

Title	Modules of Syllabus, Classes and Examinations
Session	2022-23 (Odd Semester)
Department	B.Sc General in Mathematics
Institution Name	Hiralal Bhakat College, Nalhati, Birbhum, W.B.
Coordinator	Dr. Banshidhar Sahoo, Assistant Professor in Mathematics

Details of Courses of B.Sc. General under CBCS

Sl.	Course	Credit		Marks
1.	Core Course (12 Papers) 4 core papers each in 3 disciplines of choice	Theory+Practical $12 \times (4+2) = 72$	Theory+Tutorial $12 \times (5+1) = 72$	$12 \times 75 = 900$
2.	Elective Course DSE (6 Papers)	$6 \times (4+2) = 36$	$6 \times (5+1) = 36$	$6 \times 75 = 450$
3	Ability Enhancement Core Course (AECC) AECC-1 (ENVS) AECC-2 (English/MIL)	$4 \times 1 = 4$ $2 \times 1 = 2$	$4 \times 1 = 4$ $2 \times 1 = 2$	100 50
4.	SEC (4 Papers)	$4 \times 2 = 8$	$4 \times 2 = 8$	$4 \times 50 = 200$
Total Credit:		122	122	1700

B.Sc. Mathematics General Course Structure

Semester	Course Course (CC)	Discipline Specific Elective (DSE)	Ability Enhancement Course	
			AECC (2)	SEC (4)
I	CC1A (Mathematics) CC2A (Physics) CC3A (Computer Sc.)		AECC-1	
II	CC1B (Mathematics) CC2B (Physics) CC3B (Computer Sc.)		AECC-2	
III	CC1C (Mathematics) CC2C (Physics) CC3C (Computer Sc.)			SEC-1 (Mathematics) or SEC-1 (Computer Sc.)
IV	CC1D (Mathematics) CC2D (Physics) CC3D (Computer Sc.)			SEC-2 (Mathematics) or SEC-2 (Computer Sc.)
V		DSE1A (Mathematics) DSE2A (Physics) DSE3A (Computer Sc.)		SEC-3 (Mathematics) or SEC-3 (Physics)
VI		DSE1B (Mathematics) DSE2B (Physics) DSE3B (Computer Sc.)		SEC-4 (Mathematics) or SEC-4 (Physics)

Semester-I

Core Course (CC 1A): Differential Calculus

- Total 75 Marks
- 60 Marks for Semester-end-Examination[#] (will be organized by University)
- 10+5=15 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar
- 5 Marks for Attendance
 - Attendance: 50% & above but below 60% - 2 Marks
 - Attendance: 60% & above but below 75% - 3 Marks
 - Attendance: 75% & above but below 90% - 4 Marks
 - Attendance: 90% & Above - 5 Marks

Internal Assessment	Component 1 (C ₁)
Weightage	10 Marks (Class test)
Number of Questions	5
Date	07.12.2022
Time	11.30 am
Syllabus	Limit and Continuity, Types of discontinuities, Differentiability of function, Successive derivative, Leibnitz's Theorem, Partial differential, Euler's Theorem. Tangent and Normal, Curvature, Asymptotes, Singular Points, Tracing of Curves. Polar Coordinates and tracing of curves in polar coordinates.
Name of Teacher	Dr. Banshidhar Sahoo
Number of Classes	60 (Tentative)

** Component 2 (C₂):

- 60 Marks for Semester-end-Examination (will be organized by University)
- Answer 10 questions out of 15 carrying 02 marks each = $10 \times 02 = 20$ marks
- Answer 04 questions out of 06 carrying 05 marks each = $04 \times 05 = 20$ marks
- Answer 02 questions out of 04 carrying 10 marks each = $02 \times 10 = 20$ marks

** Syllabus:

Limit and Continuity, Types of discontinuities, Differentiability of function, Successive derivative, Leibnitz's Theorem, Partial differential, Euler's Theorem.

Tangent and Normal, Curvature, Asymptotes, Singular Points, Tracing of Curves. Polar Coordinates and tracing of curves in polar coordinates.

Rolles's Theorem, MVT, Taylor's theorem with Lagrange's and Cauchy's form of remainder. Taylor's series, Maclaurin's series of $\sin(x)$, $\cos(x)$, e^x , $\log(1+x)$. Maxima and minima. Indeterminate form.

Semester-III

Core Course (CC 1C): Real Analysis

- Total 75 Marks
- 60 Marks for Semester-end-Examination[#] (will be organized by University)
- 10+5=15 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar
- 5 Marks for Attendance
 - Attendance: 50% & above but below 60% - 2 Marks
 - Attendance: 60% & above but below 75% - 3 Marks
 - Attendance: 75% & above but below 90% - 4 Marks
 - Attendance: 90% & Above - 5 Marks

Internal Assessment	Component 1 (C ₁)
Weightage	10 Marks (Class test)
Number of Questions	5
Date	16.11.2022
Time	11.30 am
Syllabus	Finite and infinite sets, countable and uncountable sets. Real line, bounded sets, supremum and infimum, completeness, property of R. Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-weierstrass theorem. Real sequence, Bounded sequence, Cauchy convergent criterion for sequences. Cauchy's theorem on limits, monotone sequences and their convergence.
Name of Teacher	Dr. Banshidhar Sahoo
Number of Classes	65 (Tentative)

** Component 2 (C₂):

- 60 Marks for Semester-end-Examination (will be organized by University)
- Answer 10 questions out of 15 carrying 02 marks each = 10 x 02 = 20 marks
- Answer 04 questions out of 06 carrying 05 marks each = 04 x 05 = 20 marks
- Answer 02 questions out of 04 carrying 10 marks each = 02 x 10 = 20 marks

** Syllabus:

Finite and infinite sets, countable and uncountable sets. Real line, bounded sets, supremum and infimum, completeness, property of R. Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-weierstrass theorem.

Real sequence, Bounded sequence, Cauchy convergent criterion for sequences. Cauchy's theorem on limits, monotone sequences and their convergence.

Infinite series, Cauchy convergence criterion for series, positive term series, geometric series, comparison

test, convergence of p-series. Root test, alternating series. Leibnitz's test. Definition and example of absolute and conditionally convergent series.

Sequence and series of functions, Pointwise and uniform convergence, M_n -test, M-test. Statement of the result about uniform convergence and integrability and differentiability of function. Power series and radius of convergence.

Skill Enhancement Course (SEC 1): Integral Calculus

- Total 50 Marks
- 40 Marks for Semester-end-Examination ** (will be organized by University)
- 10 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar

Internal Assessment	Component 1 (C ₁)
Weightage	10 Marks (Assignment)
Number of Questions	5
Date	To be announced.
Time	11.30 am
Syllabus	Integration by Partial fractions, integration of rational and irrational functions. Properties of definite integrals. Reduction formulae for integrals of rational, trigonometric, exponential and logarithmic function and their properties.
Name of Teacher	Dr. Banshidhar Sahoo
Number of Classes	22 (Tentative)

**** Component 2 (C₂):**

- 40 Marks for Semester-end-Examination (will be organized by University)
- Answer 10 questions out of 15 carrying 02 marks each = 10 x 02 = 20 marks
- Answer 04 questions out of 06 carrying 05 marks each = 04 x 05 = 20 marks

**** Syllabus:**

Integration by Partial fractions, integration of rational and irrational functions. Properties of definite integrals. Reduction formulae for integrals of rational, trigonometric, exponential and logarithmic function and their properties.

Areas and length of curves in the plane, volumes and surfaces of solids of revolution. Double and triple integrals.

Semester-V

Core Course (DSE 1A): Linear Algebra

- Total 75 Marks
- 60 Marks for Semester-end-Examination[#] (will be organized by University)
- 10+5=15 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar
- 5 Marks for Attendance
 - Attendance: 50% & above but below 60% - 2 Marks
 - Attendance: 60% & above but below 75% - 3 Marks
 - Attendance: 75% & above but below 90% - 4 Marks
 - Attendance: 90% & Above - 5 Marks

Internal Assessment	Component 1 (C ₁)
Weightage	10 Marks (Class test)
Number of Questions	5
Date	23.11.2022
Time	11.30 am
Syllabus	Vector Spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces. Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation.
Name of Teacher	Dr. Banshidhar Sahoo
Number of Classes	65 (Tentative)

** Component 2 (C₂):

- 60 Marks for Semester-end-Examination (will be organized by University)
- Answer 10 questions out of 15 carrying 02 marks each = 10 x 02 = 20 marks
- Answer 04 questions out of 06 carrying 05 marks each = 04 x 05 = 20 marks
- Answer 02 questions out of 04 carrying 10 marks each = 02 x 10 = 20 marks

** Syllabus:

Vector Spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation. Matrix representation of linear transformation, algebra of linear transformations. Dual space, Dual Basis, Double Dual. Eigen values and eigen vectors. Characteristic polynomial. Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

Skill Enhancement Course (SEC 3): Probability and Statistics

- Total 50 Marks
- 40 Marks for Semester-end-Examination** (will be organized by University)
- 10 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar

Internal Assessment	Component 1 (C ₁)
Weightage	10 Marks (Assignment)
Number of Questions	5
Date	To be announced.
Time	11.30 am
Syllabus	Sample space, probability axioms, real random variables, cumulative distribution function, probability mass functions. Mathematical expectation, moments, moments generating function, characteristic function. Discrete distributions: uniform, binomial, Poisson. Continious distribution: uniform, normal, exponential.
Name of Teacher	Dr. Banshidhar Sahoo
Number of Classes	23 (Tentative)

** Component 2 (C₂):

- 40Marks for Semester-end-Examination (will be organized by University)
- Answer 10 questions out of 15 carrying 02 marks each = 10 x 02 = 20 marks
- Answer 04 questions out of 06 carrying 05 marks each = 04 x 05 = 20 marks

** Syllabus:

. Sample space, probability axioms, real random variables, cumulative distribution function, probability mass functions. Mathematical expectation, moments, moments generating function, characteristic function. Discrete distributions: uniform, binomial, Poisson. Continious distribution: uniform, normal, exponential.

Joint comulative distribution function and its properties, joint probability density functions, marginal and contional distriбуtions. Expectation of function of two random variables, conditional expectations, independent random variables.



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