



Seat No. \_\_\_\_\_

**HH-003-0494001**

**B. Sc. / M. Sc. (Applied Physics)**

**(Sem.-IV) Examination**

**April - 2023**

**Paper-XIII : Modern Computational  
Techniques & Programming**

**Faculty Code : 003**

**Subject Code : 0494001**

**Time : 2½ Hours / Total Marks : 70**

- 1 (a) Answer the questions : **4**
- (1) RAM stands for \_\_\_\_\_
  - (2) \_\_\_\_\_ material is used to make computer chips.
  - (3) Assembly language is \_\_\_\_\_ level programming language.
  - (4) 1 Megabyte is equal to \_\_\_\_\_ KB.
- (b) Answer in brief : (any 1 out of 2) **2**
- (1) Differentiate between Low level language and High level language.
  - (2) Write the examples of input and output devices.
- (c) Answer in detail : (any 1 out of 2) **3**
- (1) What is flow chart ? Explain its basic symbols in detail.
  - (2) Write an algorithm to find the Area of the rectangle.
- (d) Answer the question : (any 1 out of 2) **5**
- (1) Write a note on Generation of computer.
  - (2) What is a computer ? Draw and explain basic block diagram of a computer.

- 2 (a) Answer the questions : 4
- (1) Find Octal number of  $(101010011.01011)_2$
  - (2) Find the Binary equivalent for  $(5DC.A7)_{16}$
  - (3) Find the Decimal equivalent for  $(110001.111)_2$
  - (4) Convert Decimal number 289.73 into Octal number.
- (b) Answer in brief : (any 1 out of 2) 2
- (1) Write  $(-30)$  in Binary form. (use 2's Complement)
  - (2) How field width of 32 bits are used by computer to represent any floating point numbers ?
- (c) Answer the question : (any 1 out of 2) 3
- (1) Write the following numbers in normalized exponential form and E form
    - (a) 187.342
    - (b)  $-0.0079527$
    - (c) 0.0002782
  - (2) Convert decimal number 1832.56 into Hexadecimal number system.
- (d) Answer the question : (any 1 out of 2) 5
- (1) Assuming that the mantissas are truncated to 4 decimal digits. Find the result of the following operations.
    - (1)  $0.5778 \times 10^3 + 0.7289 \times 10^4$
    - (2)  $0.6766 \times 10^{-2} - 0.3918 \times 10^{-3}$
    - (3)  $0.2432 \times 10^{15} \times 0.1834 \times 10^{45}$
    - (4)  $0.9856 \times 10^{35} / (\text{divided by}) 0.3442 \times 10^{12}$
  - (2) Convert the binary number 1101110111.10101 into
    - (1) Decimal number
    - (2) Octal number
    - (3) Hexadecimal number

3 (a) Select the correct option :

4

- (1) Iteration is also called as \_\_\_\_\_
  - (A) Accurate process
  - (B) Self-correcting process
  - (C) Approximate process
  - (D) Rounding off process
- (2) The Newton Raphson method is also called as \_\_\_\_\_
  - (A) Tangent method
  - (B) Secant method
  - (C) Chord method
  - (D) Diameter method
- (3) What is the primary drawback of using direct methods of solution ?
  - (A) They yield solution after a certain amount of fixed computation.
  - (B) They have large calculations involved.
  - (C) They make use of back substitution.
  - (D) They do not achieve the desirable accuracy.
- (4) The Bisection method is also known as \_\_\_\_\_
  - (A) Binary Chopping
  - (B) Quaternary Chopping
  - (C) Tri region Chopping
  - (D) Hex region Chopping

(b) Answer in brief : (any 1 out of 2)

2

- (1) What is a transcendental equation ? What are its characteristics ?
- (2) What is a nonlinear and linear equations ?  
Give example.

(c) Answer in detail : (any 1 out of 2) 3

(1) Using suitable method, find the roots of the equation upto 3 decimal places.

$$X^2 - 2X - 143 = 0$$

(2) Calculate the range of the roots for the equation

$$3X^3 - 6X^2 + 5X - 10 = 0$$

(d) Answer the question : (any 1 out of 2) 5

(1) Find the root of the following equation using Bisection Method.

$$F(X) = X^2 - 4X - 10 = 0 \quad [-2 < X < -1] \text{ up to 5 iterations.}$$

(2) Write an algorithm to find root of a non linear equation using False position method.

4 (a) Select the correct option : 4

(1) The secant method of finding roots of nonlinear equations falls under the category of \_\_\_\_\_ methods.

(A) Bracketing

(B) Graphical

(C) Open

(D) Random

(2) Number of iteration depends on the \_\_\_\_\_

(A) Initial value taken to start the iteration

(B) Type of linear equations

(C) Number of unknowns

(D) Approximations to be done

(3) Muller's method is an extension of the \_\_\_\_\_ method.

- (A) Bisection method
- (B) Secant method
- (C) Newton Raphson method
- (D) False position method

(4) In fixed point iteration method, if the solution is :

$X_1 = 5, X_2 = 2, X_3 = 5, X_4 = 2$  then it is known as

- (A) No Divergence
- (B) Single Divergence
- (C) Oscillatory Divergence
- (D) Monotone Divergence

(b) Answer in brief : (any 1 out of 2) **2**

- (1) Write the general form of a system of n equations in n unknown variables.
- (2) Enlist the properties of n<sup>th</sup> degree polynomial regarding its roots.

(c) Answer in detail : (any 1 out of 2) **3**

- (1) What is meant by purification of roots ? How is it done ?
- (2) What are the conditions to get a solution using fixed point iteration process ?

(d) Write a note on (any 1 out of 2) **5**

- (1) Write an algorithm to find root of a nonlinear equation using Secant method. Compare it with False position method.
- (2) What is synthetic division ? How is it used to obtain the multiple roots of a polynomial ?

Explain with  $P(X) = (X - 3) q(X)$  where

$$P(X) = X^3 - 7X^2 + 15X - 9 = 0$$

5 (a) Select the correct option :

4

- (1) Where is RAM located ?
  - (A) Expansion Board
  - (B) External Drive
  - (C) Mother Board
  - (D) All of above
- (2) Charles Babbage designed the first mechanical computer named :
  - (A) Analytical Engine
  - (B) Processor
  - (C) Comp Engine
  - (D) Abacus
- (3) What is the name of first super computer of India ?
  - (A) Saga 220
  - (B) PARAM 8000
  - (C) ENIAC
  - (D) PARAM 6000
- (4) If a function is real and continuous in the region from a to b and  $f(a)$  and  $f(b)$  have opposite signs then there is at least \_\_\_\_\_ real root between a and b.
  - (A) One
  - (B) Two
  - (C) Many
  - (D) Zero

(b) Answer in brief : (any 1 out of 2)

2

- (1) What is hardware ? Explain with example.
- (2) Give rate of convergence of :
  - (1) Bisection method
  - (2) Secant Method
  - (3) Newton Raphson

- (c) Answer in detail : (any 1 out of 2) **3**
- (1) Differentiation between Interpreter and Compiler.
  - (2) Explain 1's and 2's complements of binary numbers with example.
- (d) Write a note on : (any 1 out of 2) **5**
- (1) Explain and derive the Newton Raphson iterative formula for evaluating a root of a nonlinear equation.
  - (2) Give the definition of Software. Explain types of software in detail.
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