GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM
(*Accredited by NAAC "A" Grade*)
B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS

PAPER – I   SEMESTER –I

Paper Code -- MAT109**:: DIFFERENTIAL EQUATIONS**

(For the batch admitted in 2019-20)

Total marks: 100	SEE: 50	CIA: 50
Lecture-5, Tutorial-1		Credits: 5

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

Exact differential equations; Integrating factors; Linear differential equations; Differential Equations reducible to linear form(Bernouli's Equations); Change of variables; Orthogonal Trajectories – Cartesian form &Polar form.

[1]: Chapter 2 (Sections 2.1 to 2.15 & 2.20 to 2.25)

 Problem Solving Sessions: Including all Exercise Problems

UNIT- II: Differential Equations of first order but not of the first degree (12HRS)

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

[1]Chapter 3 (Sections 3.1 to 3.8)

Problem Solving Sessions: Including all Exercise Problems

UNIT –III: Higher Order linear Differential Equations –I(14HRS)

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.

[1] Chapter 4 (Sections 4.1 to 4.33)

Problem Solving Sessions: Including all Exercise Problems

UNIT –IV: Higher Order linear Differential Equations-II (12HRS)

Method of Variation of parameters; Linear differential equations with non- constant coefficients; The Cauchy- Euler equation.

[1] Chapter 5 (Sections 5.4 to 5.6)

Problem Solving Sessions Including all Exercise Problems

UNIT –V: System of linear Differential Equations.(10HRS)

Solution of a system of linear equations with constant coefficients, An equivalent triangular system .Degenerate case: p_1 (D) P_4 (D) - P_2(D) $P_3(D)$ =0.

Chapter 6(Sections 6.2 to 6.11)

[1] Problem Solving Sessions: Including all Exercise Problems

Additional Module: (4HRS)

  Plotting of second order solution family of differential equation- Plotting of third order solution family of differential equation- Growth model (exponential case only)- Decay model (exponential case only).

Reference Books:

[1] A Text book of B.Sc Mathematics-Volume I by V.Venkateswara rao , N.Krishna Murthy,

   B.V.S.S.Sharma and S.Anjaneya Sastry, published by S.Chand & company , New Delhi.

 [2] Ordinary and partial Differential equations Raisinghania , Published by S.chand & company ,

   New Delhi.

[3] A Text Book of Mathematics by Dr.A. Anjaneyulu, Deepti Publications.

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II B.Sc. MATHEMATICS   SYLLABUS

PAPER – III   SEMESTER-III

Paper Code—MAT 113**:: GROUP THEORY**

(For the batch admitted in 2018-19)

Total marks: 100   **SEE: 60**   **CIA: 40**

Lecture-5,   Tutorial-1   **Credits: 5**

UNIT - I (10 Hrs) Binary Operation & Groups:-

Binary operation- Algebraic structure –semi group – monoid –Group definition and elementary properties – Finite and Infinite groups- examples –order of a Group. Composition tables with examples. Order of an element of a group .

[1] Chapter 1 (Section 1.10), Chapter 2 (Sections 2.1 to 2.17)

Problem Solving Sessions: Including all Exercise Problems

UNIT- II (14 Hrs) SUBGROUPS, COSETS :-

Complex definition – Multiplication of two complexes - Inverse of a complex-Subgroup definition-examples- criterion for a complex to be a Subgroup-Criterion for the product of two subgroups to be a subgroup – union and intersection of subgroups-Cosets definition –properties of coset –index of a subgroup of a finite group- Lagrange's Theorem- Appilications.

[1] Chapter 3 (Sections 3.1 to 3.6) , Chapter 4 (Sections 4.1 to 4.6)

Problem Solving Sessions: Including all Exercise Problems

UNIT –III: (12 Hrs) NORMAL SUBGROUPS:-

 Definition of normal subgroup - proper and improper normal subgroup - Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group – simple group – quotient group – criteria for the existence of a quotient group.

[1] Chapter 5 (Sections 5.2 to 5.4)

Problem Solving Sessions: Including all Exercise Problems

UNIT-IV (10 Hrs) HOMOMORPHISM:-

Definition of homomorphism- Image of homomorphism- Elementary Properties of homomorphism-

Isomorphism- Automorphism definitions and elementary properties- Kernel of a homomorphism-

Fundamental theorem on homomorphism of groups and applications

[1] Chapter 6 (Sections 6.1 to 6.5)

Problem Solving Sessions: Including all Exercise Problems

UNIT-V (14 Hrs) PERMUTATIONS AND CYCLIC GROUPS:-

Definition of Permutation - Permutation multiplication- inverse of a permutation- Cyclic permutations- transpositions - Even and Odd Permutations - Alternating Groups - Cayley's Theorem-Applications-Definition of Cyclic Group - Elementary Properties. The classification of Cyclic group- Sub groups of finite cyclic group and applications.

[1] Chapter 7 (Sections 7.1 to 7.6) **.**Chapter 8 (Sections 8.1 to 8.5)

Problem Solving Sessions: Including all Exercise Problems

Additional Module: (5HRS)

Symmetry of Atomic Orbitals in Chemistry- Group Theory and its Applications in Robotics-Computer Vision & Computer Graphics - Medical Image Analysis-Rubik's Cube

Reference Books :

[1] A Text book of B.Sc Mathematics-Volume II by V.Venkateswara rao , N.Krishna Murthy,

B.V.S.S.Sharma and S.Anjaneya Sastry, published by S.Chand & company , New Delhi.

[2] A Text Book of Mathematics by Dr.A. Anjaneyulu, Deepti Publications

[3] "Topics in Algebra " by I N Herstein.

[4] "Modern Algebra" by M.L Khanna .

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III B.SC MATHEMATICS , SYLLABUS

SEMESTER-V   PAPER – V
Paper Code—MAT 118 **:: LINEAR ALGEBRA**

(For the batch admitted in 2017-18)

Total marks: 100   SEE: 60   CIA: 40

Lecture-4 , Tutorial -1   Credits:5

Unit – I (12 hrs)

Vector spaces, General properties of vector spaces, Vector subspaces, Algebra of subspaces, linear combination of vectors, Linear span, linear sum of two subspaces, Linear independence and dependence of vectors

[1] Chapter 1 (Sections 1.9 to 1.35)

Problem Solving Sessions Including all Exercise Problems

Unit – II (12 hrs)

Basis of vector space, Finite dimensional vector spaces, Dimension of a vector space, Dimension of a subspace

[1] Chapter 2 (Sections 2.1 to 2.18)

Problem Solving Sessions: Including all Exercise Problems

Unit – III (12 hrs)

Linear Transformations, Linear operators, Range and null space of linear transformation, Rank and nullity of linear transformations, Linear transformations as vectors, Product of linear transformations, Invertible linear transformation.

[1] Chapter 3 (Sections 3.1 to 3.23) & Chapter 4 (Sections 4.7 to 4.14)

Problem Solving Sessions: Including all Exercise Problems

Unit-IV (12 hrs)

Characteristic vectors and Characteristic values, Cayley – Hamilton theorem and its applications.

[1] Chapter 7 (Sections 7.2 to 7.9)

Problem Solving Sessions: Including all Exercise Problems

Unit-V (12 hrs)

Inner product spaces, Euclidean and Unitary spaces, Norm or length of a vector, Schwartz inequality, Orthogonality, Orthonormal set, complete orthonormal set, Gram-Schmidt Orthogonalisaton process.

[1] Chapter 8 (Sections 8.3 to 8.5) & Chapter 9(Sections 9.2 to 9.5)

Problem Solving Sessions: Including all Exercise Problems

Additional Module: (5HRS)

Use the Wronskian to test a set of solutions of a linear homogeneous Differential equation for linear Independence.- Identify and sketch the Graph of a conic section and Perform a rotation of axis.- Electrical Circuit Problems.

Reference Books :

[1] A Text book of B.Sc Mathematics-Volume III by V.Venkateswara rao , N.Krishna Murthy, B.V.S.S.Sharma and S.Anjaneya Sastry, published by S.Chand & company , New Delhi.

[2] A Text Book of Mathematics by Dr.A. Anjaneyulu, Deepti Publications

[3] Linear algebra by J.N.Sharma and A.R.Vasista, Krishna Prakasham Mandir,Meerut.

[4] Linear Algebra by Kenneth Hoffman and Ray Kunze, Pearson Education,New Delhi.

[5] Linear Algebra by Stephen H. Friedberg et al Prentice Hall of India Pvt.Ltd. 4th edt. 2007.

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III B.SC, MATHEMATICS   SYLLABUS

SEMESTER-V   PAPER – VI
Paper Code—MAT 106 **:: NUMERICAL ANALYSIS**

(For the batch admitted in 2017-18)

Total marks: 100   SEE: 60   CIA: 40

Lecture-4 ,Tutorial -1   Credits:5

Unit-I-(10 hrs) Errors in Numerical Computations :

Numbers and their Accuracy, Errors and their Computation, Absolute, Relative and percentage errors, a general error formula, Error in a series approximation.

[1] Chapter 1 (Sections 1.1 to 1.4)

Problem Solving Sessions: Including all Exercise Problems

Unit-II-(12 hrs) Solution of Algebraic and Transcendental Equations:

The bisection method, The iteration method, The method of false position, Newton-Raphson method, Generalized Newton-Raphson method, Ramanujan's method, Muller's method.

[1] Chapter 2 (Sections 2.2 to 2.10 , 2.14 to 2.16 & 2.19)

Problem Solving Sessions: Including all Exercise Problems

Unit-III -(12 hrs) Interpolation – I

Errors in polynomial interpolation, Finite Differences, Forward differences, Backward differences, Central Differences, Symbolic relations, Differences of a polynomial.

[1] Chapter 3 (Sections 3.2 to 3.5)

Problem Solving Sessions: Including all Exercise Problems

Unit-IV-(12 hrs) Interpolation – II

Newton's formulae for interpolation. Central Difference Interpolation Formulae, Gauss's central difference formulae, Stirling's central difference formula.

[1] Chapter 3 (Sections 3.8 to 3.9)

Problem Solving Sessions: Including all Exercise Problems

UNIT – V : (14 hours) Interpolation – III

Interpolation with unevenly spaced points, Lagrange's formula, Error in Lagrange's formula, Divided differences and their properties, Relation between divided differences and forward differences, Relation between divided differences and backward differences Relation between divided differences and central differences, Newton's general interpolation Formula, Inverse interpolation.

[1] Chapter 3 (Section 3.10)

Problem Solving Sessions: Including all Exercise Problems

Additional Module :

Network Simulation- Train and Traffic Signals-Weather Prediction-Build up a algorithm-Solving Practical technical problems using scientific and mathematical tools.

Reference Books:

 [1] Numerical Analysis by S.Ranganatham, Dr,M.V.S.S.N Prasad, Dr.V.Ramesh Babu
     published by S.Chand & company , New Delhi.

 [2] A Text Book of Mathematics by Dr.A. Anjaneyulu, Deepti Publications

 [3] Introductory methods of Numerical Analysis by S.S Sastry, Prentice Hall India, New Delhi.

 [4] Numerical Analysis by G. Sankar Rao, New Age Intn. Publishers, New – Hyderabad.