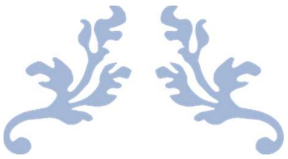

MODIFIED CBCS CURRICULUM OF

MATHEMATICS HONOURS PROGRAMME

SUBJECT CODE FOR ARTS = 24

SUBJECT CODE FOR SCIENCE = 54

FOR UNDER GRADUATE COURSES UNDER RANCHI UNIVERSITY

Implemented from
Academic Session 2017-2020 & 2018-2021

COURSES OF STUDY FOR **GENERIC ELECTIVE 'B. A. Hons'** PROGRAMME IN **"MATHEMATICS"**

SEMESTER I **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

I. GENERIC ELECTIVE (GE 1)

(Credits: Theory-05, Tutorial-01)

- All Four Generic Papers (One paper to be studied in each semester) of History to be studied by the Students of **Other than Mathematics Honours.**
- Students of **Mathematics Honours** must Refer Content from the **Syllabus of Opted Generic Elective Subject**.

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for
End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain three questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2& 3 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of 20 marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

DIFFERENTIAL CALCULUS AND COORDINATE GEOMETRY 2D

Theory: 75 Lectures; Tutorial:15 Lectures

UNIT-1 Differential Calculus

Successive Differentiation, nth order Derivative of Standard Function. Leibnitz's Theorem. Taylor's and Macularuins's series expansions of functions. Applications of Taylors's and Maclaurins' Series. Tangent and Normal, (Cartesian, Parametric form), Angle between two Curves. Length of tangent, Normal, Sub Tangent, Subnormal in Cartesian Forms. Partial Differention, Eulers' Theorem, Curvature. Asymptotes. Maxima and Minima of functions of two variables.

UNIT-II – COORDINATE GEOMETRY 2D

Change of Rectangular Axes, Rotation and Shifting of Origin, Transformation of General Equation of the Second Degree. Conditions for General Equation of Second Degree to Represent a Parabola, Ellipse and Hyperbola. Equations of the Tangent and Normal to a Curve via calculus. Polar Equation.

Suggested Readings:

- Differential Calculus: A Das Gupta & S B Prasad.
- Differential Calculus: Lalji Prasad
- Coordinate Geometry: A Das Gupta
- Coordinate Geometry: Lalji Prasad

SEMESTER II **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

II. GENERIC ELECTIVE (GE 2)

(Credits: Theory-05, Tutorial-01)

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain three questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2& 3 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of 20 marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

INTEGRAL CALCULUS, VECTOR CALCULUS AND TRIGONOMETRY

Theory: 75 Lectures; Tutorial:15 Lectures

UNIT I- INTEGRAL CALCULUS.

Integration of Rational and Irrational Functions, Partial Fractions, Integration by Transformation, Integration by Substitution, Integration by Parts.
Evaluation of Definite Integrals, Reduction Formulae, Curve Tracing, Length and Area, Surface Area and Volume of Solids of Revolution.

UNIT II- VECTOR CALCULUS & TRIGONOMETRY

Scalar Vector Calculus and Vector Point Functions, Vector Function of Scalar Variables, Continuity of a vector function. Differentiation of a vector with respect to the scalar variable. Differentiation of a vector function. Derivatives of a sum of vectors, Derivatives of a product of vectors (both Scalar and Vector Products). Gradient, Divergence and Curl and Second Order Vector Differential Operators in Cartesian coordinates systems.
Demoivre's Theorem and Applications.

Books Recommended:

- Integral Calculus: Dasgupta & Prasad.
- Integral Calculus: Lalji Prasad
- Vector Calculus: Dasgupta & Prasad
- Vector Calculus: Lalji Prajasad
- Trigonometry: DAsgupta & Prasad
- Trigonometry: Lalji prasad.

SEMESTER III **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

III. GENERIC ELECTIVE (GE 3)

(Credits: Theory-05, Tutorial-01)

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain three questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2& 3 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of 20 marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

REAL ANALYSIS-I, GROUP THEORY AND DIFFERENTIAL EQUATIONS

Theory: 75 Lectures; Tutorial:15 Lectures

UNIT I- REAL ANALYSIS

Sequence: Definition, Bounds, Limit of a sequence, Monotonic Sequence and their convergence, Algebraic Operations and Limit, Cauchy Sequence, General Principle of Convergence of a sequence.
Series: Definitions, Convergent Series, Divergent Series, Pringsheim's Theorem, Comparison tests, Cauchy's Root Test, D'Alembert's Ratio Test, Alternating Series and Leibnitz Test, Absolutely Convergent Series.

UNIT II- GROUP THEORY

Binary Operations, Notion of Group, Abelian Group and Non-Abelian group with Examples. Uniqueness of Identity element and Inverse elements in a group, Different ways of Defining a Group, Concept of Subgroup and Cyclic Group, Cosets, Lagrange's Theorem.

UNIT III- DIFFERNTIAL EQUATIONS

Differential Equations of First Order and Higher Degree, Clairaut's Form, Singular Solution, Orthogonal Trajectories.
Linear Equation with Constant Co-efficient, Homogenous Linear Equation with variable coefficients.
Simultaneous equations $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$, and Total Differential Equations $Pdx+Qdy+Rdz=0$
together with Geometric Significance.

Books Recommended:

- Real Analysis: Shanti Naryan & M D Raisinghania.
- Real Analysis: Lalji Prasad
- Abstract algebra: A R Vashishtha
- Modern Algebra: Lalji Prasad
- Differential Equations: MD Raisinghania

SEMESTER IV **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

II. GENERIC ELECTIVE (GE 4)

(Credits: Theory-05, Tutorial-01)

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain three questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2& 3 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of 20 marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

REAL ANAYSIS-II, COMPLEX VARIABLE, SET THEORY AND MATRICES

Theory: 75 Lectures; Tutorial:15 Lectures

UNIT-I – REAL ANALYSIS II

Riemann Integration, definition, Oscillatory sum and integrability condition. Integrability of monotonic and continuous functions. Fundamental theorem of integral calculus.

UNIT-II – COMPLEX VARIABLE

Real Functions of Two Variables: Simultaneous and Iteratd limits: Continuity , Partial Derivatives, Differentiability and related Necessary and Sufficient conditions. Functions of Complex variables Limit, Continuity, Derivative, Cauchy – Reiemann Equations, Analytic Function, Harmonic function.

UNIT III - SET THEORY

Indexed Family of Sets, Generalized Set of Operations & Demorgan's Laws, Set mapping, Countable and Uncountable Sets, Partition of a Set, Equivalence relation and related Fundamental Theorem of Partition. Partial Order Relation and related concepts of u.b., l.b., Inf., Sup, Maximal Element, Minimal Element and Lattice (Definition and Examples only).

UNIT IV - MATRICES

Definitions, Operations on Matrices, Matrix Algebra, Type of Matrices, Transpose, Adjoint and Inverse of a matrix, Solution of system of linear equations.

Books Recommended:

- Real Analysis, Shanti Narayan & M D Raisinghania
- Real Analysis: Lalji Prasad.
- Complex Variables: J N Sharma.
- Set Theory: K K Jha
- Matrices: A. R. Vasishtha
