**2.6.1**

**NAME OF THE DEPARTMENT: MATEMATICS**

**NAME OF THE PROGRAMME: BSc MATHEMATICS PROGRAMME CODE: 220**

### PROGRAMME SPECIFIC OUTCOMES (PSO)

|  |
| --- |
| **Intended outcomes** |
| PSO1: Acquire knowledge in functional areas of Mathematics and apply in all the fields of learning. |
| PSO2: Equip the student with skills to analyze problems, formulate a hypothesis, evaluate and validate results, and draw reasonable conclusions thereof. |
| PSO3: Employ mathematical ideas encompassing logical reasoning, analytical, numerical ability, theoretical skills to model real-world problems and solve them. |
| PSO4: Develop critical thinking, creative thinking, self confidence for eventual success in career. |
| PSO5: Analyze, interpret solutions and to enhance their Entrepreneurial skills, Managerial skill and leadership |
| PSO6: Recognize the need for lifelong learning and demonstrate the ability to explore some mathematical content independently. |
| PSO7: To prepare the students to communicate mathematical ideas effectively and develop their ability to collaborate both intellectually and creatively in diverse contexts. |
| PSO8: Imbibe effective scientific and/or technical communication in both oral and writing. |
| PSO9: Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical sciences. |

**COURSE OUTCOMES (CO)**

|  |  |  |
| --- | --- | --- |
| **Semester** | **Course name and course code** | **Indented outcomes** |
| 1. | Methods of Mathematics  MM 1141 | CO1: Define maxima, minima, critical points and points of inflection. |
| CO2: Apply the concept of differentiation in real life situation. |
| CO3: Describe the integration of a function and learn its physical interpretation through various examples. |
| CO4: Demonstrate various applications of integration. |
| CO5: Apply the concept of integration in real life situation. |
| 2. | Foundations of Mathematics  MM 1221 | CO1: Explain logic and various proof techniques. |
| CO2: Compute tangent lines to polar curves, arc length and area. |
| CO3: Sketch conic sections such as parabola, ellipse and Hyperbola |
| CO4: Distinguish the cylindrical and spherical coordinate systems. |
| 3. | Elementary Number Theory and Calculus – I  MM 1341 | CO1: Illustrate decomposition of an integer into prime factors |
| CO2: Explain the concept of congruence |
| CO3: Compute tangent lines to polar curves, arc length and area |
| CO4: Define the concept of limit, continuity, derivative of vector valued functions. |
| CO5: Illustrate various applications of multivariable calculus |
| 4. | Elementary Number Theory and Calculus – II  MM 1341 | CO1: Explain the concept of congruence |
| CO2: Analyze linear system of congruence equations |
| CO3: Describe the concepts of Multiple integrals. |
| CO3: Apply double and triple integrals to solve real life problems. |
| CO4: Describe the concepts potential functions, line integrals and surface integrals. |
| 5. | Real Analysis – I  MM 1541 | CO1: Understand the fundamental properties of Real Numbers that corroborate the formal development of Real Analysis. |
| CO2: Demonstrate and understand the theory of real sequences and series. |
| CO3: Ability to check the convergence or divergence of different sequences and series |
| CO4: Understand and perform simple proofs. |
| CO5: Understand the concepts related to Metric spaces |
| 5. | Complex Analysis – I  MM 1542 | CO1: Understand the algebraic operations of complex numbers, complex functions |
| CO2: Understand the limits, continuity and differentiability of complex functions. |
| CO3: Analyze analytic functions and other elementary functions. |
| CO4 : Apply contour integration, Cauchy’s theorem and Cauchy’s integral formula |
| 5. | Abstract Algebra – Group Theory  MM 1543 | CO1: Apply algebraic ways of thinking. |
| CO2: Examine abstractly about algebraic structures. |
| CO3: Analyze a given structure in detail |
| CO4: Compare structures. |
| 5. | Differential Equations  MM 1544 | CO1: Solve linear-first order ordinary differential equations. |
| CO2: Solve homogeneous and non-homogeneous linear differential equations with constant coefficients. |
| 5. | Mathematics Software – LATEX & Sage Math (Practical Examination Only)  MM 1545 | CO1: Know the basics of typesetting an article for a scientific publication. |
| CO2: Typeset mathematical expressions in a LATEX document. |
| CO3: Understand the basics of sage math. |
| CO4: Understand the basics of making a slide-show presentation using Beamer. |
| 5. | Business Mathematics (Open Course)  MM 1551.2 | CO1: Develop ability to solve problems related to simple and compound interest which would help the students while appearing for competitive examinations. |
| CO2: Developing the skill to mathematically formulate the problems of business and economics and solving them using the techniques of Calculus. |
| CO3: Getting introduced to the concepts of index numbers and its use in business and economics. |
| CO4: Getting aware of the significance of time series analysis in various realms of economics and business. |
| 6. | Real Analysis – II  MM 1641 | CO1: Understand the concepts of continuity, differentiability and integrability, more rigorously than what we done in the previous calculus course. |
| CO2: Understand the fundamental properties of continuous functions on intervals. |
| CO3: Understand the basic theory of derivatives. |
| CO4: Get an exposure to the theory behind the integration. |
| 6. | Complex Analysis – II  MM 1642 | CO1: Understand Sequence, Series and Power Series Representation of Complex Functions |
| CO2: Understand Singular Points, Zeros and Residue of Complex Functions |
| CO3: Apply Taylor’s Series, Laurent Series and Residue Theorem |
| CO4: Understand Conformal Mapping, Linear Fractional Transformation and Cross-ratio. |
| 6. | Abstract Algebra – Ring Theory  MM 1643 | CO1: Construct substructures. |
| CO2: Understand and prove fundamental results and solve algebraic problems using appropriate techniques. |
| CO3: Demonstrate insight into abstract algebra with focus on algebraic theories. |
| CO4: Develop new structures based on given structures |
| **6.** | Linear Algebra  MM 1644 | CO1: Understand elementary concepts in vector space, subspace, linear transformation, eigenvalues and eigenvectors. |
| CO2: Find the bases and dimension of a vector space. |
| CO3: Diagonalize various types of matrices. |
| **6.** | Integral Transforms  MM 1645 | CO1: Categories and solve different integral equations using various techniques. |
| CO2: Enable to apply Laplace Transforms to various industry related and applied problems. |
| CO3: Analyze the properties of certain functions using Fourier series |
| **6.** | Graph Theory  (ELECTIVE)  MM 1661.1 | CO1: To define and understand the fundamental concepts of graph theory |
| CO2: To apply the concepts and theorems that are treated in the course for problem-solving and proofs. |
| CO3: To write combinatorial proofs, including those using basic graph theory proof techniques such as minimal counterexamples, double counting, and Mathematical induction. |

**2.6.2. Attainment of PO s and Co s are evaluated.**

Course outcomes and program outcomes (POs) are determined using various methods. Students' knowledge and skills are put to the test right away through their performance in class/assignment exams, internal assessment tests, assignments, semester examinations, seminars, mini-projects, and other activities. These approaches provide a sampling of what students know and/or are capable of doing, as well as reliable evidence of student learning.