Program: **Diploma** Class: **UG**	Year: **Second**	Semester: **IV**
Subject: **Mathematics**		
Course Code: **MJ-6**	Course Title: **Real Analysis & Set theory**	

Course Learning Outcomes: This course will enable the students to:

a) Understand the concept of limit & continuity of a function.

b) Understand the concept of differentiation and expansion of function with remainder.

c) Understand the definition and condition for Riemann Integrability.

d) Understand the generalized set operations and relation on sets.

Credit: **4 (Theory)**	**Compulsory**
Full Marks: **75**	Time: **3 Hours**

Unit	Content	Hours
I	Limit and Continuity: Limit, Continuity, Discontinuities, uniform continuity, properties of functions continuous in closed intervals, Functions of bounded variation.	**15 h**
II	Derivability, Relationship with continuity, Taylor's theorem, Maclaurin's theorem, remainder after n terms, Power series expansion of $(1+x)^n$, sinx, cosx and log (1+x) using suitable remainder after n terms.	**15 h**
III	Riemann Integration Definition, Darboux's theorem I & II. Integrability condition, particular classes of bounded integerable function primitive, fundamental theorem, first and second Mean value theorem.	**15 h**
IV	Index family of sets, Generalised set operations & De-Morgan Laws, set Bijection mapping: Countable and Uncountable sets, Equivalence relation and related fundamental theorem on partition. Partial order & Total order relation	**15 h**

Sessional Internal Assessment (SIA) Full Marks . 25 Marks

A Internal written Examination . 20 Marks (1 Hr)

B . Over All Performance including Regularity . 05 Marks

Books Recommended:

1. Real Analysis by Lalji Prasad
2. Real Analysis by K. K. Jha
3. Principle of Real Analysis: S. C. Malik

Program: **Diploma** Class: **UG**	Year: **Second**	Semester: **IV**
Subject: **Mathematics**		
Course Code: **MJ-7**	Course Title: **Ordinary Differential Equation**	

Course Learning Outcomes: This course will enable the students to:

a) solve ordinary differential equation of first order and understand its physical significance.
b) solve higher order differential equation using concept of complimentary function & particular integral.
c) solve ordinary differential equation with variable coefficients.
d) solve simultaneous & total differential equation and understand its geometrical significance.

Credit: **4 (Theory)**	**Compulsory**
Full Marks: **75**	Time: **3 Hours**

Unit	Content	Hours
I	First order higher degree ordinary differential equations, Equation solvable for y, solvable for x, Clairaut's form, singular solution orthogonal trajectories.	**15 h**
II	Linear Differential Equation of higher order with constant coefficients. Homogeneous linear differential equation (Cauchy- Euler's Form)	**15 h**
III	Second order linear differential equations: Normal forms (removal of first derivative) solution by changing independent variable and by variation of parameters.	**15 h**
IV	Simultaneous equation $dx/P = dy/Q = dz/R$ and Total differential equation $Pdx+Qdy+Rdz=0$ together with their geometrical significance.	**15 h**

Sessional Internal Assessment (SIA) Full Marks . 25 Marks
A Internal written Examination . 20 Marks (1 Hr)
B Over All Performance including Regularity . 05 Marks

Books Recommended:

1. Differential Equation by Lalji Prasad
2. Advanced differential equation by M. D. Raisinghania
3. Differential equation by J. N. Sharma

Program: **Diploma** Class: **UG**	Year: **Second**	Semester: **IV**
Subject: **Mathematics**		
Course Code: **MJ-8**	Course Title: **Group Theory**	

Course Learning Outcomes: This course will enable the students to:

a) Understand concept of groups & their properties.
b) Understand the concept of subgroups and cyclic groups.
c) Understand the concept of Factor group, centralizer and normalizer of group.
d) Understand the concept of Homomorphism in Group & Isomorphism and related properties.

Credit: **4 (Theory)**	**Compulsory**
Full Marks: **75**	Time: **3 Hours**

Unit	Content	Hours
I	Definition and examples of groups including dihedral, permutation and quaternion groups, Elementary properties of groups.	**15 h**
II	Subgroups and examples of subgroups, Cyclic groups, Properties of cyclic groups, Classification of subgroups of cyclic groups, Order of group, Lagrange's theorem,	**15 h**
III	Properties of cosets, Normal subgroups, Simple groups, Factor groups, Cauchy's theorem for finite abelian groups; Centralizer, Normalizer, Center of a group, Cycle notation for permutations, Properties of permutations, Even and odd permutations, alternating groups,	**15 h**
IV	Group homomorphisms, Properties of homomorphisms, Group isomorphisms, Properties of isomorphisms; Fundamental theorem of homomorphism. Cayley's theorem and its applications.	**15 h**

Sessional Internal Assessment (SIA) Full Marks 25 Marks
A Internal written Examination 20 Marks (1 Hr)
B Over All Performance including Regularity 05 Marks

Books Recommended:

1. Modern Algebra: Surjeet Singh Quazi Zameeruddin
2. Modern Algebra: A R Vasistha
3. Topics in Algebra: I. N. Herstein
4. A First Course in Abstract Algebra: J. B. Fraleigh