DIFFERENTIAL EQUATIONS, ABSTRACT ALGEBRA & REAL ANALYSIS

DIFFERENTIAL EQUATIONS

UNIT - I: (40 hours)

1. **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;

2. **Total Differential equations**- Methods of solving integrable Total Differential Equations, Simultaneous Total Differential Equations (Chapter 1 & 2: Section 1.1 to 2.3 from the prescribed book)

3. **Differential equations of the first order and Higher degree** - Methods of finding general solution of \(F(x,y,p)=0\), Orthogonal Trajectories,(Chapter 3: Section 3.1 and 3.2 from the prescribed book).

   (One 15 marks question and two 5 marks questions are to be set from this portion).

UNIT - II: (40 hours)

4. **Linear differential equations with constant coefficients**- Homogeneous Linear Differential Equations with Constant Coefficients Solution of Homogeneous Linear Differential Equations of Order \(n\) with Constants Coefficients. Solution Non-Homogeneous Linear Differential Equations with Constant Coefficients and their solutions.

5. **Linear Differential equations with variable coefficients**- Method of Variation of Parameters; Linear Differential Equations with Non-Constant Coefficients; The Cauchy-Euler equation (Chapter 4 & 5: Section 4.1 to 4.3 and 5.1 to 5.3 from the prescribed book).


   (One 15 marks question and two 5 marks questions are to be set from this portion).

**Prescribed Text book**: Scope and treatment as in Differential Equations First year Mathematics by Telugu Academy, Himayatnagar, Hyderabad.


ABSTRACT ALGEBRA

UNIT - III:  (50 hours)

GROUPS:

3. Permutation groups – Cayley’s theorem, Groups of Permutations, Cycles, the Alternating Group A_n
4. Cyclic Groups– Definition and Examples, Classification of Cyclic Groups, Generators and Subgroups of Cyclic Groups.
   (Chapters 1 –4: Section 1.1 to 4.3 from the prescribed book).
   (One 15 marks question and two 5 marks questions are to be set from this portion).


                    II: Topics in Algebra by I.N. Herstein, Willy-Eastern Ltd.

UNIT - IV:  (50 hours)

REAL ANALYSIS:

1. The Real Numbers– The set of Natural Numbers, Integers, Rational Numbers and Real Numbers. The set of Real Numbers R as a complete ordered field Intervals, Bounds and Order- Completeness of the set of Real Numbers. Some important properties of the system of Real Numbers. The Dense property of the set of Real Numbers. The modulus of a Real Number. Limit Point of a Set. Existence of Limit Points. (Chapter 2 Section 2.1 to 2.8 and 2.11,2.12,2.13 and Chapter-3, 3.4 & 3.5 from Prescribed Book)
   (No question to be set from this portion)
2. Sequences – Sequence, Bounded and Unbounded sequences, Limit point of a sequence, Convergent Sequences, the limit of a Sequence, Algebra of Convergent Sequences, Bounded Non-Convergent Sequences, Some important theorems on Limits, Cauchy Sequences, Convergency of a Sequence, Monotonic Sequence and their Convergency, Sub Sequences.(Chapter-5 section 5.1 to 5.6 and 5.8 to 5.12 from Prescribed book)
3. **Infinite Series with Positive Terms** – Infinite Series its Convergency and Sum. An necessary condition for the Convergency of an Infinite Series. Cauchy’s general principle of Convergency for Series. General test for Convergency of Positive Term Series. Two important Standard Series. $\sum r^n$ and $\sum \left(\frac{1}{n^p}\right)$. Comparison test for the Convergency of Positive Term Series. Comparison test of the first type. Practical comparison test of the First type. Comparison test of the second type. Practical comparison test of the second type, D’Alembert’s ratio test. Cauchy’s nth root test. Absolute Convergency and conditional Convergency, Alternating Series(Chapter 6, section 6.1 to 6.11 and Chapter 7: Section 7.2,7.3 from the Prescribed book)

(One 15 mark question and two 5 marks questions are to be set from this portion)

**Prescribed Text book**: Elements of Real Analysis by SanthiNarayana&M.D.RaiSinghanai, S.Chand&Co.Ltd.

**Reference Book-II**:  
1. Mathematics Second Year Telugu Academy Book Real Analysis Part.  