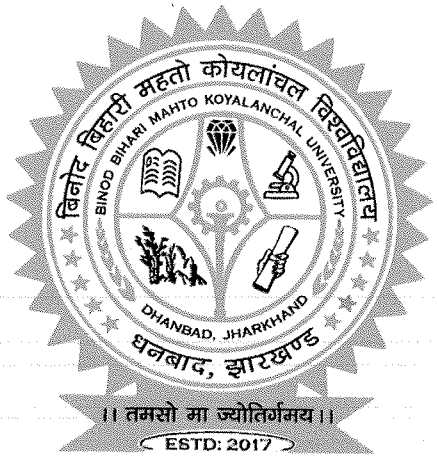

BINOD BIHARI MAHTO KOYALANCHAL UNIVERSITY, DHANBAD, JHARKHAND.

FYUGP Syllabus
MATHEMATICS

17/07/25

17/07/25

17/07/25

Head University Department of Mathematics

Contents

FYUGP Syllabus: Mathematics
Discipline Specific Course (Major – 1)

Mid Semester Exam: Full Marks – 25. (Pass Maks – 10) (Internal Test: 20; Attendance & Curricular activities: 05) End Semester Exam: Full Marks – 75. (Pass Marks – 30)	Credits - 04 No. of Lecturer - 60

General Instructions

There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type six questions of fifteen marks each, out of which four are to be answered.

Year/ Semester	Paper Title & Study Materials
First (Foundation or Introductory Courses) Semester - I	**Calculus and Vector Calculus** **Unit 1: Differential Calculus** Successive differentiation, Leibnitz theorem and its applications. Tangent and Normal to the curve in cartesian and polar coordinates. Curvature of a curve at a point. Asymptotes of a curves. Maxima and Minima of a function. Curve tracing. (2 Questions) **Unit 2: Integral Calculus** Derivations and illustrations of reduction formulae of the type $\int sin^n x\, dx$, $\int cos^n x\, dx$, $\int tan^n x\, dx$, $\int sin^n x cos^m x\, dx$, $\int \sin nx\, dx$, $\int \cos nx\, dx$, $\int (logx)^n dx$, etc. Arc length of a curve, arc length of parametric curves, area enclosed by a curve, area between two curves, surface area, volume and surface of solids of revolution. (2 Questions) **Unit 3: (Vector Calculus)** Introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions. Tangential and Normal components of velocity and acceleration. Triple product, Gradient, Divergence and Curl of a vector functions. Green's, Gauss's and Stoke's theorem. (2 Question) **Textbooks:** 1. Lalji Prasad, Calculus and Vector Calculus, Paramount publication. 2. Ghosh, R K, and Maity, K C, An Introduction to Analysis: Differential Calculus: Part I, New Central Book Agency. 3. Ghosh, R K, and Maity, K C, An Introduction to Analysis: Integral Calculus, New Central Book Agency. 4. K. C. Maity, and R. K. Ghosh, Vector Analysis, New Central Book Agency (P) Ltd. Kolkata.

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FYUGP Syllabus: Mathematics
Discipline Specific Course (Major – 2)

Mid Semester Exam: Full Marks – 25. (Pass Maks – 10) (Internal Test: 20; Attendance & Curricular activities: 05) End Semester Exam: Full Marks – 75. (Pass Marks – 30)	Credits - 04 No. of Lecturer - 60

General Instructions

There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type six questions of fifteen marks each, out of which four are to be answered.

Year/ Semester	Paper Title & Study Materials
First (Foundation or Introductory Courses) Semester - II	**Real Analysis** **Unit 1: Set of real numbers** Order properties in the set of real numbers R, ε-neighbourhood of a point in R. Countable and uncountable sets in R. Bounds of a set, bounded below and bounded above sets, unbounded sets. Suprema and infima of a set. Completeness property of R, Archimedean property, Rational and irrational numbers in R, intervals. Limit point and isolated points of a set in R, open set, closed set, derived set, Compactness of a set in R, Heine-Boreal Theorem. (2 Question) **Unit 2: Sequence of real numbers** Notion of Sequence, bounds of a sequence, convergent and divergent sequence, limit point of a sequence, Monotonic sequences, Cauchy's general principle of convergence, Cauchy's theorems on limits. Sub-sequence, divergence criteria. Monotone sub-sequence theorem (statement only), Bolzano Weier strass theorem for sequences. Cauchy sequence. (2 Questions) **Unit 3: Series of real numbers** Notion of Infinite series, convergence and divergence of infinite series, Cauchy criterion, tests for convergence of an infinite series: comparison test, auxiliary series, D'Alembert ratio test, Raabe's test, Cauchy's nth root test, Cauchy's Condensation test, Logarithmic test, Cauchy's integral test. Alternating series, Leibniz test. Absolute and conditional convergence. (2 Questions) **Reference & Text books:** 1. R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002. 2. S. C. Malik, Savita Arora, Mathematical Analysis. 3. S. K. Mapa, Introduction to Real Analysis. 4. Lalji Prasad, Real Analysis, Paramount publication.

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FYUGP Syllabus: Mathematics
Multidisciplinary Course (MDC)

End Semester Exam: Full Marks – 75. (Pass Marks – 30)	Credits - 03 No. of Lecturer - 45

General Instructions

There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type six questions of fifteen marks each, out of which four are to be answered.

Year/ Semester	Paper Title & Study Materials
(Multidisciplinary Course)	**Unit-I** Matrix: types of matrices, Transpose and conjugate of a matrix, Adjoint and inverse of a matrices and its properties, Orthogonal, Unitary matrices. (2 Questions) **Unit-II** Trigonometry: De Moivre's theorem and its applications. Logarithm of complex quantities, Gregory's Series, Hyperbolic function, Summation of trigonometrical functions, Expansion of $\cos n\theta$ and $\sin n\theta$. (2 Questions) Unit-III Successive differentiation, Leibnitz theorem and its applications. Expansion of functions in series, Taylor's Theorem, Maclaurin's Theorem, and their applications. Integration by partial fraction, Integration of irrational functions, Integration as process of summations, General properties of definite integrals. (2 Questions) **Reference & Text books:** 1. Lalji Prasad, Calculus and Vector Calculus, Paramount publication. 2. Ghosh, R K, and Maity, K C, An Introduction to Analysis: Differential Calculus: Part I, New Central Book Agency. 3. Ghosh, R K, and Maity, K C, An Introduction to Analysis: Integral Calculus, New Central Book Agency.

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Magadh University Department of Mathematics, B.B.M.K.U. Bodh Gaya

Subject/ Code

F.M. = 75 **Time**=3Hrs. Exam Year

General Instructions:

i. Group A carries very short answer type **compulsory** questions.
ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B.**
iii. Answer in your own words as far as practicable.
iv. Answer all sub parts of a question at one place.
v. Numbers in right indicate full marks of the question.

Group A

1. [5x1=5]
   i. .....
   ii. .....
   iii. .....
   iv. .....
   v. .....
2. ..... [5]
3. ..... [5]

Group B

4. ..... [15]
5. ..... [15]
6. ..... [15]
7. ..... [15]
8. ..... [15]
9. ..... [15]

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

Subject/ Code

F.M. = 100 **Time**=3Hrs. Exam Year

General Instructions:

i. Group A carries very short answer type **compulsory** questions.
ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B.**
iii. Answer in your own words as far as practicable.
iv. Answer all sub parts of a question at one place.
v. Numbers in right indicate full marks of the question.

Group A

1. [10x1=10]
   i. ..... vi. .....
   ii. ..... vii. .....
   iii. ..... viii. .....
   iv. ..... ix. .....
   v. ..... x .....
2. ..... [5]
3. ..... [5]

Group B

4. ..... [20]
5. ..... [20]
6. ..... [20]
7. ..... [20]
8. ..... [20]
9. ..... [20]

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