

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU/B.Sc./08/2022

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies and Ad-hoc Boards with recommendation of the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the following syllabi of Bachelor of Science with Regulation under the scheme of Choice Based Credit & Grading System in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Table with 3 columns: Sr.No., Courses, Semester. It lists 6 B.Sc. courses and their respective semesters.

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus, Aurangabad-431 004. REF.NO.SU/2022/ 6852-62 Date:- 10.08.2022.

\* \* \* \* \*

Deputy Registrar, Academic Section

Copy forwarded with compliments to :-

- 1] The Principal of all concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University,
2] The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.
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**DR. BABASAHEB AMBEDKAR MARATHWADA  
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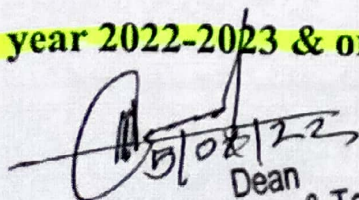
**CURRICULUM**

**CHOICE BASED CREDIT & GRADING SYSTEM**

**B.A/B.Sc. FIRST YEAR (MATHEMATICS)**

**SEMESTER - I and II**

[Curriculum will be progressively effective from the Academic  
year 2022-2023 & onwards]

  
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Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

  
Dr. Bhausahab R. Sontakke  
Chairman,  
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**B.A./B.Sc. First Year**

**Semester – I**

**MAT-101: Geometry**

**(No. of Periods:60, Max.Marks: 50)**

**Course Description:** This course provides elementary-level knowledge of Three-dimensional geometries especially plane, right line, sphere, cone, and cylinder.

**Course Objectives:** General objectives are to study three-dimensional geometry, plane, right line, sphere, cone and cylinder along with their properties and interpretations.

**Course Outcomes:** After successful completion of this course. The student will be able to identify and study equation of plane. Basic idea of lines, sphere, cones and cylinders.

#### **Unit- I. The Plane:**

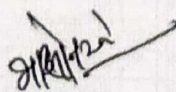
Equations of the first degree in  $x, y, z$ , transformation to the normal form, determination of the plane under given conditions, equations of the plane through three given points, systems of planes, length of the perpendicular from a point to a plane. (15 Periods)

#### **Unit-II. Right Line :**

Equations of a line, equations of a straight line in terms of its direction cosines and the co-ordinates of a point on it, equations of a line through two points, symmetrical and unsymmetrical forms of the equations of a line, transformation of the equations of a line to symmetrical form, angle between a line and a plane. (10 Periods)

#### **Unit-III. Applications of Right Line:**

The condition that a given line may lie in a given plane, the condition that two given lines are coplanar, number of arbitrary constants in the equations of a straight line, sets of conditions which determine a line, the shortest distance between two lines, the length and equations of the line of shortest distance between two straight lines, length of perpendicular from a given point to a given line. (10 Periods)



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#### **Unit-IV.Sphere:**

Definition and equations of the sphere, equation of the sphere through four given points, plane section of a sphere, intersection of a spheres, equations of two spheres, equation of a circle, sphere through a given circle, intersection of a sphere and a line. (15 Periods)

#### **Unit –V.Cones and Cylinders:**

The right circular cone, equation of a right circular cone, the right circular cylinder, equation of a right circular cylinder. (10 Periods)

#### **Recommended Text Book:**

[1] Shanti Narayan and P. K. Mittal: Analytical Solid Geometry, S. Chand and Company Ltd, New Delhi, Seventeenth Edition, 2013.

#### **Scope:**

Chapter 2: Articles 2.1, 2.3, 2.32, 2.4, 2.41, 2.42, 2.5, 2.7

Chapter 3: Articles 3.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.2to 3.5, 3.6, 3.61, 3.7

Chapter 6: Articles 6.1,6.1.1, 6.1.2, 6.1.3, 6.2, 6.3.1, 6.3.2, 6.4, 6.4.1, 6.5

Chapter 7: Articles 7.6.1, 7.6.2, 7.8.1, 7.8.2

#### **Reference Books:**

1. Text Book of Coordinate Geometry, By Gorakh Prasad and H. C. Gupta, Pothishala Pvt. Ltd. Allahabad, 2000.
2. The Elements of Coordinate Geometry, By S. L. Loney, Mc-Millan and Company, London, 1895.
3. A Text Book of Analytical Geometry of Three dimensions, By P. K. Jain and Khalil Ahmad, Wiley Eastern Ltd.2018.
4. Elementary Treatise on Co-ordinate geometry of three Dimensions by R.J.T. Bell, Mac Millan India Ltd.

**B.A./B.Sc. First Year**

**Semester- I**

**MAT-102: Differential Calculus**

(No. of Periods: 60, Max. Marks: 50)

**Course Description:** This course provides the basics of real sequences, functions of single variable, higher derivatives and vector derivatives.

**Course Objectives:** The objective of the course is to learn real sequences, functions and higher derivatives, vector differentiation and applications

**Course Outcomes:** After completion of the course students will be able to:

- Classify the sequences
- Check the limit and continuity of functions
- Evaluate the derivative of functions
- Find the curl divergence and gradient of functions

**Unit-I: Sets and Real Sequences**

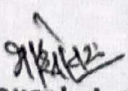
Introduction, limit points of set, closed sets, sequences, limit point of a sequence, limit inferior and superior, convergent sequences, non-convergent sequences. (15Periods)

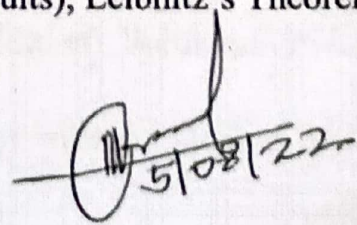
**Unit-II: Functions of a Single Variable**

Limits, Continuous functions, Functions continuous on a closed interval, Uniform Continuity, The Derivative, Increasing and Decreasing Functions, Rolle's Theorem, Lagranges Mean Value Theorem, Cauchy's Mean Value Theorem(15 Periods)

**Unit-III: Successive Differentiation**

Higher order derivatives, Calculation of  $n^{\text{th}}$  derivatives: Some standard results, Determination of  $n^{\text{th}}$  derivatives (Some Standard results), Leibnitz's Theorem. (10 Periods)

  
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## Unit-IV: Vector Differentiation

Vector function of a single scalar variable, Continuity, Differentiability, Derivative of the Sum ( or difference) of vectors, Derivative of the scalar product, Derivative of the cross product, Derivative of scalar triple product, Derivative of vector triple product, scalar and vector field, level surfaces, vector function of two or more variables, partial derivatives of vectors, geometrical interpretation of, Directional derivative, Operator del  $\nabla$ , The gradient, Properties of gradient, The divergence, Properties of Divergence, Curl, Properties of Curl.

(20 Periods)

### Recommended Text Books:

1. S.C.Malik, Savita Arora: Mathematical Analysis (Fifth Edition) New Age International (P) Ltd. Publishers, Reprint 2018, 2022
2. Shanti Narayan and P.K. Mital: Differential Calculus, S.Chand & Company Ltd. New Delhi, Reprint 2005.
3. N.Saran, R.Prasad: Elements of Vector Calculus (Fifth Edition), Pothishala Pvt.Ltd. 2016.

### Scope:

Chapter 2: Article 1,2,3 [1]

Chapter 3: Article 1, 2,3,4,5 [1]

Chapter 5: Article 1,2,3,4 [1]

Chapter 6: Article 1,2,3,5,6,7 [1]

Chapter 5: Article 5.1, 5.2, 5.5 [2]

Chapter 1: Article 1.1, 1.2, 1.3, 1.32, 1.61, 1.62,1.63, 1.64 [3]

Chapter 2: Article 2.1,2.11,2.2,2.21, 2.22, 2.23,2.3, 2.31, 2.33, 2.4,2.41, 2.5,2.51 [3]

### Reference Books:

1. Gorakh Prasad: Differential Calculus (Revised Edition), Pothishala Pvt. Ltd., 2018.
2. Shanti Narayan and P.K. Mital: A Text Book of Vector Calculus, S.Chand and Company Ltd. New Delhi.

**B.A./B.Sc. First Year**

**Semester-II**

**MAT- 201: Number Theory**

(No. of Periods: 60, Max. Marks: 50)

**Course Description:** This course provides an elementary knowledge of divisibility, primes, congruences, number theoretic functions and Diophantine equations.

**Course Objective:** A primary objective of the course is to learn elementary knowledge of number theory.

**Course Outcomes:** At the end of course, students will be able to

- Evaluate the greatest common divisor and solve Diophantine equations
- Understanding of divisibility concepts, prime numbers and usefulness of congruences
- Use the results to solve problems

**Unit-I: Divisibility**

Introduction, Divisibility, Primes (Theorem 1.19 Statement only) (15 Periods)

**Unit-II: Congruences**

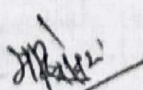
Congruences, Solution of Congruences, The Chinese Remainder Theorem. (20 Periods)

**Unit-III: Some Functions of Number Theory**

Greatest Integer Function, Arithmetic Functions, The Mobius Inversion Formula. (15 Periods)

**Unit-IV: Some Diophantine Equations**

The equation  $ax+by=c$ , Simultaneous Linear Equations. (10 Periods)

  
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### Recommended Text Books:

1. Ivan Niven, Herbert S. Zuckerman, H.L.Montgomery : An Introduction to The Theory of Numbers (Fifth Edition) Wiley India Pvt. Ltd., New Delhi (Reprint 2016).

### Scope:

Chapter 1: Article 1.1, 1.2, 1.3 (Theorem 1.19 statement only)

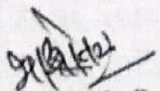
Chapter 2: Article 2.1 (Lemma 2.13, Lemma 2.14, Theorem 2.15 Statements only), 2.2, 2.3

Chapter 4: Article 4.1 (Theorem 4.2 statement only), 4.2, 4.3

Chapter 5: Article 5.1, 5.2.

### Reference Books:

1. J.S.Chahal: Topics in Number Theory, Plenum (New York),1988.
2. David M. Burton: Elementary Number Theory, McGraw-Hill (2005).
3. William J. LeVeque: Fundamentals of Number Theory, Dover Publications, 2014.
4. S.B.Malik: Basic Number Theory (Second Edition) Vikas Publishing House, New Delhi,1998.
5. J.H.Silverman: A Friendly Introduction to Number Theory, Pearson Education India, (Fourth Edition) 2014.

  
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**B.A./B.Sc. First Year**

**Semester II**

**MAT-202: Integral Calculus**

**(No. of Periods: 60, Max. Marks: 50)**

**Course Description:** This course provides the methods of finding integration, concept of integral, vector integration and its applications

**Course Objectives:** The main objective of the course is to study methods of finding integration and apply it to evaluate line integral, volume integral and surface integral.

**Course Outcomes:** After successful completion of the course student will be able to:

- Apply method of integration to find the integral of function
- Find the area, surface and volume of given shape

**Unit-I: Integration of Rational and Irrational Algebraic Fractions**

Rational fractions, Non-repeated linear factors in the denominator, Repeated linear factors, General Case, Integration of  $\frac{1}{ax^2+bx+c}$ , Integration of  $\frac{(px+q)}{ax^2+bx+c}$ , Integration of  $\frac{1}{(x^2+k)^n}$ , Integration of  $\frac{(px+q)}{(ax^2+bx+c)^n}$ , Some special cases, Integration of  $\frac{1}{\sqrt{(ax^2+bx+c)}}$ , Integration of  $\frac{(px+q)}{\sqrt{(ax^2+bx+c)}}$ , Integration of  $\frac{1}{(x-k)^r\sqrt{(ax^2+bx+c)}}$ . (10 Periods)

**Unit-II: Reduction Formulae**

Definition, Reduction formulae for  $\int \sin^n x dx$  and  $\int \cos^n x dx$ , Walli's formula, Reduction formula for  $\int \sin^m x \cos^n x dx$ , Trigonometrical transformations, Reduction formulae for  $\int e^{ax} \sin^n bx dx$  or  $\int e^{ax} \cos^n bx dx$ . (10 Periods)

**Unit-III: Definite Integrals and Rectification**

The integral as the limit of sum, Integration from definition as the limit of a sum, Areas, Length of curves, Remarks, Intrinsic equations. (10 Periods)

#### Unit-IV: Volumes and Surfaces of Solids of Revolution

Definitions, Volumes of solids of revolution Cartesian form, volumes of revolution parametric form, Surface of solids of revolution Cartesian form, Surface of solids of revolution parametric form. (10 Periods)

#### Unit-V: Integral Transformations

Line integral, other types of line integrals, surface integral, other types of surface integral, evaluation of surface integrals, volume integral, conservative field, Gauss Divergence Theorem, Deductions from Gauss Theorem, Stoke's Theorem, More deductions from Gauss and Stokes's Theorem, Green's Theorems [Only statements]. (20 Periods)

#### Recommended Text Books:

1. Gorakh Prasad: Integral Calculus (Revised Edition), Pothishala Private Ltd., 2018.
2. N.Saran, R.Prasad: Elements of Vector Calculus (Fifth Edition) , Pothishala Private Ltd., 2016.

#### Scope:

Chapter 2: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9 [1]

Chapter 3: 3.2, 3.3, 3.4 [1]

Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.6, 4.10 [1]

Chapter 5: 5.4, 5.5, 5.7 [1]

Chapter 9: 9.1, 9.2, 9.3 [1]

Chapter 10: 10.1, 10.2, 10.3, 10.5, 10.6 [1]

Chapter 3: 3.1, 3.11, 3.2, 3.21, 3.22, 3.3, 3.4 [2]

Chapter 4: 4.1, 4.2, 4.3, 4.31, 4.4, 4.41, 4.42, 4.43 [2]

#### Reference Books:

1. Shanti Narayan and P.K. Mital: Integral Calculus, S.Chand & Company Ltd. New Delhi, Reprint 2005.
2. Shanti Narayan and P.K. Mital: A Text Book of Vector Calculus, S.Chand and Company Ltd. New Delhi.

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