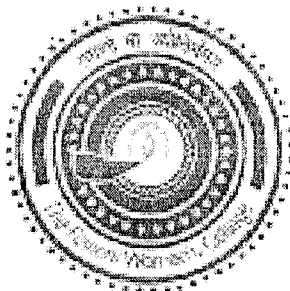# RANCHI WOMEN'S COLLEGE, RANCHI

(AUTONOMOUS COLLEGE UNDER RANCHI UNIVERSITY)

UNDERGRADUATE
MATHEMATICS(HONS.)/GENERAL

SYLLABUS W.E.F.2018-19

(UNDER CHOICE BASED CREDIT SYSTEM)

DEPARTMENT OF MATHEMATICS

B.SC (Honours)

Nine questions will be set. Candidates will be required to answer 5 questions.

Question **1** will be compulsory, consisting of 10 short answer type questions covering entire syllabus uniformly. Candidates will be required to answer any 7 out of these 10 questions; each question will be of 2 marks.

Out of the remaining 8 questions, candidates will be required to answer any 4 questions selecting at least one from each group. Questions shall contain two parts worth 7 marks each. Part (a) should be theoretical and part (b) problem (preferably).

Paper Code: UCCMATH 101

Credits:6, Full Marks:70, Time:

UNIT1-ANALYTICAL GEOMETRYOF TWO DIMENSION

Change of rectangular axes. Conditions for the general equation of second degree to represent parabola, ellipse, hyperbola and reduction into standard forms, Equations of tangent and normal (Using Calculus).   (2 Questions)

Equations of Chord of contact, Pole and Polar, Pairof tangents, in reference to general equation of conic. Axes, centre, director circle, in reference to general equation of conics.
Polar equation of conics.

(2 Questions)

UNIT11-HIGHERALGEBRA&TRIGONOMETRY

Statement and proof of binomial theorem for any index,exponential and logarithmic series.   (1 Questions)

De Moivre's theorem and its applications. Trigonometric and Exponential functions of complex argument and hyperbolic functions.   (2 Questions)
Summation of Trigonometrical series. Factorisation of $\sin\theta, \cos\theta$. (1 Questions)

Books Recommended:

1.Analytical Geometry &Vector Analysis-B.K.Kar,Books&Allied Co.,Kolkata
2.Analytical Geometry of Two Dimension-Askwith
3.CoordinateGeometry-SLLoney. A. Das Gupta / Laljee Prasad
4.Trigonometry-Das and Mukherjee
S.Trigonometry- A. Dasgupta/ Laljee Prasad

Paper Code: UCCMATH 102

Credits:6, Full Marks:70,

UNIT I– DIFFERENTIAL CALCULUS

Successive Differentiation,Leibnitz's theorem. Maclaurin and Taylor series expansions .Partial differentiation,Euler's theorem for functions of two variables,Total differential .   (2Questions)

Tangent and Normal, Curvature, Asymptotes,Curve Tracing ,Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.   (2Questions)

UNIT II -VECTOR CALCULUS

Product of three and four vectors, Work done, Moment of a vector about a point and a line.   (2Questions)

Scalar and vector point functions, Differentiation of a vector function of scalar variables.
Gradient,Divergence and Curl,Second order operators in Cartesian coordinate system.

                              (2Questions)

Books Recommended:
1.Calculus-GBThomas&RLFinney.
2.DifferentialCalculus-Das&Mukherjee. J. Edward / Laljee Prasad / A. Dasgupta
3.VectorCalculus-A Dasgupta / Shanti Narayan / Dr. K.K. Jha

Paper Code: UCCMATH 203

Credits:6,FullMarks:70,

UNIT I —TOPOLOGY OF THE REAL LINE R

Axioms of least upper bound and greatest lower bound in R. The completeness property of R ,Archimedean property, Density theorem. Neighbourhoods and limit point of a set, open and closed sets, isolatedpoints, Bolzano-Weierstrass theorem. (2 Questions)

Compact sets and their properties. Hein borel theorem. (1 Questions)

UNIT II ANALYSIS - I

Sequences, Bounded sequence, Convergent sequence, Monotonic sequence, Sub sequence, Cauchy sequence and Cauchy's general principle of convergence. (2Questions)

Infinite series, Convergence and Divergence of infinite series of real numbers, Pringsheim's theorem, Comparison test, Cauchy's root test, D'Alembert's ratio test, Raabe's test, De-Morgan's and Bertrand's test, Gauss's ratio test, Cauchy's condensation test, Integral test, Alternating Series Leibnitz test, Absolute and conditional convergence. (3 Questions)

Books Recommended:
1.Elements of Real Analysis- Shanti Narayan & M D Raisinghania / Dr. K.K. Jha
2.Higher Algebra-S Bernard & J M Child / Tom M. Apostol.

Paper Code: UCCMATH 204

Credits:6,Full Marks:70,

UNITI- INTEGRAL CALCULUS

Evaluation of definite integrals, Reduction Formulae, Differentiation and Integration under the sign of integration,.

(1Questions)

Length of plane curve ,Area bounded by plane curves. Volume and surface area of solid of revolution.Double and triple integrals. (3 Questions)

UNIT II -ANALYTICALGEOMETRY OF 3 DIMENSIONS

Rectangular, spherical, polar and cylindrical co-ordinates, Direction cosines. Angle between two straight lines, Equation of planes and straight lines, Shortest distance between two lines.   (2 Questions)

Sphere, cone and cylinder.   (2 Question)

Books Recommended:
1.Calculus- G B Thomas & R L Finney.
2.Integral Calculus- Das & Mukherjee.
3.Integral Calculus- Lalji Prasad.
4. Coordinate Geometry of 3 D- J T Bell
5.Analytical Geometry of 3 D- Lalji Prasad / Dasgupta and prasad.

B.Sc. (General)

Thirteen questions will be set. Candidates will be required to answer 9 questions.

Question 1 will be compulsory, consisting of 12 short answer type questions covering entire syllabus uniformly. Candidate will be required to answer any 10 out of these 12 questions, each question will be of 2 marks.

Out of the remaining 12 questions, candidates will be required to answer any 8 questions selecting at least one from each group. Each Question shall contain two parts worth 5 marks each. Part (a) Theoretical and part (b) problem (preferably).

For B.Sc .General Science Students having Mathematics as one of the subjects.

Paper Code: UGEMATH 101/ UGDSCMATH 101

Credits:6, Full Marks:100,

UNIT I-DIFFERENTIALCALCULUS

Successive Differentiation, n^{th} derivatives of some standard functions, Leibnitz theorem. n^{th} derivatives of some rational functions.   (1Questions)

Expansion, Taylor's Theorem, Maclaurin's Theorem, Partial Differentiation.

(2 Question)

Tangents and Normals,   (1 Question)

Maxima and Minima of functions of two variables.   (1 Question)

UNIT II-COORDINATE GEOMETRY 2D& TRIGONOMETRY

Transformation of axes with and without change of origin   (1Questions)
Condition of general equation of second degree to represent parabola, ellipse, hyperbola and reduction to standard forms.   (1 Question)
Equations of tangents and normals (using Calculus) Chord of contact, Polar and pair of tangents.   (2 Question)

De- Moivre's theorem, Trigonometric and exponential Functions of complex arguments and Hyperbolic functions.   (2 Question)
Summation of trigonometric series   (1 Question)

Books Recommended:
1. Differential Calculus: A Das Gupta & S B Prasad.
2. Differential Calculus: Lalji Prasad.
3. Coordinate Geometry: A Das Gupta / Laljee Prasad.
4. Trigonometry by Das and Mukherjee / Laljee Prasad

Paper Code: UGEMATH 202 /UGDSCMATH 202

Credits:6, Full Marks:100,

UNIT I-INTEGRAL CALCULUS

Integration of rational and irrational functions.	(1Question)
Evaluation of definite integrals, Reduction formulae,	(1 Question)
Length and Area,	(1 Question)
Volume and Surface area of solids of revolutions.	(1Question)

UNIT 11-VECTOR CALCULUS & REAL ANALYSIS

Product of three and four vectors.   (1question)
Work done, Moment of a Vector about a fixed point and about fixed line.(1 Question)
Point function, Differentiation of a Vector function of a scalar variable   (1 Question)

Gradient, Divergence and Curl and second order vector differentia loperators in
Cartesian coordinate systems.   (1 Question)

Axioms for the real number system, Least Upper Bound and Greatest Lower
Bound. Limit of a sequence, Subsequence, Cauchy sequence, Cauchy's
general principal of convergence, Algebraic operations on limits, Monotonic
Sequences and their convergence.   (2 Questions)
Notion of convergent and divergent series of positive terms, Cauchy's general
principal of convergence, Comparision test, D' Alemberts' ratio test, Cauchy's
root test, Cauchy's Condensation test, Raabe's test.   (2 Questions)

Books Recommended;
1. Integral Calculus: Dasgupta & Prasad.
2. integral Calculus :Lalji Prasad.
3. Vector Calculus: Dasgupta & Prasad.
4. Vector calculus: Lalji Prasad.
5. Trigonometry: Dasgupta & Prasad.
6. Trigonometry: Lalji Prasad.
7. Elements of Analysis : Dr. K.K. Jha / Shanti Narayan & M D Raisinghania