

Name of the Department : DEPARTMENT OF MATHEMATICS

Academic Year : 2017-18

A. Program Outcome and Program Specific Outcomes

Name of the programme (UG/PG/M.Phil./ Diploma etc.)	Programme Outcomes Students will be able to	Program Specific Outcomes Students will be able to
UG	1. skillful in logical thinking and reasoning.	1. be able to clear exams in mathematical aptitude
	2. able to apply mathematics for problems occurring in different fields of science and engineering.	2. be able to analyse any data using statistical tools
	3. be able to take up mathematics programme at Master's level anywhere in and outside India.	3. be able to develop codes using C-language for simple problems
		4. be able to use packages like octave, R etc.
		5. be able to apply mathematics for solving transportation problems, assignment problems and some physical problems involving differential equations, transforms, vector calculus etc.
PG	1. strong in logical thinking and reasoning to solve any problem.	1. have acquired strong knowledge in the core areas of Mathematics and applications of Mathematics to continue with research.
	2. able to take up any project from the fields of science and engineering.	2. be proficient in Mathematics to teach it at school and college level.
	3.	3. be skillful to take up jobs that require sound knowledge in Mathematics in different private and public sectors.

Name of the programme (UG/PG/M.Phil./ Diploma etc.)	Programme Outcomes Students will be able to	Program Specific Outcomes Students will be able to
M.Phil.	1. able to analyse and write logical arguments to prove mathematical concepts	1 be proficient in teaching mathematics for students at the University level
	2. able to communicate mathematical ideas coherently	2 be able to pursue research in mathematics
	3 able to take up research as a career	3 have developed abstract mathematical thinking

B1. Course Outcomes of all Programmes Offered by the Department

Name of the Programme : B.Sc. Mathematics

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
1.	Core Course I - Algebra, Trigonometry and Differential Calculus	U14MA101	1 find the eigen values, eigen vectors of a given matrix.
			2 expand circular functions as a series.
			3 evaluate limits of combination of trigonometric functions.
			4 find higher derivatives of given functions.
2	Core course II - Integral Calculus and Analytical Geometry of Three Dimensions	U14MA202	1 know the evaluation of indefinite integrals of standard forms.
			2 know methods of solving multiple integrals.
			3 be able to understand properties of straight lines and spheres.
3	Elective I - Vector Calculus	U14MA2:1	1 find derivatives of vector functions.
			2 evaluate line, surface and volume integrals.
4	Core Course III - Sequences and Series	U17MA303	1 test convergence of a given sequence and of a given series.
5	Core Course IV - Differential Equations and Laplace Transforms	U14MA304	1 classify and solve specific types of ordinary and partial differential equations.
			2 solve differential and integral equations using Laplace transforms.
6	Allied Course III - Mathematical Statistics I	U17MAS31	1 analyse discrete and continuous data through measures of central tendency and measures of dispersions.
7	Core Course V - Theory of Equations and Fourier Series	U16MA405	1 find roots of a given algebraic equation and find algebraic equation having given roots.
			2 find Fourier series of a given periodic function.

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
8	Allied Course IV - Mathematical Statistics II	U17MAS42	1 deduce statistical inference of a given data through sampling techniques.
9	Allied Practical – Mathematical Statistics III	U16MA4P1	1 develop codes using R for analysing statistical data.
			2 use different modules of R for different applications to analyse a data
10	Core Course VI – Algebra	U16MA506	1 identify different algebraic structures, isomorphic and non-isomorphic structure.
11	Core Course VII– Real Analysis	U16MA507	1 analyse continuity, derivability, integrability of given real valued function and find derivatives, integrals of given real valued function through limits.
			2 analyse the structure of the real line.
12	Core Course VIII – Mechanics	U14MA508	1 resolve a given force and find equation of catenary.
			2 analyse the motion of a projectile.
			3 analyse simple harmonic and orbital motions.
13	Core Course IX – Numerical Methods	U14MA509	1 solve algebraic, differential and integral equations numerically.
14	Core Course X – Complex Analysis	U16MA610	1 identify analytic functions
			2 analyse the effect of Bilinear Transformations on the complex plane.
			3 evaluate complex integrals through residues.
15	Core Course XI – Discrete Mathematics	U16MA611	1 construct compiling techniques based on lattices & Boolean algebra.
			2 encode& decode messages through formal languages.
16	Core Course XII – Elementary Number Theory	U16MA612	1 analyse integers
			2 solve problems in combinatorics

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
17	Elective II – Mathematical Modeling	U16MA6:2	1 deduce inferences from a given mathematical model.
18	Elective III – Operations Research/Graph Theory	U16MA6:3	1 identify standard graphs and list their properties.
			2 use standard graphs to model different networks and study the networks.
19	SBEC Course I - Mathematics for Competitive Examinations	U14MA1S1	1 solve arithmetic problems in various screening examinations
20	SBEC Course II – Introduction to Scientific Computing (OCTAVE)	U16MAPS2	1 develop codes (using OCTAVE) to solve algebraic & differential equations.
			2 trained in using different modules of OCTAVE to solve algebraic differential equations.
21	SBEC Course III – Programming in C (Linux OS)	U14MAPS3	1 develop codes in C to solve algebraic, differential & integral equations.
			2 work in Linux operating systems.
22	LIFE SKILLS	U16LFS41	1 face interviews with confidence.
23	Extra Credit Course-I –Data Structures and Algorithms	UXMA5:1	1 analyse and create algorithms.
24	Extra Credit Course-II –Fourier transforms	UXMA5:2	1 solve Partial Differential Equations using Fourier Transforms
25	Extra Credit Course-III–Fuzzy Mathematics	UXMA6:1	1 identify fuzzy sets and perform set operations on fuzzy sets.
26	Extra Credit Course-IV – Simulation	UXMA6:2	1 model simple systems.

B2. Course Outcomes of all Programmes Offered by the Department

Name of the Programme : M.Sc. Mathematics

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
1	Core Course I - Real Analysis	P14MA101	1 know the structure of the real systems, the metrics, behavior of functions at limit points etc.
			2 be able to analyse metric spaces and functions defined on metric spaces.
2	Core Course II - Linear Algebra	P14MA102	1 analyse vector spaces and transformations defined on vector spaces.
3	Core Course III - Ordinary Differential Equations	P16MA103	1 analyse the existence and behavior of solution of an initial value problem and a system of non-linear equations.
4	Core Course IV - Calculus of Variation, Integral Equations and Transforms	P16MA104	1 solve boundary value problems through integral equations using Green's function.
			2 find extreme values of functionals
5	Elective Course I - Graph Theory	P14MA1:1	1 identify standard graphs and list their properties.
			2 use standard graphs to model different networks and study the networks.
6	Core Course V - Algebra	P14MA205	1 analyse structure and properties of finite abelian groups, rings and modules.
			2 construct finite extensions of fields.
			3 investigate the resolving field of polynomials.
			4 investigate solvability of polynomials through Galois theory.
7	Core Course VI - Partial Differential Equations	P14MA206	1 classify and solve first and second order partial differential equations.

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
8	Core Course VII - Fluid Dynamics	P16MA207	1 analyse the technical characteristics like pressure, velocity, viscosity of two dimensional and three dimensional flows and their media.
9	Elective Course II - Object Oriented Programming in C++	P16MA2:P	1 develop codes in C++ to solve problems.
10	Core Course VIII - Topology	P14MA308	1 analyse various topological spaces and the properties of functions defined on these spaces.
11	Core Course IX – Measure and Integration	P14MA309	1 identify measurable sets and measurable functions.
			2 identify Integrable functions and evaluate Lebesgueintegrals
12	Core Course X – Complex Analysis	P14MA310	1 evaluate radius of convergence of a given power series.
			2 identify and analyse properties of analytic functions, meromorphic functions.
			3 evaluate definite complex integrals
13	Core Course XI - Probability & Statistics	P16MA311	1 calculate the probability for any event and use it to estimate certain possibilities.
			2 identify the distributions depending on the nature of the data and derive inferences.
14	Elective Course III - Fuzzy Set Theory and its Applications	P17MA3:1	1 identify fuzzy sets and perform set operations on fuzzy sets.
			2 apply fuzzy logic in various real life situations such as decision making and inventory control.

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
15	Core Course XII - Functional Analysis	P14MA412	1 identify various properties of Banach & Hilbert spaces.
			2 analyse properties of operators defined on these spaces.
			3 construct Banach algebras through Banach spaces.
16	Core Course XIII - Numerical Analysis	P14MA413	1 derive the rate of convergence and estimate the error in a constructed numerical technique.
			2 construct interpolating polynomials.
17	Core Course XIV - Operations Research	P14MA414	1 solve Integer Programming problems.
			2 construct operational research models to solve problems in decision making
18	Elective Course IV - Stochastic Processes	P14MA4: 1	1 identify and classify various stochastic processes.
			2 construct queuing models and derive programme measures of a queuing model.
19	Core Course - Differential Geometry		1 have the geometrical ideas over the surfaces, the normals and tangents, curvature and related equations of evolutes and involutes.
			2 be able to understand the physical systems involved in partial differential equations
20	Core Course - Classical Dynamics		1 understand dynamical systems based on the laws governing oscillations, motions, variations and related physical phenomena.
21	Core Course - Algebraic Number Theory		1 have an introduction of results on algebraic congruencies and residues.

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
22	Core Course - Advanced Analysis		1 to acquire an understanding of functions of several variables.
			2 to apply the techniques used in Real and Complex Analysis in extending the results to 'n' dimensional space.
			3 to prove the results on mathematical analysis and to formulate precise mathematical arguments.
23	Core Course -Rings and Modules		1 have a clear understanding over the basic structures of Rings and Modules
			2 understand the structure of abelian groups through the idea of finitely generated modules.
24	Elective Course - Computational Fluid Dynamics		1 know the construction of numerical methods with appropriate meshes to solve problems of fluid flows.
			2 know the appropriate packages from the software OCTAVE for solving problems of fluid dynamics.
25	Elective Course - Boundary Value Problems		1 know the properties of dynamical systems in nature.
			2 be able to apply the concepts of ordinary/partial differential equations in various problems in nature.
			3 be able to apply the concepts of special functions in problems on fluid motions.
26	Elective Course – MATHLAB		1 know the essential commands of MATLAB.
			2 know how to solve flow problems using MATLAB.
			3 be able to apply SIMULINK in population dynamics, Linear Economic models and Linear Programming Problems

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
27	Elective Course - Programming with JAVA		1 write simple programs using JAVA
28	Elective Course – Combinatorics		1 understand the concepts in combinatorial analysis and techniques of discrete methods.
29	Extra Credit Course I - Finite Difference Methods	P14MAX:1	1 to understand the discretization of differential equation and to apply to solve differential equations numerically.
			2 to analyse the stability theory of system of differential equations
30	Extra Credit Course II - Information Theory	P14MAX:2	1 know the classification of channels and their information processes.
			2 be able to understand the basic concepts of information theory and coding theory.
31	Extra Credit Course III - Wavelet Theory	P14MAX:3	1 know the basic concepts of wavelet theory.
			2 be able to understand construction of wavelets.
			3 be able to comprehend wavelets on the real line.
32	Extra Credit Course IV - Theory of linear Operators	P14MAX:4	1 know the theory of linear operators and their properties in normed spaces
			2 be able to understand the characteristics of linear operators.
33	Extra Credit Course V - Mathematical Physics	P14MAX: 5	1 be able to comprehend some special mathematical functions and their relevance in other fields.
			2 be able to analyse boundary value problems and their applications in other fields.
34	Extra Credit Course VI - History of Modern Mathematics	P15MAX:6	1 know the prominent movements in modern mathematics.
			2 know the mathematicians' work and their valuable contributions.

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
35	Extra Credit Course VII - Research Methodology	P15MAX:7	1 know the process of academic writing.
			2 know to write a thesis.

B3. Course Outcomes of all Programmes Offered by the Department

Name of the Programme : M.Phil.

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
1	Core Course I – Research Methodology	M09MA1P1	1 present his/her research findings in the form of a research article acceptable for publication.
			2 prepare a research thesis using LaTeX.
			3 use MATLAB for scientific computations.
2	Core Course II – Advanced Mathematics	M16MA102	1 evaluate derivatives of functions of several variables.
			2 differentiate integrals.
			3 derive canonical forms of a linear transformation.
			4 pursue research.
3	Core Course – III – Methodology of Teaching and Learning Mathematics	M09MA103	1 able to teach Mathematics at the College/ University level
			2 skilfulin handling various modern technological tools in teaching Mathematics
			3 able to make the listeners involve themselves in academic discussion
4	Elective Course I – Mathematical Modelling	M09MA:01	1 model dynamical systems using systems of differential equations
			2 fit a model to a data graphically
			3 model systems using graphs of functions

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
5	Elective Course II – Numerical Solutions to Singular Perturbation Problems	M09MA:02	1 understand the importance of singularly perturbed differential equations and the behavior of solutions
			2 evaluate the convergence of a numerical method involving classical finite difference scheme on fitted meshes for solving linear second order differential equations.
			3 develop codes in FORTRAN (LINUX OS) to solve singularly perturbed linear differential equations
6	Elective Courses III - Fuzzy Theory and Applications	M12MA:03	1 understand fuzzy sets, fuzzy functions, differentiation and integration of fuzzy functions
			2 solve fuzzy linear programming problem
			3 solve fuzzy linear system of algebraic equations
7	Elective Courses IV - Manpower Planning	M12MA:04	1 understand various stochastic processes
			2 derive the parameters of a stochastic model for a single grade manpower system
			3 derive the parameters of a stochastic model for two and three grade manpower systems
8	Elective Course V - Advanced Operations Research	M12MA:05	1 formulate and solve a non-linear programming problem
			2 understand Markov chains and queuing models
			3 understand zero-one programming problem and network models
9	Elective Course VI - Polynomials in Graph Theory	M15MA:06	1 understand the applications of Weiner polynomials in molecular graphs
			2 understand the applications of characteristic polynomials in molecular graphs
			3 understand edge detour polynomials

