7. a) Give the order of convergence of an iterative process.
b) Explain the graph of Normal Distribution.
c) Solve for a positive root of x² – 4x + 1 =0 by Regula Falsi method.
3. a) Give the conditions of Binomial distribution.
b) Mention the applications of Chi-Square distribution.
c) What are the chief properties of binomial distribution.
9. a) How will you fit a Poisson distribution?
b) Solve o² – 3x u o by the method of describes of Chi-square distribution.

K21P 0245

Reg. No.:
Name :
IV Semester M.Sc. Degree (CBSS – Reg./Suppl. (Including Mercy Chance)/Imp.)
Examination, April 2021
(2014 Admission Onwards)
PHYSICS

PHY4C15 - Numerical Techniques and Probability

Time: 3 Hours

Max. Marks: 60

SECTION - A

Answer both the questions. (Either a or b or c).

 a) Obtain Euler's formula and Modified Euler's formula and give its geometrical significance for the numerical solution of the differential equation.

OB

- b) i) Explain Newton-Raphson method and give its geometrical meaning.
 - ii) Obtain the criterion for the convergence in Newton-Raphson method.

OR

- c) i) Explain Poisson's distribution. Which are the constants of Poisson's distribution?
 - Define binomial distribution. Under what conditions does it tend to Poisson distribution.
- a) i) Define Probability. Differentiate between dependent and independent events.
 - ii) Explain Bayes' theorem.

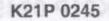
OR

- b) i) Explain the error propagation in a difference table.
- ii) The following table gives the values of y which is a polynomial of degree 5. It is known that y = f(3) is in error. Correct the error.

х	0	-1	2	3	4	5	6
У	1	2	33	254	1025	3126	7777

OR

P.T.O.





- c) i) Derive Lagrange's interpolation formula for unequal intervals.
 - ii) Use Lagrange's formula to fit a polynomial to the data and hence find y(x = 1).

-2-

X	-1	0	2	3
Y	-8	3	1	12

(2×12=24)

SECTION - B

Answer any four questions (One mark for Part a, 3 marks for Part b, 5 marks for Part c).

- a) A bag contains 6 white, 4 red and 10 green balls. Two balls are drawn at random. Find the probability that there will be both green.
 - b) State and prove multiplication theorem of probability.
 - c) Explain mutually exclusive events and equally likely events. Give an example to both.
- 4. a) When will we use Legrange's Interpolation formula?
 - b) By the method of least squares find the best fitting straight line to the data given below.

Х	5	10	15	20	25
у	15	19	23	26	30

- c) Obtain Newton's backward interpolation formula for equal intervals.
- 5. a) Give the important property of Gauss Quadrature formula.
 - b) Briefly explain Simpson's $\frac{3}{8}$ rule.
 - c) Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using Trapezoidal rule with h = 0.2. Hence obtain an approximate value of π . Can you use Simpson's formula in this case?
- 6. a) What is the order of convergence of Newton Raphson method?
 - b) How does the Runge-Kutta method works? Write Runge-Kutta second order formulae.
 - c) Using Milne's method find y (4.4). Given $5xy' + y^2 2 = 0$, y(4) = 1, y(4.1) = 1.0049, y(4.2) = 1.0097, y(4.3) = 1.0143.



K21P 0245

- 7. a) Give the order of convergence of an iterative process.
 - b) Explain the graph of Normal Distribution.
 - c) Solve for a positive root of $x^3 4x + 1 = 0$ by Regula Falsi method.

-3-

- 8. a) Give the constants of Binomial distribution.
 - b) Mention the applications of Chi-Square distribution.
 - c) What are the chief properties of binomial distribution?
- 9. a) How will you fit a Poisson distribution?
 - b) Solve $e^x 3x = 0$ by the method of iteration.
 - Derive the probability distribution function of Chi-square distribution with n degrees of freedom.
- 10. a) What is the area under the curve in each Chi-square distribution?
 - b) What do you understand by the test of goodness of fit?
 - c) Find the 1st and 2nd order differences for f(x) = ab^{cx}.

 $(4 \times 9 = 36)$