

बरकतउल्ला विश्वविद्यालय,भोपाल
Barkatullah University, Bhopal

As per model syllabus of U.G.C. NewDelhi, drafted by
Central Board of Studies and Approved by Higher
Education and the Governor of M.P.



विज्ञान संकाय
Faculty of Science
Syllabus & Prescribed Books

B.Sc. Semester Examination 2010-11
V & VI Semester (Mathematics)
(10+2+3)

कुलसचिव
बरकतउल्ला विश्वविद्यालय,भोपाल

रु. 50 /—

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केन्द्रीय अध्ययन मण्डल द्वारा अनुशासित स्नातक पाठ्यक्रम की परीक्षा योजना

कक्षा बी.एससी./बी.ए. सेमेस्टर-V

विषय गणित

	प्रथम सत्र	प्रथम	I. Real Analysis वास्तविक विश्लेषण	50	150
		द्वितीय	II. Linear Algebra रैखिक बीजगणित	50	
		तृतीय	III. Discrete Mathematics विविक्त गणित	50	

उच्च शिक्षा विभाग, म.प्र. शासन
 बी.एससी/बी.ए. कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
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Department of Higher Education , Govt. of M.P.
B.Sc./ BA Semester wise syllabus

As Recommended by central Board of studies and Approved by the Governor of M.P.

अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	V
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- I
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	Real Analysis
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Compulsory

: Particulars/ विवरण :

Unit -1 इकाई-1	Riemann integral. Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus.
	रीमान समाकल, सतत एवं एकदिष्ट फलनों की समाकलनीयता, समाकलन का मूलभूत प्रमेय, समाकलन के माध्यमान प्रमेय।
Unit -2 इकाई-2	Partial derivation and differentiability of real-valued functions of two variables
	वास्तविक मान फलनों की दो चरों के आंशिक अवकलज एवं अवकलनीयता,
Unit -3 इकाई-3	Schwarz and Young's theorem. Implicit function theorem. Fourier series of half and full intervals.
	स्वार्ज एवं यंग के प्रमेय, अस्पष्ट फलन प्रमेय, अर्द्ध एवं पूर्ण अंतराल की फोरियर श्रेणी।
Unit -4 इकाई-4	Improper integrals and their convergence. Comparison tests, Abel's and Dirichlet's tests tests Frullani's integral. Integral as a function of a parameter.
	विषम समाकल एवं उनका अभिसरण, तुलना परीक्षण, आबेल एवं डिरिक्लेट का परीक्षण फ्रुलानी समाकल, प्राचलिक फलनों के रूप में समाकल

Unit -5	Continuity, derivability and integrability of an integral of a function of a parameter.
इकाई-5	संततता, प्राचलिक फलनों के रूप में अवकलनीयता एवं समाकलनीयता।

Text Books :-

1. R.R Goldberg, Real Analysis, Oxford & IBH Publishing Co., New Delhi, 1970.
2. G.F. Simmons. Introduction to Topology and Modern Analysis. McGraw-Hill, 1963.
3. म.प्र. हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Books :-

- 1 T.M Apostol, Mathematical Analysis. Narosa Publishing House. New Delhi, 1 985
2. S. Lang. Undergraduate Analysis, Springer-Verlag, New York, 1983.
3. D. Somasundaram and B. Choudhary, A first Course in Mathematical Analysis. Narosa Publishing House, New Delhi 199 /.
4. Shanti Narayan, A Course of Mathematical Analysis. S. Chand & Co. Delhi.
5. RK. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi. 2000.
6. P.K. Jain and K. Ahmed Metric Spaces, Narosa Publishing House, New Delhi, 1996.
7. S. Lang, Undergraduate Analysis, Springer-Verlag, New York 1983.
8. E.T. Copson, Metric Spaces, Cambridge University Press, 1968.

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Department of Higher Education , Govt. of M.P.

B.Sc./ BA Semester wise syllabus

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अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	V
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- II
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	II- Linear Algebra /रैखिक बीज गणित
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	Compulsory

: Particulars/ विवरण :

Unit-1 इकाई-1	Definition and examples of vector spaces, subspaces. Sum and direct sum of subspace. Linear span. Linear dependence, independence and their basic properties.
	सदिश समष्टि की परिभाषा एवं उदाहरण, उपसमष्टि, उपसमष्टियों का योग एवं सीधा योग, रैखिक विस्तृति, रैखिक आश्रितता, स्वतंत्रता एवं उनके मूल गुणधर्म।
Unit-2 इकाई-2	Basis. Finite dimensional vector spaces, Existence theorem for basis Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space.
	आधार, परिमित विमीय सदिश समष्टियाँ, आधार का अस्तित्व प्रमेय, आधार समुच्चय में अवयवों की संख्या की अपरिवर्तनशीलता, विमा, परिमित विमीय सदिश समष्टि की उपसमष्टि की पूरक उपसमष्टि का अस्तित्व,
Unit-3	Dimension of sums of subspaces. Quotient space and its dimension. Dual space, Bidual space and natural isomorphism. Adjoint of a linear transformation.
	उपसमष्टियों के योग की विमा, विभाग समष्टि एवं उसकी विमा। द्विद्वैत समष्टि एवं प्राकृत तुल्याकारिता, रैखिक रूपांतरण का संलग्न रूपांतरण।

Unit-4	Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem.
इकाई-4	रैखिक रूपांतरण एवं उनका आव्यूह निरूपण, रैखिक रूपांतरणों का बीज गणित, जाति शून्यता प्रमेय,
Unit-5	Eigen values and eigen vectors of a linear transformation. Diagonalisation
इकाई-5	रैखिक रूपांतरणों के आयगन मान एवं आयगन सदिश, विकर्णीकरण

Text Books :

1. K. Hoffman and R.Kunze, Linear Algebra, 2nd Edition. Prentice Hall Englewood Cliffs, New Jersey. 1971.

Reference Books:

- 1 K.B. Datta. Matrix and Linear Algebra, Prentice hall of India Pvt Ltd., New Delhi, 2000.
2. S.K. Jain, A. Gunawardena & P.B. Bhattacharya. Basic Linear Algebra with MATLAB Key college Publishing (Springer-Verlag) 2001.
3. S. Kumarsaran, Linear Algebra, A Geometric Approach Prentice – Hall of India, 200

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Semester/ सेमेस्टर	:	V
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	Discrete Mathematics विविक्त गणित
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	Compulsory /अनिवार्य

: Particulars/ विवरण :

Unit -1	Cardinality. Mathematical Induction Principle of Inclusion and exclusion
इकाई-1	गणनीयता,(गणन-संख्येयता) गणितिय आगमन का सिद्धान्त, इनक्लुजन एवं एक्सक्लुजन
Unit -2	Binary Relations. Equivalence Relations and Partitions. Partial Order Relation
इकाई-2	द्विचर संबंध, तुल्यता संबंध एवं विभाजन आंशिक क्रम संबंध
Unit -3	Graphs, Multigraphs. Weighted Graphs.
इकाई-3	ग्राफ, बहुग्राफ भारित ग्राफ
Unit -4	Paths and Circuits. Shortest Paths. Eulerian Paths and Circuits
इकाई-4	पथ एवं परिपथ लघुतम पथ आयलर पथ एवं परिपथ
Unit -5	Trees and its Properties.
इकाई-5	वृक्ष एवं उसके गुणधर्म

Text Books:

1. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science series 1986.
2. Narsingh Deo : Graph Theory, McGraw Hill.

Reference Book:

1. Babu Ram, Discrete Mathematics, Vinayak Publication.
2. म.प्र. हिन्दी ग्रंथ अकादमी

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Faculty of Science
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VI Semester (Mathematics)
(10+2+3)

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केन्द्रीय अध्ययन मण्डल द्वारा अनुशासित स्नातक पाठ्यक्रम की परीक्षा योजना

कक्षा बी.एससी./बी.ए. सेमेस्टर-VI

विषय गणित

2	द्वितीय सत्र	प्रथम द्वितीय तृतीय (एच्छिक) दी गई सूची में से कोई एक	<p>I. Metric spaces</p> <p>II. Numerical Analysis</p> <p>III. Any one of the following</p> <p>Optional Papers :</p> <p>a) Principles of Computer Science</p> <p>b) Differential Geometry</p> <p>c) Advanced Discrete Mathematics</p> <p>d) Dynamics of Rigid Bodies</p> <p>e) Mathematical Modelling</p> <p>f) Applications of Mathematics in Finance</p> <p>g) Tensor and Special theory of Relativity</p> <p>h) Elementary and Combinatorial Number theory</p> <p>i) Computational Mathematics Laboratory</p> <p>j) Probability Theory</p> <p>k) Programming in C & Data Structure</p> <p>l) Elementary Statistics</p>	50 50 50	150
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उच्च शिक्षा विभाग, म.प्र. शासन

बी.एससी/बी.ए. कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
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Department of Higher Education , Govt. of M.P.

B.Sc./ BA Semester wise syllabus

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अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	I- Metric Spaces/ दूरीक समष्टियाँ
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Compulsory

: Particulars/ विवरण :

Unit -1	Definition and examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Sub space of a metric space.
इकाई-1	दूरीक समष्टि की परिभाषा एवं उदाहरण, सामीप्य, सीमा बिन्दु, अंतः बिन्दु, विवृत्त एवं संवृत समुच्चय, संवरणक एवं अभ्यंतर, परिसीमा बिन्दु, दूरीक समष्टि की उप समष्टि ।
Unit -2	Cauchy sequences. Completeness Cantor's intersection theorem Contraction principle. Real numbers as a complete ordered field. Dense subsets. Baire Category theorem.
इकाई-2	कौशी अनुक्रम, पूर्णता, केन्टर का सर्वनिष्ठ प्रमेय, संकुचन सिद्धांत, पूर्ण क्रमित क्षेत्र के रूप में वास्तविक संख्यायें, सघन समुच्चय, बेयर का संवर्ग प्रमेय ।
Unit -3	Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity.
इकाई-3	विघटीय द्वितीय एवं प्रथम गणनीय समष्टि, सतत फलन, विस्तार प्रमेय, एक समान संततता ।

Unit -4	Compactness. Sequential compactness. Totally bounded spaces, Finite intersection property.
इकाई-4	संहतता, अनुक्रमणीय संहतता, पूर्ण परिबद्ध समष्टि, परिमित सर्वनिष्ठ प्रगुण।
Unit -5	Continuous functions and compact sets. Connectedness.
इकाई-5	संतत फलन एवं संहतित समुच्चय, संबद्धता।

Text Books :-

1. R.R Goldberg, Real Analysis, Oxford & IBH Publishing Co., New Delhi, 1970.
2. G.F. Simmons. Introduction to Topology and Modern Analysis. McGraw-Hill, 1963.
3. म.प्र. हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Books :-

- 1 T.M Apostol, Mathematical Analysis. Narosa Publishing House. New Delhi, 1985
2. S. Lang. Undergraduate Analysis, Springer-Verlag, New York, 1983.
3. D. Somasundaram and B. Choudhary, A first Course in Mathematical Analysis. Narosa Publishing House, New Delhi 199 /.
4. Shanti Narayan, A Course of Mathematical Analysis. S. Chand & Co. Delhi.
5. RK. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi. 2000.
6. P.K. Jain and K. Ahmed Metric Spaces, Narosa Publishing House, New Delhi, 1996.
7. S. Lang, Undergraduate Analysis, Springer-Verlag, New York 1983.
8. E.T. Copson, Metric Spaces, Cambridge University Press, 1968.

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अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	II- Numerical Analysis
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Compulsory

Unit-1	Solution of Equations : Bisection. Secant Regula Falsi. Newton's Method. Roots of second degree Polynomials
Unit-2	Interpolation Lagrange interpolation. Divided Differences, Interpolation Formulas using Differences, Numerical Quadrature. Newton-Cote's Formulas, Gauss Quadrature Formulas.
Unit-3	Linear Equations Direct Methods for Solving Systems of Linear Equations (Guass elimination LU Decomposition. Cholesky Decomposition), Iterative methods (Jacobi. Gauss - Seidel Reduction Methods).
Unit - 4	Ordinary Differential Equations : Euler Method. Single-step Methods, Runge-Kutta's Method Multi-step Methods, Milne-Simpson Method. Methods Based on Numerical Integration, Methods Based on numerical Differentiation.
Unit-5	Approximation : Different Types of Approximation, Least Square Polynomial Approximation, Polynomial Approximation using Orthogonal Polynomials. Approximation with Trigonometric Functions. Exponential Functions. Chebychev Polynomials, Rational Functions.

Text Books

1. V Raja raman Programing C, Prentice Hall cf India, 1994
2. C E Frooerg. Introduction to Numerical Analysis, (Second Edition L Addison-Wesley - 1979, Other references.

Reference:

1. Henry, Mullish and Herbert, *L. Copper*, Spirit of C: An Introduction to Modern Programming, Jaico Publishers.
2. M K Jain, S.R.K. Iyengar, R. K. Jain. Numerical Methods Problems and Solutions, New Age International (P)Ltd. 1996.
3. E. Balaguruswamy- Numerical Method Tata Mc Graw_ Hill Pub.Com. New Yark.

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IS)kfUrd vf/kdre vad: 25
izk;ksfxd vf/kdre vad : 15

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- a Principles of Computer Science
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional- a

: Particulars/ विवरण :

Unit-1	Data Storage of bits Ram Memory. Mass storage. Coding Information of Storage. The Binary System Storing integers fractions, communication errors.
Unit-2	Data Manipulation - The Central Processing Unit The Stored Program concept. Programme Execution,. Arithmetic/Logic Instruction. Computer-Peripheral Communication.
Unit-3	Operation System : The Evolution of Operating System.(Dos, Window)
Unit-4	Operating System Architecture. Coordinating the Machine's Activities. Other Architectures.
Unit-5	Algorithms - The Concept of an Aigorithm Representation Alogorithm Discover. Iterative Structures. Recursive Structure. Efficiency and Correctness-(Algorithms to be implemented in C ++)

Text Book :

1. J. Glen Brokkshear, Computer Science: An Overview, Addition- Wesley.
2. Stanley B. Lippman, josee Jojoie. C++ Primer)3rd Edition), Addision- Wesley

Total at least ten practicals. 14

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अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (b) Differential Geometry
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Contravariant and covariant vectors. Definition of Tensor, Gradient, Tensor field, Addition and subtraction of Tensors, Multiplication of Tensors.
Unit-2	Inner product of Tensors, Contraction, symmetric Tensor, Anti-symmetric Tensor, Quotient law, Reciprocal, Invariant relative Tensor.
Unit-3	Local Theory of curves - Space curves. Examples, Planar curves, Helices. Serret-Frenet formulae.
Unit-4	Existence of space curves, Involutes and evolutes of curves. Global Curve Theory - Rotation index. Convex curves, Isoperimetric inequality. Four vertex theorem.
Unit-5	Local Theory of Surfaces - Parametric patches on surface. First Fundamental form and arc length. Normal curvature. Vector field along a curve. Second fundamental form of a surface. Weingarten map.

Text Book :

Supreme

1. J. A Thorpe, Introduction to Differential Geometry, Springer-verlag.

Reference: Books

1. I.M. Singer and J.A Thorpe, Lecture notes -Elementary.' Topology. and Geometry, Springer Verlag, 1967.
2. B.O. NeilL Elementary Differential Geometry, Academic Press 1966.
3. S. Stembeg, Lectures on Differential Geometry, Prentice-Hall, 1964.
4. M. DoCarmo, Differential Geometry of curves and surfaces, Prentice-Hall 1976.

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Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III-(c) Advanced Discrete mathematics
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Computability and Formal Languages Ordered sets, Languages, Phrase structure grammars. Types of grammars and Languages.
Unit-2	Discrete Numeric Functions and Generating Functions.
Unit-3	Recurrence relations and recursive algorithms – Linear recurrence relations with constant Coefficients
Unit-4	Lattices and Algebraic structures, Duality. Distributive and Complemented Lattices
Unit-5	Boolean Algebras and Boolean Lattices. Boolean Functions and Expressions. Propositional Calculus, Design and Implementation of Digital Networks. Switching Circuits.

Text Books:

1. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science series 1986.
2. Narsingh Deo : Graph Theory, McGraw Hill.

Reference Book:

1. Babu Ram, Discrete Mathematics, Vinayak Publication.

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Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (d) Dynamics of Rigid Bodies
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Moments and products of inertia.
Unit-2	The Momental Ellipsoid. Equipomental Systems. Principal axes.
Unit-3	D'Alembert's principle. The general equations of motion of a rigid body. Motion of the Centre of inertia and motion relative to the Centre of inertia
Unit-4	Motion about a fixed axis. The compound pendulum Centre of percussion
Unit-5	Motion of a rigid body in two dimensions under finite and impulsive forces. Conservation of Momentum and Energy,

Text book :-

1. S.L. Loney. An Elementary Treatise on the Dynamics of a Particle of Rigid.bodies. Cambridge University Press, 1956.

References :-

1. AS. Ramsey, Dynamics, part I Cambridge University Press, 1973.
2. M. Ray and H.S. Sharma, Dynamics of Rigid Body, Students Friends, Agra

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Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (e) Mathematical Modelling
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	The process of Applied Mathematics. Setting up first order differential equations.
Unit-2	Qualitative solution sketching. Stability of solutions.
Unit-3	Difference and differential equation models of growth and decay
Unit-4	Single species population model, Exponential and logistic population models.
Unit-5	An age structure model, prey predator models for two species.

Text Books:

1. Kapoor, J.N. : Mathematical models in Biology and Medicine. EWp (1985)
2. SAXENA V.P. : Bio-Mathematics an introduction, M.P. Hindu Growth Arademy 1993
3. Martin Braun C.S. Coleman, DA Drew (Eds) Differential Equation Models.
4. Steven J.B. Lucas W.P., Straffin B.D. (Eds.) Political and Related Models, Vol.-2

Reference Books :

1. Cullen Linen. Models in Biology.
2. Rubinow, SI : Introduction to Mathematical Biology. John Wiley and Sons 1975.

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अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (f) Applications of Mathematics in Finance
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Financial Management - An overview. Nature and Scope of Financial Management, Goals of Financial Management and main decisions of financial management. Difference between risk, speculation and gambling.
Unit-2	Time value of Money - Interest rate and discount rate. Present value and future value discrete case as well as continuous compounding case. Annuities and its kinds.
Unit-3	Meaning of return. Return as Internal Rate of Return (IRR). Numerical Methods like Newton Raphson Method to calculate IRR Measurement of returns under uncertainty situations.
Unit-4	Meaning of risk. Difference between risk and uncertainty. Types of risks. Measurements of risk Calculation of security and Portfolio risk and Return-Markowitz Model. Sharpe's Single Index Model- Systematic Risk and Unsystematic Risk.
Unit-5	Taylor series and Bond Valuation Calculation of Duration and Convexity of bonds. Financial Derivatives - Futures. Forward. Swaps and Options. Call and Put Option. Call and Put Parity Theorem.

Text Book:

1. Sheldon M Ross, An Iraroduction to Mathematical Finance, Cambridge University Press.
2. Mark S. Dorfman, Introduction to Risk management and insurance, Prentice Hall Englewood Cliffs, New Jersey.

References:

1. Aswath Damodaran, Corporate Finance - Theory and Practice, John Wiley & Inc.
2. John C. Hull, Options, Futures, and Other Derivatives, Prentice-Hall of India Private Limited.
3. CD. Daykin, T. Pentikainen and M. Pesonen, Practical Risk Theory for .Actuaries. Chapman & Hall

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अधिकतम अंक / Max. Marks : 50

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (h) Elementary and Combinatorial Number Theory
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Primes and factorization. Division algorithm.
Unit-2	Congruences and modular arithmetic Chinese remainder theorem.
Unit-3	Euler phi function. Primitive roots of unity.
Unit-4	Quadratic law of reciprocity. Applications.
Unit-5	Arithmetical functions. Mobius inversion formula:'

Text Book:

1. I. Niven, S.H. Zuckerman, and L.H. Montgomery, An Introduction to the Theory of Numbers, John Wiley, 1991.
2. G.H. Hardy, Number Theory.
3. Meivyn B. Nathans on. Additive Number Theory : Inverse Problems and the Geometry of Sumsets, Springer, 1996.

References :

1. David M. Burton, Elementary Number Theory, Wm. C. Brown Publishers, Dubuque, Iowa. 1989.
2. K. Ireland, and M. Rosen. A Classical Introduction to Modern Number Theory, GTM Vol. 84. Springer-Verlag, 1972.
3. G.A. Jones, and J.M. Jones, Elementary Number Theory, Springer. 1998.
4. David M. Burton, Elementary Number Theory, Wm. C. Brown Publishers, Dubuque, Iowa. 1989.
5. K. Ireland, and M. Rosen, A Classical Introduction to Modern Number Theory, GTM Vol. 84. Springer-Verlag, 1972.
6. G. A. Jones, and J.M. Jones, Elementary Number Theory, Springer, 1998.
7. W. Sierpinski. Elementary Theory of Numbers, North-Holland, 1988. Ireland.
8. K. Rosen and M. Rosen, A Classical Introduction to Modern Number Theory, GTM Vol 84 Springer-Verlag, 1972.
9. H.B. Mann, Addition theorems, Krieger, 1976

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अधिकतम अंक / Max. Marks : 35

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (i) Computational Mathematics Laboratory
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Plotting of functions.
Unit-2	Matrix operations, vector and matrix manipulations, matrix function.
Unit-3	Data analysis and curve fitting.
Unit-4	Use of FFT algorithms
Unit-5	Numerical integration.

Computational Mathematics Laboratory:

The student is expected to familiarize himself herself with popular software's for numerical co-impuation and optimization, Real life problems requiring knowledge of numerical algorithms for linear and nonlinear algebraic equations Eigen value problems. Finite difference methods. Interpolation, Differentiation. Integration Ordinary differential equations etc. should be attempted.

Capabilities to deal with linear, integer and nonlinear optimization problems need to be developed. The objective of such a laboratory is to equip students to MODEL and simulate large-scale systems using optimization modeling languages. (The concerned teacheris expected to provide the necessary theoretical background before the student does the corresponding practical). To this end software's like MATLAB, LINDO, MATHEMATICA, MAPLE can be adopted. Following course outline is suggested based on MATLAB and LINDO.

Text Books :

1. MATHEMATICA - Stephen Wolfram, Cambridge.
2. Introduction to operations research. F.S. Hiller and GJ. Liebetman.

References:

1. MATLAB -High performance numeric computation and visualization software
:User's "guide. /
2. Optimization modelling with LINDO : Linus Schrage

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Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III-(j) Probability Theory
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Notion of probability ; Random experiments, Sample space. Axiom of probability. Elementary properties of probability, Equally likely outcome problems.
Unit-2	Random Variables : Concept, cumulative distribution function. Discrete and continuous random variables, Expectations, Mean, Variance, Moment generating function.
Unit-3	Discrete random variable . Bernoulli random variable, binomial random variable. Geometric random variable, Poisson random variable and corresponding distributions
Unit-4	Continuous random variables : Uniform random variable, Exponential random variable. Gamma random variable. normal random variable and corresponding distributions.
Unit-5	Conditional probability and conditional expectations, Bayes theorem, independence, Computing expectation by conditioning; Some applications -a list model A random graph, Polya's urn model

Text Book:

- 1- S.C. Gupta and V.K Kapoor, Mathematical Statistics.

References:

1. S.M. Ross, Introduction to Probability Model (Sixth edition)
2. Academic Press, 1997.
3. I.Blake, An Introduction to Applied Probability, John Wiley & Sons,1979.
4. J. Pitmaa Probability. Narosa, 1993.
5. A.M. Yagolam and I.M. Yagolam, Probability and Information, Hindustan Publishing Corporation, Delhi 1983.

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IS)kfUrd vf/kdre vad: 25
izk;ksfxd vf/kdre vad : 15

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (k) Programming in C and Data Structure
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Algorithms, Flow Charts, Data Types, Arithmetical and input output instruction. Decisions control structures. Decision statements
Unit-2	Logical and Conditional operators. Loop
Unit-3	Case control structures. Functions.. Recursions. Arrays.
Unit-4	Data Structures - Arrays. Lists. Stacks. Queues. Trees. Customised Data Types.
Unit-5	File Structure - Sequential Files. Text Files, Indexed Files. Hashed Files

Text Books

1. V Raja raman Programing C, Prentice Hall of India, 1994
2. C E Froberg. Introduction to Numerical Analysis, (Second Edition L Addison-Wesley - 1979, Other references.
3. J. Glen Brookshear Computer Science : An Overview. Addison- Wesley.

Reference:

1. Henry, Mullish and Herbert, L. Copper, Spirit of C: An Introduction to Modern Programming, Jaico Publishers.
2. M K Jain, S.R.K. Iyengar, R. K. Jain. Numerical Methods Problems and Solutions, New Age International (P)Ltd. 1996.
3. E. Balaguruswamy- Numerical Method Tata Mc Graw Hill Pub.Com. New York.

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Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	III- (I) Elementary Statistics
Compulsory / अनिवार्य या Optional / वैकल्पिक	:	Optional

: Particulars/ विवरण :

Unit-1	Frequency distribution - Measures of central tendency, Mean, Median, mode, G.M., HM, partition values
Unit-2	Measures of dispersion-range, inter quartile range, Mean deviation, Standard deviation, moments, skewness and kurtosis.
Unit-3	Probability-Event, sample space, probability of an event, addition and multiplication theorems Baye's theorem.
Unit-4	Continuous probability, probability density function and its applications for finding the mean, mode, median and standard deviation of various continuous probability distributions, Mathematical expectation, expectation of sum and product of random variables.
Unit-5	Theoretical distribution- Binomial, Poisson distributions and their properties and use Moment generating functions.

Text Book

1. Statistics by M. Ray
2. Mathematical Statistics by J.N. Kapoor, H.C. Saxena (S. Chand)

References Book:

1. Statistical Methods, H.K. Pathak, Shiksha Sahitya Prakash, Meerut
2. Fundamentals of Mathematical Statistics, Kapoor and Gupta