PG and Research Department of Mathematics

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COURESE OUT COME

Real Analysis (sub code : 16SCCMM10)

PCO1 Real analysis serves are the basis for measure theory, axiomatic probability, which follow to stochastic processes.

PCO1 Stochastic processes are used in finance, trading, computer and network, simulations, modeling, manufacturing, quality control.

PCO2 Real Analysis with Real Applications.

PCO3 A well balanced subject.

Real Analysis (sub code : P16MA12)

PCO1 Applications of Fourier analysis and probability theory.

PCO2 Real Analysis tools in Harmonic Analysis and some applications.

The proof of the inverse function theorem. Simplified by means of the fixed point theorem about contraction mappings.

The chapter and the Riemann-Stieltses integral has been the useful subject.

Measure Theory and Integration (sub code :P16MA32)

PCO1 Measure theory and integration from there the reader is led to the general notion of measure, to the construction of the lebesgue integral as a measure space, and to the major limit theorems.

PCO2 Measure theory we look carefully at various ways to measure the size of a set. Measure theory along with the associated. Theory of Lebesque integration, has important Application in many areas. Including Functional Analysis, Harmonic Analysis and probability theory.

Functional Analysis (sub code :P16MA41)

PCO1 Functional analysis is a powerful tool when applied to mathematical problems. The present book provides, by careful selection of material, a collection of concept and techniques essential for the modern subject.

PCO2 Functional Analysis Problems related to ordinary and partial differential

equations, numerical analysis, calculus of variations, approximation theory,

integral equations.

Partial Differential Equations (sub code :P16MA23)

PCO1 A partial differential equation is differential equations that contain unknown multivariable functions and their partial derivatives.

PCO2 Partial differential equations used to formulate problems involving functions of several variables, used to create a computer model.

PCO3 This subjects the recent progress in linear and nonlinear partial differential equations. The real life of partial differential equations is heat and mass transfer and electrometric theory

Advanced Operation Research. (sub code :P16MAE4B)

PCO1 The Advanced Operation Research is the application of scientific and especially mathematical methods to the study and analysis of problems involving complex systems.

PCO2 If includes methods applied to the management and administration of organized military, governmental, commercial and industrial processes.

PCO3 Predation Research is the discipline of applying advance analytical methods to help make as better decisions.

PCO4 Non finding optimal decisions in production processes.

Operation Research(sub code :16SMBEMM1:1)

PCO1 Operation Research is a Arts and Science which deals with problem formulations solutions and finally appropriate decision making.

PCO2 It is most offers used to analyze complex real life problems typically with the goal of improving or optimizing performance.

PCO3 Simple method is an algebraic procedure in which a series of repetitive operation are used to reach at the optimal solution.

PCO4 The transportation problem is a distribution type problem. The main goal of which is to decide how to transfer goods from various receiving locations with minimal casts or maximum profit.

PCO5 Assignment problem refers to the analysis on how to assign objects to objects in the best possible way.

Graph Theory(sub code :16SMBEMM2:1)

PCO1 Graph Theoretical concepts are used to study and model various applications in different areas.

PCO2 Graph Theory is the study of graphs which are mathematical relations between objects.

PCO3 Graphs are useful is geometry and certain parts of topology such as know theory.

PCO4 The travelling sales man problem the show test spanning tree in a weighted graph, training as optimal mater of jobs and men and locating the shortest path between two vertices in a graph it also used in modeling transport networks, actively network and theory of graph.

Ordinary Differential Equations: (sub code :P16MA13)

PCO1 An equation involving one dependent variable and its derivatives with respect to one or more independent variables is called a differential equation. Application of this subject is second order linear equations, power series solutions, some special

functions, system of first order equations, the existence and uniqueness of solutions, qualitative properties of solutions nonlinear equations.

Uses of the subject are mathematics itself especially in geometry, and in engineering, economics and many other fields of applied science.

Complex Analysis: (sub code :P16MA21)

PCO1 Complex analysis is the branch of mathematics investigating holomorphic functions. Which are defined in some region of the complex plane, take complex values and are differentiable as complex functions.

PCO2 Applications of the complex analysis is analytic functions, complex integration, series and product developments. Uses of this subject is particular the theory of conformal mappings has many physical applications and is also used throughout analytic number theory. It has become very popular through a new boost from complex dynamics and the pictures of fractals produced by iterating holomorphic functions.

Differential calculus and Trigonometry (sub code :16SCCMM1)

PCO1 Y=f(x) represent a function that is differentiable on an open interval containing x. The differential of x is any non zero real number. The differential of y & dy=f' (x) dx.

PCO2 Applications of this paper Leibnitz theorem, maxima and minima, curvature, trigonometry.

PCO3 Uses of the paper is solve many types of real –world problems. We use the derivative to determine the maximum and minimum values of particular functions, examples cost, strength =, amount of material used in a building profit, loss, etc.

Analytical Geometry 3D: (sub code :16SCCMM4)

PCO1 The analytic geometry also known as coordinate geometry or Cartesian geometry, is the study of geometry using a coordinate system. This contrasts with synthetic geometry.

PCO2 Applications of this subject is coordinate in space planes, straight lines, sphere, the equation of the surface, cone, quadric cone.

PCO3 Analytic geometry is widely used in physics and engineering and also in aviation rocketry, space science and space and light.

Discrete MathematicsP16MAE3B)

PCO1 Discrete mathematics describes process that consist of a sequence of individual steps. This contrasts with calculus, which describes process that change in a continuous fashions.

PCO2 Where the ideas of calculus were fundamental to the science and technology of the industrial revolution, the ideas of discrete mathematics under lies the science and technology of the computer age.

PCO3 The main themes of a first course in discrete mathematics are logic and proof, induction and recursion, discrete structures, combinatory and discrete probability, algorithms and their analysis and applications and modeling.

Operation Research(sub code :16SMBEMM1:1)

Significant Features of Operation Research

PCO1 Decision making – Every Industrial organization faces multifacet problem to identify best possible solution to their problems. Operation Research aims to help the executives to obtain optimal solution with the use of Operation Research techniques.

PCO2 Scientific Approach: Operation Research applies scientific methods techniques and tools for the purpose of analysis and solution of the complex problems.

PCO3 System Approach: The main aim of the system approach is to trace for indirect effects on all sub – system on a system and to evaluate each action in terms of effects for the system as a whole.

PCO4 Use of computers: The models of Operation Research need lot of computation and therefore, the use of computers it is possible to handle compels problems requiring large amount of calculation.

SEQUENCES & SERIES(sub code :16SCCMM5)

PCO1 Sequences and series play an important role in various aspects of our daily life. They help us to predict, evaluate and monitor the outcomes of a situation as event and help us in decision making.

PCO2 Sequence is a list of objects which have been ordered in a sequential manner such that each number either comes before or after every other number. A series is a sum of a sequence of terms.

PCO3 Sequences and series deals with boundedness, monotonic, convergent, divergent, oscillating sequences, Algebra of limits, some theorems on limits and theorems on convergence and test of convergence.

LINEAR ALGEBRA(sub code :P16MA22)

PCO1 Linear algebra leads to abstract thinking to the linear. From the definitions, theorems and proofs of linear algebra one can think clearly and express themselves clearly to avoid misunderstanding and confusion.

PCO2 This subject deals with vector spaces, basis and dimension, matrix and inner product space, theory of matrices, characteristic equation and bilinear forms

APSTRACT ALGEBRA(sub code :16SCCMM12)

PCO1 Abstract algebra is the set of advanced topics of algebra that deal with abstract algebraic structures rather than the usual number system.

PCO2 These structures are groups, rings, fields, vector spaces.

PCO3 The real life problem can be converted into an equation which can be solved by using algebraic concepts abstract algebra introduce students a advanced mathematical concepts.

ASTRONOMY (sub code :16SMBEMM3:1)

PCO1 Astronomy is the study of the sun, moon, star, planet, etc and other non earthly bodies and phenomena. The astronomical knowledge is important for space.

PCO2 This subject gives the basic knowledge about earth, moon, sun and other celestials bodies and deals with the calculation of coordinates of celestial sphere, Dip of the horizon, season, calendar, kepler’s planetary lows, laws of refraction and lunar and solar eclipses.

GRAPH THEORY(sub code :16SMBEMM2:1)

PCO1 Graph theory pays a vital role in mathematical model to analyses many concrete real world problems successfully. Basic concepts such a paths walks, cycle has tremendous applications in network.

PCO2 Directed graphs and connectivity concepts are used in study of sequential machines, system, and analysis and communication network. Independent sets and coverings of graphs have several potential applications in practical situations.

PCO3 Matching has varied application in operations research. Kirkman's schoolgirl problem and scheduling problems are examples that can be solved by graph coloring.

LINEAR ALGEBRA(sub code : 16SCCMM10)

PCO1 Linear Algebra plays a significant role in all areas of mathematics which is used in most sciences and engineering areas.

PCO2 Systems of linear equations provides the origin of linear algebra and the computational techniques necessary to understand. Also deals with vector spaces, subspaces, bases and dimension.

PCO3 Linear transformations, polynomial, determinants, elementary canonical forms which roots, Taylor's formula, the Lagrange interpolation formula, develops determinates of square matrices and contains a discussion of the concepts which are basic to the analysis of a single linear transformation.

TOPOLOGY(sub code :P16MA33)

PCO1 Topology is concerned with the properties of space that are preserved under continuous deformation. This plays a significant role in functioning of networks.

PCO2 Topology is used in many branches of mathematics such as differentiable equations, Riemann surfaces in complex analysis, describing the space time structure of universe.

PCO3 Euclidean space, matrix spaces are topological spaces. The deformations are homeomorphism.

PCO4 The subject deals with topological spaces, connectedness, compactness and the countability and separation axioms.

STATICS (sub code :16SCCMM11)

PCO1 The six classification of simple machines were establishes by renaissance scientists. They are as follows, lever, wheel and axle, pulley, inclined.

PCO2 A simple machine is a device that changes the direction of a force or arguments a force. Simple machines fall into six categories.

PCO3 Arches and dames are structures that orbit structural strength and span large areas.

PCO4 The application of force alongside the glass will not disturb its equilibrium.

COMPLEX ANALYSIS(sub code :P16MA21)

PCO1 Complex analysis with applications in science and engineering weaves together theory and extensive applications in mathematics.

PCO2 Complex analysis has all roots of applications. Complex analysis is used in analytic behavior of defined sequences.

PCO3 Complex analysis has several applications to the study of Banch algebras in functional analysis.

PCO4 For example: Holomorphic functional calculus.

CALSSICAL DYNAMICS (sub code :P16MA31)

PCO1 Classical dynamics or Newtonian mechanics have many applications in daily life.

PCO2 Classical mechanics uses common-sense notions of how matter and forces exists and interact. It assumes that matter and energy have definite, knowable attributes such as 10 certain in space and speed.

PCO3 Dynamic viscosity, pressure and energy density , septic energy, energy.

DIFFERENTIAL GEOMETRY (sub code :P16MA42)

PCO1 Differential geometry can be applied to solve problems in digital signal processing. In probability, statistics, and information theory, one can interpret various structures as Riemannian manifolds.

PCO2 The latest results in Riemannian geometry, connections, sets, differential invariants. The calculus of variations differential equations, finagler structures and geometric methods.

Applications of Descriptive Statistics:

PCO1 The method is highly useful for professionals offering financial services as well as people who are conducting marketing research. The trends followed by a set of shares being traded on the market, or the fluctuations in the currencies across the world will be known. This helps the traders and brokers estimate the further movements and make the investment or advice their clients better. The latter can easily gauge the tends reflected by the consumers for a particular product. By knowing how many people on an average purchased the product during a certain period, the researchers will be able to formulate the marketing strategy in a more focused manner.

Applications of Probability Theory

PCO1 The subject of probability can be traced back to the 17^{th} century when it arose out of the study of gambling games.

PCO2 The range of applications extends beyond games into business decisions, insurance, law, medical tests, and the social sciences.

PCO3 The stock market, "the largest casino in the world," cannot do without it.

PCO4 The telephone network, call centers, and airline companies with their randomly fluctuating loads could not have been economically designed without probability theory.

Applications of Special Discrete Distributions

1. Binomial Distribution

PCO1 In many scientific works, in medical and military operations, in industries, quality control

2. Negative Binomial Distribution

PCO1 Large number of attempts are required to fix the number of success. Model for memory effect

3. Hyper Geometric Distribution

PCO1 Acceptance sampling in order to determine whether the entire lot is accepted or not

4. Poisson Distribution

PCO1 Number of spelling mistakes one makes while typing a single page. Number of phone calls at call centers per minutes.

Stochastic Process (sub code :P16MAE2A)

PCO1 An integral valued random variable is a power roll of generating function. Stochastic Process involves non negative integral valued random variable. T he principal advantage of stochastic process whole set of individual items. Stochastic process in queries theory in useful to telephone transfer.

Algebraic Number Theory(sub code :P16MAE5C)

PCO1 The theory of number is concurred with properties of the natural numbers. Prime number constitute an increasing and changeling area of research in number theory. Composite number play an important role in modern cryptography or coding system. Congruence is simple, useful powerful in the study of number theory. Number theory is used to develop

our skills, and confidence in reading, understating and writing mathematical arguments are improving.

ALGEBRA(sub code : P16MA11)

PCO1 Algebra as could as an outgrowth of all and a subject with an independent life and vigor. The word abstract is subject, concrete. The important algebraic systems are groups rings, side and vector space. An algebraic system can be described as a set of objects together with some operation for combining them. The main use of an algebra to develop over cortices knowledge thinking.

Classical Algebra and theory of numbers16SCCMM6)

PCO1 Algebra has evolved as an outgrowth of all and a subject with an independent life and vigor. An algebraic equation can be solved by using the method of A.P, G.P and H.P. The theory of numbers is concerned with the properties of natural number. Number theory is used to develop our skills.

Vector calculus and Fourier series (sub code :16SCCMM7)

PCO1 Vector calculus is the study of velocity, vector and scalar using addition, subtraction, dot product and Goss product operations. Integral is used to find out the length us the open curve.

PCO2 Surface integral is used to find out the area of a closed curve. Volume integral us used to find out the volume of the cubic region. Fourier series is used to find the value of the function using sine and cosine series.

Integral Equation calculus of variation transform: (sub code :P16MA15)

PCO1 **This course has been successfully used by almost all scientist and engineer**

PCO2 **Its importance as a discipline to be studied and cultivated.**

PCO3 **The object is to get single into the situation concerned.**

PCO4 **Expected that students will be able to transfer the learning gained from special case-studies.**

PCO5 **This courses at IIT. Kanpur, Manitoba university and university of waterloo to students from mathematics, science, engineering and commerce department.**

Mathematical Modeling: (sub code :P16MAE1B)

PCO1 Special courses on mathematical models in biology and medicine and maximum entropy models in science and engineering based subjects.

PCO2 Mathematical Modeling have appeared either discipline – centered, technique cented, situation centered.

PCO3 Mathematical Models are considered from different disciplines, but the choice is restricted to the models which can be understood through the particular class of techniques.

PCO4 Mathematical modeling can be learnt by making mathematical models.

DYNAMICS : (sub code : 16SCCMM14)

PCO1 This courses an introduction to the dynamics of a particle and is designed to meet the needs of undergraduate's students in mathematics physics and technology.

PCO2 Dynamics has since long, occupied a key place in applied mathematics curriculum and rightly so.

PCO3 Study of dynamics is to acquired an appreciation of the way mathematics creates in discipline and there by gains in strength and utility.

Differential Equation and Laplace Transform: (sub code :16SCCMM3)

PCO1 This course has several applications in almost all engineering disciplines, in system modeling, where large mathematical equations are used.

PCO2 In electrical circuits a Laplace transform is used for the analysis of linear time-invariant systems.

PCO3 Laplace transform methods have a key role to play in the modern approach to the analysis and design of engineering system.

PCO4 Laplace transform can be interpreted as a transformation from time domain where imparts and outputs are functions.

PCO5 The concepts of linear transform are applied in the area of science and technology in electric circuit analysis, communication engineering control engineering and nuclear physics.

Integral Calculus: (sub code :16SCCMM2)

PCO1 Computing the area between courses, volumes of work done by a varying force, average value of a function.

PCO2 Displacement which is the integral of velocity with respect to time.

PCO3 Integrals are used engineering in many areas of mathematics as well as in many other areas such as probability theory, determine the probability of some random variable falling within a certain range.

PCO4 The integrals discussed integral that connects differentiation also.

PROGRAM OUTCOME

B Sc Mathematics

PCO1 After your graduation from a B.Sc., mathematics degree, you can pursue course like MCA, M.Sc (IT), and actuarial sciences, MBA or M.Sc in mathematics.

PCO2 To get the most out of this course, it's best to immediately pursue higher studies after having completed your graduation. The world is your oyster afterwards, with a plethora of opportunities in research, academia, and technical institutes, Career opportunities can include hobs at financial companies, software developers, marketers and Bankers; everyone wants a good mathematician.

PCO3 In applied mathematics you have to creatively solve problems in business and social domains. Data analytics, a field which is the talk of town, often need people who are good with numbers and understand data. With excellent mathematical abilities you might just be picked up by political or military intelligence bodies to work as a cryptanalyst who deciphers encrypted messages.

PROGRAM OUTCOME

M Sc Mathematics

PCO1 M.Sc mathematics makes sure to provide advanced research skills and provide in – depth knowledge of reasoning and problem – solving skills to the students. It incorporates the foundation of mathematical thinking and teachers both pure and applied mathematics to the core.

PCO2 Mathematics offers a huge variety of career opportunities. These are

Accountancy and professional service:

The Actuarial Profession:

Banking

Computing and IT

Engineering Sciences

General Management

Postgraduate Study - PhD

Statistical Research Teaching etc.