteration method.

Unit-IV

4. What do you mean by interpolation in numerical methods ? Also explain different types of interpolation formula with examples.

Or

Describe Runge-Kutta second and fourth order method for finding solution of ordinary differential equation.

SECTION C

12×4=48

(Long Answer Type Questions)

Note : Attempt one question from each unit.

Unit-I

1. Describe the different types of C constants and illustrate the formation rules of integer and character constants.

Or

Explain character set related to C-programming language. Also describe the characters in different categories.

Unit-II

2. Explain while loop and for loop with the help of example. Also draw the flow chart for both loops.

Or

How are multidimensional array defined ? State the rule that determines the order in which initial values are assigned to multidimensional array element.

Unit-III

3. By using the Bisection method, find an approximate root of the equation $\sin x = \frac{1}{x}$ that lies between $x = 1$ and $x = 1.5$ (measured in radian). Carry out computation upto 7th stage.

Or

Find the eigen value of largest modulus and the associated eigen vector of the matrix

$$A = \begin{bmatrix} 2 & 3 & 2 \\ 4 & 3 & 5 \\ 3 & 2 & 9 \end{bmatrix}$$

by power method.

Unit-IV

4. Find $y(2.0)$ if $y(t)$ is the solution of $\frac{dy}{dt} = \frac{1}{2}(t + y)$ assuming $y(0) = 2$, $y(0.5) = 2.636$, $y(1.0) = 3.595$ and $y(1.5) = 4.968$ using Milne's predictor-corrector method.

Or

Find the approximate value of

$$y = \int_0^{\pi} \sin x \, dx$$

using (i) trapezoidal rule, (ii) Simpson's $\frac{1}{3}$ rule by dividing the range of integration into six equal parts. Calculate the percentage error from its true value in both the cases. Also state that which rule is more appropriate ?

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