

D. K. Govt. College for women Autonomous, Nellore
DEPARTMENT OF MATHEMATICS
SYLLABUS FOR THE YEAR 2022-23
 (B.Sc. MATHEMATICS & Data science)
REVISED SYLLABUS FOR CORE COURSES CBCS/ SEMESTER SYSTEM
(w.e.f. 2020-21) Admitted Batch
CORE COURSES STRUCTURE
I to V Semesters (As per the guidelines of APSHE)

Course	Subject	Hours	Credits	IA	EA	Total
I	Differential Equations	6	5	30	70	100
II	Three dimensional analytical Solid geometry	6	5	30	70	100
III	Abstract Algebra	6	5	30	70	100
IV-1	Real Analysis	6	5	30	70	100
IV-2	Linear Algebra	6	5	30	70	100
V-1	Multiple integrals and Applications of Vector calculus	6	5	30	70	100
V-2	Integral transforms with applications	6	5	30	70	100

LSC Sem-III	Analytical Skills	2	2	10	40	50
Maths for Data Science	Matrix Algebra	6	5	30	70	100

D.K. GOVT.COLLEGE FOR WOMEN, NELLORE
B.SC FIRST YEAR MATHEMATICS SYLLABUS - SEMESTER – 1
PAPER-1: DIFFERENTIAL EQUATIONS
(w.e.f. 2020-21 Admitted Batch)

Course Outcomes: (75 hours)

After successful completion of this course, the student will be able to:

1. Solve linear differential equations
2. Convert non exact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the first degree.
4. Solve higher-order linear differential equations, both homogeneous and Non- homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential equations.

UNIT- I : (12 hrs) Differential Equations of first order and first degree:

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

UNIT- II (12 hours): Differential equations of first order but not of the first degree.:

Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Equations homogeneous in x and y; Equations of the first degree in x and y – Clairaut's Equation.

UNIT- III (12 hours) : Higher order linear differential equations-1:

Solution of homogeneous linear differential equations of order n with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of Polynomial operators. General Solution of $f(D)y=0$.

General Solution of

1. $f(D)y=Q$ when Q is a function of x.

$1/f(D)$ is expressed as partial fractions.

2. P.I. of $f(D)y = Q$ when $Q = be^{ax}$.
3. P.I. of $f(D)y = Q$ when $Q = b\sin ax$ or $b\cos ax$.

UNIT – IV (12 Hours) :Higher order linear differential equations-II:

Solution of the non-homogeneous linear differential equations with constant coefficients.

1. P.I. of $f(D)y = Q$ when $Q = bx^k$.
2. P.I. of $f(D)y = Q$ when $Q = e^{ax}V$, where V is a function of x .
3. P.I. of $f(D)y = Q$ when $Q = xV$, where V is a function of x .
4. P.I. of $f(D)y = Q$ when $Q = x^{mV}$, where V is a function of x

UNIT- V (12 hours): Higher order linear differential equation – with constant coefficients and Variable Coefficients:

Solution of the non-homogeneous linear differential equations with constant coefficients.

Method of variations of parameters- The Cauchy Euler Equations.

Prescribed text book :

1. A textbook of mathematics for B.A/B.SC vol-1 by N.Krishna Murthy and others, published by **S.Chand and company**, New Delhi.

Reference books:

1. Differential Equations , S. Chand Publications by V. Venkateswara Rao, B.V.S.S Sarma and S. Anjaneya Sastry.

D.K.GOVT. COLLEGE FOR WOMEN (AUTONOMOUS), NELLORE
B.Sc (DATASCIENCE) I YEAR : SEMESTER-I
PAPER – I: MATHS FOR DATA SCIENCE

Course Outcomes:

(75 hours)

After successful completion of this course, the student will be able to:

1. Understand the basic mathematical techniques which are used computer science.
2. know the concept of matrices and its operations.
3. Find and evaluate the adjoint and determinant of a matrix.
4. Understand the concept of Rank of a matrix and its applications.
5. solve the simultaneous equations using matrix method.
6. Know the concepts of set and different operations in sets.

Unit-I : Matrix Algebra I:

Introduction – Definition of Matrix – Various types of Matrixes – Row Matrix – Column Matrix – Square Matrix – Rectangular Matrix – Scalar Matrix – Unit matrix – Null Matrix – Addition of Matrices – Subtraction of Matrices – Multiplication of Matrices and their applications.

Unit-II: Matrix Algebra II:

Transpose of a Matrix, Symmetric Matrix – Skew Symmetric Matrix – Orthogonal Matrix – Singular Matrix – Non Singular Matrix – Determinant of a Matrix – Adjoint of a Square Matrix – Inverse of a Matrix up to 3 order only.

Unit-III: System of Linear Equations-I :

Eigen values and Eigenvectors Characteristic Polynomial, Definition of Left/Right Eigen values and Eigenvectors, Caley – Hamilton theorem, singular value Decomposition, Interpretation of Eigen values/vectors.

Unit-IV : System of Linear Equations-II :

Rank of a Matrix – Definition – To find Rank of a Matrix for a given Matrix.

Solutions of Linear equations: Matrix inversion method, Cramer’s Rule up to 3 order only.

Unit-V : Set Theory:

Definition of Set – Types of Sets – Union of Sets – Intersection of Sets – Venn diagrams – Operations on Sets – Complement of Set – Distributive Laws – De-Morgan Laws.

References :

1. Mathematical Methods by Dr. T.K.V Ivengar, Dr. B. Krishna Gandhi,
2. Dr. S. Ranganatham and Dr. M.V.S.S.N. Prasad by S. Chand publications 6th revised edition 2011.

3. Quantitative Techniques by C.S atya devi by S. Chand Company.
4. Gilbert Strang, *Linear Algebra and its Applications*. Thomson /Brooks Cole (Available in a Greek Translation).
5. David C. Lay, *Linear Algebra and Its Applications*, 4th Editoin.

Suggested Activities:

Open book Assignments /seminars/SCLactivities(15hours).

D.K. GOVT.COLLEGE FOR WOMEN (Autonomous)NELLORE
B.ScMATHEMATICS SYLLABUS FIRST YEAR :SEMESTER – 2
Course-II :Three Dimensional Analytical Solid Geometry.
w.e.f. (2020-21 Admitted Batch)

Course Outcomes: (75 hours)

After successful completion of this course, the student will be able to:

1. Understand the concepts of Line, Plane distance and angles.
2. They can able find the angle between the Planes and distance of Lines.
3. Know the methods of finding the solutions of given lies.
4. Solve the shortest distance of lines and directional cosines etc.
5. Understand the concept and apply the appropriate method of problem solving.

UNIT – I (12 hours) : THE PLANE :

Introduction to Solid Geometry – Coordinates – Vector representations – Directional Cosines and Directional Ratios of a line – Angle between two lines- Equation of plane in terms of its intercepts on the axis- equation of the plane through the given points - length of the perpendicular from a given point to a given plane - bisectors of angles between two planes – Pair of Planes.

UNIT- II (12HOURS): THE LINE :

Equation of a line; angle between a line and a plane;thecondition for Parallelism of a Line and Plane – the condition that two given lines are co-planar – Image of a point in Line and Plane- shortest distance between two lines -the length and equations of a line - shortest distance between two straight lines (Method of Projection and Intersection).

UNIT-III (12 HOURS): SPHERE-1:

Definition and equation of the sphere- equation of the sphere through four given points- plane sections of a sphere-intersection of two spheres- equation of a circle- sphere through a given circle- intersection of a sphere and a line.

unit– IV (12 hours): SPHERE-2:

Angle of intersection of two spheres- condition for two spheres to be orthogonal- radical line - radical plane- co-axial system of spheres- simplified form of the equations of two sphere – limiting points of coaxial system of spheres.

UNIT- V (12 HOURS): CONE:

Definitions of a cone- vertex- guiding curve- generators- equation of the cone with a given vertex and guiding curve- enveloping cone of a sphere- condition that a cone may have three mutually perpendicular generators. right circular cone- equation of the right circular cone with a given vertex- axis and semi-vertical angle-Enveloping cone.

Prescribed text books :

1. Analytical solid geometry by Shanthi Narayan and P. k Mittal, published by S.Chand and company ltd. Seventh edition.

Reference books :

1. A text book of Mathematics, Deepti publications by Dr. Anjaneyulu, Tenali (A.P).

2. A text book of Mathematics for B.A / B.SC vol-1, by V.KrishnaMurthy and others, published by S.Chand and company, New Delhi.

3. Co-ordinate geometry of two and Three Dimensions by P.Balasubrahmanyam, K.Y. Subrahmanyam, G.R.venkataraman published by Tata-MC Gran-Hill publishers company ltd. New Delhi.

Suggested activities:

Student Seminars/ Assignments/SCL activities. (15 hours)

D.K. Govt. College for Women (A) ::Nellore.
B.A/B.Com/B.Sc SECOND YEAR THIRD SEMESTER
LIFE SKILL COURSE : ANALYTICAL SKILLS (w.e.f 2022-23)
(30 hours)

Unit-1:DATA ANALYSIS ,SEQUENCE AND SERIES:

Tables, Graphs- Line graphs, Bar graphs, Analogies of numbers and alphabets, completion of blank spaces A: B:: C: d relationship - odd thing out; missing number in a sequence or a series.

Unit-2: QUANTATIVE APTITUDE AND ARITHMETIC ABILITY :

Averages, Ratios and proportion, problems on ages, Algebraic operations BODMAS, fractions, Divisibility rules, L.C.M and G.C.D , Calender problems.

Unit-3:-BUSSINESS COMPUTATIONS

Percentages, Profit and loss, Simple interest.

Recommended Co-Curricular Activities (3hrs)

Surprise tests /Viva-Voice/ Problem solving/Group discussion.

Reference Books:

- 1.Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
- 2.Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
- 3.Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, KiranPrakasan publishers
- 4.Quantitative Aptitude for Competitive Examination by AbhijitGuha, Tata McGraw hill publications.

D.K GOVT. COLLEGE FOR WOMEN, NELLORE
B.Sc. SECOND YEAR :FOURTH SEMESTER
MATHEMATICS :PAPER – IV-1: REAL ANALYSIS

(W.e.f 2020-21, admitted batch)

(75 hours)

UNIT – 1: (12 hours) : SEQUENCES :

Introduction to Real numbers–Intervals – Limit point of a set – open and closed intervals – Bolzano Weierstrass theorem- **(No question is to be given from this portion)**

Sequence definition – Subsequence – Range of Sequence – Boundedness of a sequence – Limit and Convergence of a sequence – Sandwich theorem – Limit point of a sequence - Cauchy sequences: Cauchy general principle of convergence.

UNIT – 2: (12 hours) : INFINITE SERIES :

Introduction to series – convergence of series – Cauchy general principle of convergence – P- series test –Geometric series –_comparison tests : Limit comparison test –De Alembert’s Ratio test - Cauchy’s n^{th} root test.

UNIT – 3: (12 hours) CONTINUITY :

Real valued functions – Algebra of limits - Limit of a function – Sandwich theorem – Limits of standard functions – Limits at infinity.**(No question is to be given from this portion)**

Introduction to continuity – Continuity in an interval – Cases of discontinuity – Continuity of standard functions – Continuity on a closed interval – Borel’s theorem – Absolute maximum-minimum theorem.

UNIT – 4: (12 hours) DIFFERENTIATION AND MEAN VALUE

THEOREMS : The derivability of a function at a point, on an interval – continuity of a function – Mean value theorems : Role’s theorem – Lagrange’s theorem – Cauchy mean value theorem and applications

UNIT – 5: (12 hours)RIEMANN INTEGRATION :

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

Prescribed Text Books :

1. A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published by S. Chand & Company, New Delhi.
2. Real Analysis , by Vasista and Khanna.
3. Real Analysis by S.C. Malik and Arora.

***Suggested Activities:* Student seminars/open book Assignment**

/Problem solving (15 marks)

D.K Govt. COLLEGE FOR WOMEN (A), NELLORE
B.Sc. SECOND YEAR : FOURTH SEMESTER
MATHEMATICS COURSE-IV-2 : LINEAR ALGEBRA
(w.e.f. 2020-21 admitted batch)

UNIT – I (12 hrs) : Vector Spaces-I : (75 hours)

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

UNIT –II (12 hrs) : Vector Spaces-II :

Basis of a Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace.

UNIT –III (12 hrs) : Linear Transformations :

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

UNIT –IV (12 hrs) : Matrices:

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of a Matrix, Linear Equations, Characteristic equations, Characteristic Values & Vectors of square matrix, Cayley – Hamilton Theorem.

UNIT –V (12 hrs) : Inner product spaces :

Inner product spaces , Euclidian and unitary spaces, Norm or length of a vector Schwarz inequality, Triangle inequality, Parallelogram law, Orthogonality, ortho normal set, complete ortho normal set , gram schmidth orthogonalisation process, Bessel's inequality, Parsavel's identity.

Prescribed book :

1. B.Sc Mathematics Vol-III, S.CHAND by V.V.Rao, B.V.S.S. Sharma, N. Krishna Murthy and S. Anjaneya Sastry.

Reference Books :

1 .Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut-250002.

2 .Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.

1. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities :

Student ppt's/Seminar/ open book Assignments/ SCL activities(15 marks)

D.K Govt. COLLEGE FOR WOMEN (A), NELLORE

B.Sc. THIRD Year : SEMESTER – V (W.e.f. 2020-21 batch)

Course – V-1 : Multiple integrals and applications of Vector calculus

Course Out comes:

75 hours

After successful completion of the course student can be able to:

1. Understand multiple integrals as a natural extension of definite integral to a function of two variables in the case of double integral / three variables in the case of triple integral.
2. Learn applications in terms of finding surface area by double integral and volume by triple integral.
3. Determine the gradient, divergence and curl of a vector and vector identities.
4. Evaluate line, surface and volume integrals.
5. understand relation between surface and volume integrals (Gauss divergence theorem), relation between line integral and volume integral (Green's theorem), relation between line and surface integral (Stokes theorem).

Unit–1: Multiple integrals-I:

1. Introduction, Double integrals, Evaluation of double integrals, Properties of double integrals.
2. Region of integration, double integration in Polar Co-ordinates,
3. Change of variables in double integrals, change of order of integration.

Unit–2: Multiple integrals-II :

1. Triple integral, region of integration, change of variables.
2. Plane areas by double integrals, surface areas by double integral.
3. Volume as a double integral, volume as a triple integral.

Unit–3: Vector differentiation:

1. Vector differentiation, ordinary derivatives of vectors.
2. Differentiability, Gradient, Divergence, Curl operators,
3. Formulae involving the separators.

Unit-4: Vector integration :

- 1.Line Integrals with examples.
- 2.Surface Integrals with examples.
- 3.Volume integrals with examples.

Unit -5: Vector integration applications :

- 1.Gauss theorem and applications of Gauss theorem.
- 2.Green's theorem in plane and applications of Green's theorem.
- 3.Stokes's theorem and applications of Stokes theorem.

I. Reference Books:

- 1.Dr. M. Anitha, Linear Algebra and Vector Calculus for Engineer, Spectrum University Press, SR Nagar, Hyderabad-500038, INDIA.
- 2.Dr. M. Babu Prasad, Dr. K. Krishna Rao, D. Srinivasulu, Y. Adi Narayana, Engineering Mathematics-II, Spectrum University Press, SR Nagar, Hyderabad-500038,INDIA.
3. V.Venkateswararao, N. Krishnamurthy, B.V.S.S.Sarma and S. Anjaneya Sastry, A text Book of B.Sc., Mathematics Volume-III, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. R. Gupta, Vector Calculus, Laxmi Publications.
5. P.C. Matthews, Vector Calculus, Springer Verlag publications.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project (15 hours)

D.K Govt. COLLEGE FOR WOMEN (A), NELLORE
B.Sc. Third Year SEMESTER – V (W.e.f. 2020-21 batch)
Course – V-2 :Integral transforms with applications

Learning Outcomes:

75 hours

Students after successful completion of the course will be able to:

1. Evaluate Laplace transforms of certain functions, find Laplace transforms of derivatives and of integrals.
2. Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function and periodic function.
3. Understand properties of inverse Laplace transforms, find inverse Laplace transforms of derivatives and of integrals.
4. Solve ordinary differential equations with constant/variable coefficients by using Laplace transform method.
5. Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

Unit–1: Laplace transforms-I

1. Definition of Laplace transform, linearity property-piecewise continuous function.
2. Existence of Laplace transform, functions of exponential order and of class A.
3. First shifting theorem, second shifting theorem and change of scale property.

Unit–2: Laplace transforms- II

1. Laplace Transform of the derivatives, initial value theorem and final value theorem. Laplace transforms of integrals.
2. Laplace transform of $t^n \cdot f(t)$, division by t , evolution of integrals by Laplace transforms.
3. Laplace transform of some special functions-namely Dirac delta function, error function, Bessel function and Laplace transform of periodic function.

Unit–3: Inverse Laplace transforms

1. Definition of Inverse Laplace transform, linear property, first shifting theorem, second shifting theorem, change of scale property, use of partial fractions.
2. Inverse Laplace transforms of derivatives, inverse, Laplace transforms of integrals, multiplication by powers of 'p', division by

‘p’.

3. Convolution, convolution theorem proof and applications.

Unit – 4: Applications of Laplace transforms

1. Solutions of differential equations with constant coefficients, solutions of differential equations with variable coefficients.

2. Applications of Laplace transforms to integral equations - Abel's integral equation.

3. Converting the differential equations into integral equations, converting the integral equations into differential equations.

Unit-5: Fourier transforms:

1. Integral transforms, Fourier integral theorem (without proof), Fourier sine and cosine integrals.

2. Properties of Fourier transforms, change of scale property, shifting property, modulation theorem.

3. Convolution theorem for Fourier transform, Parseval's Identify, finite Fourier transforms.

Reference Books:

1. Dr. S. Sreenadh, S. Ranganatham, Dr. M. V. S. S. N. Prasad, Dr. V. Ramesh Babu, Fourier series and Integral Transforms, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.

2. A. R. Vasistha, Dr. R. K. Gupta, Laplace Transforms, Krishna Prakashan Media Pvt. Ltd. Meerut.

3. M. D.

Raisinghania, H. C. Saxena, H. K. Dass, Integral Transforms, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.

4. Dr. J. K.

Goyal, K. P. Gupta, Laplace and Fourier Transforms, Pragathi Prakashan, Meerut.

5. Shanthi

D.K. Govt. College for Women, (A), Nellore.
Department of Mathematics and Statistics
A Multi disciplinary Certificate Course in
“Logical Reasoning, Data Interpretation and Personality development”

Learning objectives : To extract the numerical data in tables, diagrams and graphs. To interpret the numerical data in tables and graphs. To explore and apply key concepts in logical thinking to solve the business problems. Enable students to critical analyze information to evaluate evidence, construct reasoned arguments and communicate inferences and conclusions. It helps the students to make important decisions, to solve problems and set achievable goals. Logical reasoning in combination with other cognitive skills is an important skill where we use during all kinds of daily situations.

Outcomes

After completion of the course Students will be able to

- Identify logical relations among given numbers and alphabets.
- Symbolise natural language statements in the language of propositional and predicate logic.
- Understand coding problems on alphabets and numerals.
- Identify logical relations among statements.
- Evaluate the solution of the problem using reasoning types.
- Know their strength and weakness.
- Know innovative study skills and study habits.
- Understand the time management skills.

UNIT-I : Logical Reasoning : **20 hours**

Reasoning Analogies – Calendar problems – Blood Relations – Decision Making – Problems on ages- Coding-Decoding – Odd one out – Puzzles – Statements and Assumptions – Statements and conclusions.

UNIT-II : Data Interpretation : **10 hours**

Data tables – Line Graph – Bar Graph – Mixed Graph – Pie Chart.

UNIT-III: Personality Development : **10 hours**

Personal Inventory – Cognitive corrections – How do you carry yourself in the world? – Your signature style: How to dress to impress – Instant Confidence – The secret of success – How to make an amazing first impression – How to deal with anxiety – Instant relief: Holding the Neuro technique – Meta cognitive strategies for learning.
