B.A/B.Sc(NM)/B.Sc(CSM)-II

BA324: Numerical Analysis -II (SEC) SEM -III

Course Outcomes:

CO1: To develop skills to solve mathematical problems using numerical methods.

CO2: Student will be able to use numerical techniques to solve ODEs.

CO3 : Student will be able to analyze and estimate the errors in numerical solutions.

CO4 : Will develop critical thinking skills to choose appropriate numerical method

CO5 : Will use different types of Numerical techniques to solve ODEs

Credits: 3hrs per week

Total marks: 100

SECTION:A

Definition and types of error. Operators and their properties. Forward Backward and central finite differences. Divided difference formula.

SECTION: B

Numerical differentiation and integration. Trapezoidal rule. Simpson's 1/3rd rule and Simpson's 3/8th rule. Newton Cotes integration and Gaussian integration.

References

1. **Arnold Neumaier: Introduction to Numerical Analysis, Cambridge University Press, 2001.**

2. **Carl Erik Froberg: Introduction to Numerical Analysis, 2nd Edition, Addison Wesley Publishing Company, 1969.**

3. **Elements of Numerical Analysis: R.S. Gupta, Macmillan India Limited, 2009.**

Ordinary and Partial Differential Equations

Session-2026-27

BA505 B.A-III/B. Sc-III (NM)(SEM-V) Maximum marks - 100

External exam :70

Internal Assessment :30

Credits: 3

Pass percentage: 35%

Course objective: The objective of the course is to help the students acquire skills to understand concepts of ordinary and partial differential equations and various methods to solve them along with their applications.

Course learning outcomes: On completion of course , the student will be able to

CO-I: Understand solving differential equations of first order and the equations reducible to these.

CO-II: Understand first order and higher degree differential equations and their respective solutions.

CO-III: Understand the methods of solving linear homogeneous and non-homogeneous differential equations of higher order with constant/variable coefficients.

CO-IV: Understand methods of solving linear partial differential equations of first order and partial differential equations of first order but of any degree.

CO-V: Understand solving homogeneous and non-homogeneous partial differential equations with constant coefficients.

INSTRUCTIONS FOR THE PAPER-SETTER /EXAMINER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 12 marks and Section C will be of 22 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

SECTION:A

First order Differential Equations : Differential equations of first order and first degree: Separable differential Equations, Homogeneous differential Equations, Exact differential Equations, Linear differential Equations and differential Equations reducible to above mentioned forms. First order and higher degree differential equations solvable for x,y and p, clairaut's form, singular solutions, Geometrical meaning of a differential equation.

Higher order differential Equations: Wronksian, Solution of linear homogeneous and non-homogeneous differential equations of higher order with constant coefficients and with variable cofficients, Cauchy's and Legendre's equations, Method of variation of parameters.

SECTION : B

First order Partial Differential Equations: Linear Partial differential equations of first order, Lagrange's solution. Integral surfaces passing through a given curve, Partial differential equations of first order but of any degree, Charpit's general method of solution.

Higher order Partial Differential Equations : Classification of Partial differential equations of second order into hyperbolic, elliptic and parabolic types, Solutions of homogeneous and non-homogeneous partial differential equations with constant coefficients, An introduction to heat, wave and Laplace's equations.

Books Recommended:

1. H.T.H. Piaggio: An Elementary Treatise on Differential Equations and their applications: Barman Press.
2. Rai Singhania: Ordinary and Partial differential Equations, S.Chand & Company, New Delhi.
3. I.N. Sneddon: Elements of Partial differential Equations, Mc Graw Hill Book Co.
4. D.A.Murray: Introductory Course in Differential Equations, Orient Blackswan Pvt.Ltd., New Delhi.2012.