Roll No......................

Total No. of Units : 04
Total No. of Printed Pages : 04

Code No. : 04/201

Fourth Semester Examination, May 2019

M.Sc. PHYSICS

Paper - II

COMPUTATIONAL METHODS & PROGRAMMING

Time : 3 Hrs.   Max. Marks : 80

- Part A and B of each question in each unit consist of very short answer type questions which are to be answered in one or two sentences.
 Part C (Short answer type) of each question should be answered in 200-250 words.
 Part D (Long answer type) of each question should be answered within the word limit 400-450.

Unit - I

Q.1 A. Write the properties of Eigen values. **(2)**

Q.1 B. Find the position root of . Solve using Newton-Raphson method. **(2)**

Q.1 C. Find a real root of the equation by the method of false position correct to four decimal places. **(4)**

OR

Using Jacobi's method, find all the Eigen values and the Eigen vectors of the matrix :

$$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$

P.T.O.

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(4)   **Code No. : 04/201**

Q.3 D. Using Euler's method, find an approximate value of corresponding to , given that and when . **(12)**

OR

Apply Milne's method to find a solution of the differential equation in the range for the boundary condition at .

Unit - IV

Q.4 A. Write FORTRAN operator symbols and Arithmetic operation. **(2)**

Q.4 B. Write advantage of flow chart. **(2)**

Q.4 C. What are statements? Explain Input/Output statements. **(4)**

OR

Write definition of flow chart. Explain all flow chart symbols.

Q.4 D. Explain control statements. **(12)**

OR

Solve the expression with the help of FORTRAN :

1)   2)

---x---

Q.1 D. Using Iteration method, find a root of the equation $x^3 - x^2 - 1 = 0$ correct to four decimal places.   **(12)**

OR

Apply Cramer's rule to solve the following :

Unit - II

Q.2 A. Reduce to linear form of given equation :   **(2)**

Q.2 B. Fit the curve $y = ax^2 + \dfrac{b}{x}$.   **(2)**

Q.2 C. If P is the pull required to lift a load W by means of a pulley block, find a linear law of the form   connecting P and W using the following data: **(4)**

where P and W are taken in kg-wt. Compute P when W= 150kg.

OR

Find the polynomial $f(x)$ by using Lagranges formula and hence find   for :

Q.2 D. Obtain the cubic spline for the following data :   **(12)**

x	0	1	2	3
y	2	-6	-8	2

OR

Using Gauss background difference formula. Find $y(8)$ from the following table :

x	0	5	10	15	20	35
y	7	11	14	18	24	32

Unit - III

Q.3 A. Write the formula of Taylor's series method.   **(2)**

Q.3 B. Write Milne's method for predictor and corrector.   **(2)**

Q.3 C. Apply Runge-Kutta fourth order method to find an approximate value of y when $x = 0.2$, given that   and   when   .   **(4)**

OR

Find by Taylor's series method, the values of y at   and to five places of decimals from   .

P.T.O.