Hindi Vidya Prachar Samiti's

Ramniranjan Jhunjhunwala College of Arts, Science & Commerce

(Empowered Autonomous Status)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for the T.Y.B.Sc. (under NEP)

Program: B.Sc. Mathematics

Program Code: RJSUMAT

Course: Vocational Skill Course

Course Code: RJVSCMAT & RJVSCMATP

(REVISED in 2024-2025 in alignment with the NEP 2020 facilitating the inter-and multidisciplinary learning and multiple entry and exit of the students)

(CBCS 2025-2026)

THE PREAMBLE

Why Mathematics?

Mathematics is the language of all Science, Engineering, and Technology. Mathematics is considered the queen of sciences. Without Mathematics, there can be neither science nor engineering. Mathematics occupies a crucial and unique role in human societies and represents a strategic key in the development of the whole of mankind. Mathematics is around us. It is present in different forms; the list is just endless if one goes on to note down the situations when our computational skill or more specifically, simple mathematics comes to play a role, almost every next moment we do the simple calculations at the back of our mind. Of course, these are all done pretty unconsciously without a thought being spared for the use of mathematics on all such occasions. Mathematics helps the man to give exact interpretation to his ideas and conclusions. It is the numerical and calculation part of man's life and knowledge. It plays a predominant role in our everyday life and it has become an indispensable factor for the progress of our present-day world. Further, in modern times, the adoption of mathematical methods in the social, medical and physical sciences has expanded rapidly, confirming mathematics as an indispensable part of undergraduate curricula and creating a great demand for mathematical training. Much of the demand stems directly from the need for mathematical modeling of phenomena. Such modeling is basic to all engineering, plays a vital role in all physical sciences and contributes significantly to the biological sciences, medicine, psychology, economics and commerce. The numerous applications of the subject in almost every field makes mathematics the most versatile subject choice.

Why Mathematics at R J College?

The department of Mathematics of R J College is the department as old as the college itself. It started in 1963, the inception year of the college and since then has remained as the center of academic activities for the subject. With a legacy of more than 6 decades, today the department offers undergraduate programs in the subject of mathematics with more than one discipline-specific elective paper and is affiliated to, and recognized by the University of Mumbai. As an applied component in the final year, mathematics students learn computer programming languages like Java, SQL, and python along with system analysis. Series of guest lectures, Problem-solving sessions, lecture-based learning, bridge courses, institute visits etc. motivate students to explore more in terms of applications of the subject. Under autonomy, the department has made the curriculum more robust by incorporating skill-based learning and value-added course that imparts practical knowledge of the subject to the students. Every year the department organizes a seminar competition on the theme 'Applications of Mathematics' in various areas. Department of Mathematics also runs a value-added course in a year and is able to attract students from other disciplines of science enrolling for these courses. Department of mathematics has received funding from the Department of Biotechnology (DBT), New Delhi to further strengthen our hands in being

able to provide hands-on training to the students to satisfy their curiosity and inculcate research aptitude.

Our Curriculum, Your Strength

The syllabus for mathematics for the total six semesters is meticulously designed so as to make students understand the diversity of subject. From learning elementary calculus and basic algebra, students move on to applied aspects of the subject in terms of Real analysis, multivariable calculus, Complex analysis, abstract algebra. Specialized training in differential equations, numerical methods is a part of the learning process. The teaching staffs of the department of mathematics are highly qualified and are dedicated to their subjects giving a friendly environment for the students. The department always aims to develop skills, ideas and overall progress of the students. Many of our students participate and get awards in various activities like MTTS program, Madhava Mathematics competition and other competitive exams. The environment of the department is very friendly which is useful for the students coming from other colleges also.

CREDIT STRUCTURE FOR SEMESTER V

Course	Nomenclature	Credits	Topics
VOCATIONAL SKILL COURSE			
RJVSCMAT351 & RJVSCMATP351	Computer Programming	04 (2T+2P)	1. Web page Development: HTML 2. Basic programming constructs: Java Introduction

CREDIT STRUCTURE FOR SEMESTER VI

Course	Nomenclature	Credits	Topics
VOCATIONAL SKILL COURSE (Any one from A and B)			
RJVSCMAT36A	SQL	02	1. Basic SQL 2. Advanced SQL
RJVSCMAT36B	Geometry	02	1. Planes, Straight Lines and Spheres 2. Locus, Surfaces, Curves and Conicoids

T.Y.B.Sc. Semester V Mathematics (Major) Syllabus

Vocational Skill Course (VSC)

Title: Computer Programming **Course code: RJVSCMAT351**

Credits: 04 (02L+02P)

UNIT I: Web page development: HTML [15 hours]

1. Introduction to HTML, advantage and disadvantage of HTML, study of tags, < HEAD> ,<TITLE>, <BODY>, <P>, < BR>, <UL>, <OL>, <PRE>, <MARQUE>,

2. STUDY OF FONTS-< B>, <I>, <U>, <BIG>, <SMALL>, <SUB>, <SUP>, <FONT>
3. STUDY OF TABLES -< TABLE>, <CAPTIONS>, <TR>, <TH>, <TD>

4. STUDY OF IMAGE -H REF, HR, <IMG> SRC, ALT, HEIGHT, WIDTH, ALIGN

5. Use of scripting: using Java Script. Basic programs using java script.

6. Creating interactive web pages using Java Script.

7. Using conditional statement of java script in web page.

UNIT II: Basic programming constructs: Java Introduction [15 hours]

1. Object-Oriented approach: Features of object-orientations: Abstraction, Inheritance, Encapsulation and Polymorphism.

2. Introduction: History of Java features, different types of Java programs, Differentiate Java with C. Java Virtual Machine.

3. Java Basics: Variables and data types, declaring variables, literals numeric, Boolean, character and string literals, keywords, type conversion and casting. Standard default values. Java Operators, Loops and Controls

4. Classes: Defining a class, creating instance and class members: creating object of a class, accessing instance variables of a class, creating method, naming method of a class, accessing method of a class.

5. Access control: public access, friendly access, protected access, private access.

6. Arrays: declaring array variables, creating array objects, accessing array elements.

7. Constructor and Finalizer: Basic Constructor, parameterized constructor, finalize () method, overloading constructor.

8. Inheritance – Various types of inheritance, super and sub classes, Extend keyword, Super keyword, creating abstract class, creating abstract methods, method overriding

9. Final – Final variables, Final methods & Final classes

10. Concept of packages. Inter class method: parseInt ().

Vocational Skill Course Practical **Course code: RJVSCMATP351**

List of Practicals based on Computer Programming **[60 hours]**

1. HTML page creation
2. Interactive Web pages with Java Script.
3. Basic Java Programs
4. Creating Object Oriented Programs using Conditional & loop statements.
5. Creating Inherited classes using java
6. Creating Applet Programs in Java

References Books:

1. Data base management system, Ram Krishnam, Gehrke, McGraw-Hill
2. Elsmasri and Navathe, "Fundamentals of Database Systems" Pearson Education.
3. Peter Roband Coronel, "Database System, Design, Implementation and Management", Thomson Learning.
4. C.J. Date, Longman, "Introduction database system", Pearson Education.
5. Jeffrey D. Ullman, Jennifer Widsom, "A First Course in Database Systems", Pearson Education.
6. Java the complete Reference, 8th Edition, Herbert Schildt, Tata McGraw Hill.

SEMESTER	V VOCATIONAL SKILL COURSE
TITLE OF THE COURSE	COMPUTER PROGRAMMING
COURSE CODE	RJVSCMAT351 & RJVSCMATP351
CREDITS	04 (02L+02P)
DURATION	90 (30+60) HOURS

LEARNING OBJECTIVES	
1	Introduction to Web programming using HTML
2	To understand Object oriented programming system.
3	To understand various Java concepts related to Inheritance.

COURSE OUTCOME NUMBER	On completing the course, the student will be able to:	PSO addressed	BLOOM'S LEVEL
CO1	create Applet based programs.	1,3,6	2,3
CO2	create new versions of existing classes using Inheritance concept.	1,3,6	2,3
CO3	create & execute Object oriented programs using Java Programming Language.	1,3,6	2,3

T.Y.B.Sc. Semester VI Mathematics (Major) Syllabus

Vocational Skill Course

Title: SQL **Course code: RJVSCMAT36A**

Credits: 02

List of Practicals: **[60 hours]**

1. Introduction to Data base Concepts: DDL, DML, DQL
2. DDL: Create , Alter & Drop Commands.
3. DML: Insert, Update & Delete Command.
4. DQL: using SELECT Command with various clauses: Where, Group by, Having, Order by.
5. Using Constraints: Not Null, Check, Unique key, Primary Key, Foreign Key, Default.
6. Functions: Aggregate functions- AVG, SUM, MIN, MAX and COUNT, Date functions- ADD_MONTHS(), CURRENT_DATE(), LAST_DAY(), MONTHS_BETWEEN(), NEXT_DAY(). String functions- LOWER(), UPPER(), LTRIN(), RTRIM(), TRIN(), INSERT(), RIGHT(), LEFT(), LENGTH(), SUBSTR(). Numeric functions: ABS(), EXP(), LOG(), SQRT(), POWER(), SIGN(), ROUND(number).

Advanced SQL:

7. Joining tables: Inner, outer and cross joins.
8. UNION
9. Subqueries
10. Using Group functions with Subqueries

Reference Books

1. Ivan Bayross, "SQL, C PROGRAMMING – The Programming languages of Oracle" B.P.B. Publications, 3rd Revised Edition.

2. George Koch and Kevin Loney, ORACLE "The complete Reference", Tata McGraw Hill, New Delhi.
3. Elsmasri and Navathe, "Fundamentals of Database Systems" Pearson Education.
4. Peter Roband Coronel, "Database System, Design, Implementation and Management", Thomson Learning.
5. C.J. Date, Longman, "Introduction database system", Pearson Education.
6. Jeffrey D. Ullman, Jennifer Widsom, "A First Course in Database Systems", Pearson Education.

SEMESTER	VI VOCATIONAL SKILL COURSE
TITLE OF THE COURSE	SQL
COURSE CODE	RJVSCMAT36A
CREDITS	02 (Practical)
DURATION	60 HOURS

LEARNING OBJECTIVES	
1	Learn to create and manage tables with data.
2	Learn to use inbuilt functions to get appropriate information from underlying tables.
3	Learn to consolidate data and get required output.

COURSE OUTCOME NUMBER	On completing the course, the student will be able to:	PSO addressed	BLOOM'S LEVEL
CO1	understand RDBMD and data handling	1,3,6	2,3
CO2	create tables and manage data using SQL commands	1,3,6	2,3
CO3	merge data of tables to create consolidated output.	1,3,6	2,3

Vocational Skill Course

Title: Geometry **Course code: RJVSCMAT36B**

Credits: 02

UNIT I: Planes, Straight Lines and Spheres [15 Hours]

Planes: Distance of a point from a plane, Angle between two planes, pair of planes, Bisectors of angles between two planes; Straight lines: Equations of straight lines, Distance of a point from a straight line, Distance between two straight lines, Distance between a straight line and a plane; Spheres: Different forms, Intersection of two spheres, Orthogonal intersection, Tangents and normal, Radical plane, Radical line, Coaxial system of spheres, Pole, Polar and Conjugacy.

UNIT II: Locus, Surfaces, Curves and Conicoids [15 Hours]

Space curves, Algebraic curves, Ruled surfaces, Some standard surfaces, Classification of quadric surfaces, Cone, Cylinder, Central conicoids, Tangent plane, Normal, Polar planes, and Polar lines.

Recommended Books:

1. Robert J. T. Bell. An Elementary Treatise on Coordinate Geometry of Three Dimensions. Macmillan India Ltd., 1994.

2. D. Chatterjee. Analytical Geometry: Two and Three Dimensions. Narosa Publishing House, 2009.

SEMESTER	VI VOCATIONAL SKILL COURSE
TITLE OF THE COURSE	GEOMETRY
COURSE CODE	RJVSCMAT36B
CREDITS	02
DURATION	30 HOURS

LEARNING OBJECTIVES	
1	Properties of plane, straight line, sphere
2	Properties of surfaces, curves, conicoids

COURSE OUTCOME NUMBER	On completing the course, the student will be able to:	PSO addressed	BLOOM'S LEVEL
CO1	Find distance between different geometric objects	1,3,5,6	2,3
CO2	Derive tangent lines, tangent planes, normal	1,3,5,6	2,3
CO3	Classify quadric surfaces	1,3,5,6	2,3

Suggestive Scheme of Examination

Internal Assessments: There will be one Internal Assessment of 20 marks for each Vocation Skill Course. The internal assessment will be done through Assignment / class test and will be held online/offline.

Semester End Examinations: There will be a Semester end theory examination of 30 marks for each Vocation Skill Course. The SEE will be objective and/or subjective based and will be held online/offline.

Semester End Practical Examinations: At the end of the Semester V Practical examinations of 90-minute duration and of 40 marks shall be conducted for the Vocational Skill course RJVSCMAT35A.

Marks for Journals: 10 marks. A student must have a certified journal before appearing for the practical examination.