उच्च शिक्षा विभाग, म.प्र. शासन

बी.एससी / बी.ए. कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम

केन्द्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

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 : 50

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

: Particulars/ विवरण :

Unit -1	**Partial differentiation. Change of variables. Euler's Theorem on homogeneous function Taylor'stheorem for functions of two variables.**
इकाई–1	आंशिक अवकलन, चरों का परिवर्तन, समघात फलनों पर आयलर का प्रमेय, दो चरों के फलनों के लिए टेलर का प्रमेय।
Unit -2	**Jacobians, Envelopes, Evolutes.**
इकाई–2	जेकोबियन एन्वलप, इवोलुट्स ।
Unit -3	**Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.**
इकाई–3	दो चरों के फलनों का उच्चिष्ठ निम्निष्ट एवं सेंडल बिन्दु, लाग्रांज की गुणांक विधि।
Unit -4	**Indeterminate forms, Beta and Gamma functions.**
इकाई–4	अनिर्धार्य रूप, बीटा एवं गामा फलन।
Unit -5	**Double and triple integrals. Dirichlet's integrals. Change of order of integration in double intergrals.**
इकाई–5	द्विश एवं त्रि–समाकलन, डिरिष्लेट समाकलन, द्विश समाकलन में क्रम परिवर्तन

Text Books :

1. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd. Allahabad.

Reference Book:-

1. T.M. Apostol, Mathematical Analysis Narosa Publishing House, New Delhi 1985

2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing o., New York.
3. N. Piskunov , Differential and Integral Calculus, Peace Publishers, Moscow.
4. S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., New Delhi.

उच्च शिक्षा विभाग, म.प्र. शासन

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अधिकतम अंक / Max. Marks : 50

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	IV
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- II
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**II- Partial differential Equations and Complex Analysis**
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Compulsory**

: Particulars/ विवरण :

Unit -1	Partial Differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than general methods.
इकाई–1	प्रथम कोटि के आंशिक अवकल समीकरण, लेग्रांज का हल, कुछ विशिष्ट प्रकार के समीकरण जिन्हें व्यापक विधि के अलावा सरल विधि से हल किया जा सके।
Unit -2	Charpit's general methods of solution, Partial differential equations of second and higher orders. Classification of linear partial differential equations of second order.
इकाई–2	चारपिट की हल की व्यापक विधि, द्वितीय एवं उच्चतर कोटि के आंशिक अवकल समीकरण, द्वितीय कोटि के रैखिक आंशिक अवकल समीकरणों का वर्गीकरण
Unit -3	Homogeneous and non- Homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients.
इकाई–3	अचर गुणांकों के समघातीय एवं असमघातीय समीकरण, आंशिक अवकल समीकरण जो अचर गुणांकोंवाले समीकरणों में परिवर्तनीय है।
Unit -4	Complex numbers as ordered pairs. Geometric representation of Complex numbers, Stereographic projection. Continuity and differentiability of Complex functions.
इकाई–4	क्रमित युग्म के रूप में संख्यायें, सम्मिश्र संख्याओं की ज्यामितीय व्याख्या, स्टिरियोग्राफिक प्रक्षेप, सम्मिश्र फलनों की संततता एवं अवकलनीयता।
Unit -5	Analytic functions. Cauchy Riemann equations. Harmonic functions. Mobius transformations. Fixed points. Cross ratio. Inverse points and critical mappings.
इकाई–5	वैश्लेषिक फलन, कौशी रीमान समीकरण, प्रसंवादी फलन, मोबियस रूपांतरण, स्थिर बिन्दु, तिर्यक अनुपात, व्यूत्क्रम बिन्दु एवं क्रांतिक प्रतिचित्रण।

Text Books :-

1. I.N. Sneddon, Elemets of partial Differential equatiins Mc graw Hill, Co. 1988
2. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.

References :-

1. R. V. Churchill & J.W. Brown, Complex Variables and Applications, 5th Edition, McGraw-Hili New. York. 1990.
2. Mark; J. Ablowitz & A. S. Fokas. Complex Variables : Introduction and Applications, Cambridge
   University Press, South Asian Edition, 1998.
3. Ponnuswamy : Complex Analysis, Narosa Publishing Co.

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अधिकतम अंक / Max. Marks : 50

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	IV
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III- Abstract Algebra-II/अमूर्त बीज गणित–द्वितीय**
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Compulsory**

: Particulars/ विवरण :

Unit -1	Group-Automorphisms, inner automorphism. Automorphism groups.
इकाई–1	समूह स्वकारिता (स्वसमरूपता), आंतर स्वकारिता, स्वकारिताओं के समूह।
Unit -2	Conjugacy relation and centraliser. Normaliser. Counting principle and the class equation of a finite group.
इकाई–2	संयुग्मता संबंध एवं सेन्ट्रीलाईजर, प्रसामान्यक, गणता सिद्धांत एवं परिमित समूह का वर्ग समीकरण।
Unit -3	Cauchy's theorem and Sylow's theorems for finite abelian groups and non abelian groups
इकाई–3	परिमित आबेली एवं अनआबेली समूहों के लिये कौशी एवं सैलो के प्रमेय।
Unit -4	Ring homomorphism. Ideals and Quotient Rings. Field of Quotients of an Integral Domain. Euclidean Rings.
इकाई–4	वलय समाकारिता, गुणजावली एवं विभाग वलय, पूर्णांकी प्रांत का भाज्य क्षेत्र, युक्लीडीयन वलय।
Unit -5	Polynominal Rings. Polynomials over the Rational Field. Polynominal Rings over Commutative Rings. Unique factorization domain.
इकाई–5	बहुपद वलय, परिमेय क्षेत्र पर बहुपद, क्रमविनिमय वलयों पर बहुपद वलय, अद्रितीय गुणन खण्ड प्रांत।

Text Book:

1. I. N. Herstein Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.

Reference Books :

1. N. Jacobson, Basis Algebra, Vols, I & II. W.H. Freeman, 1980 (also published by Hindustan Publishing Company.)
2. Shanti Narayan, A Text Book of Modern Abstract Algebra, S. Chand & Co. New DelhL

3. P.B. Bhattacharya. S.K. Jain and S.R. Nagpal. Basic Abstract Algebra (2nd Edition) Cambridge University Press, Indian Edition 1997.
4. Vivek Sahai and Vikas Bist Algebra, Norosa Publishing House, 1997
5. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol. II-Rings, Narosa Publishing House (Vol I-1996, Vol II-1999).
6. D.S. Malik, J.N. Mordeson, and M.K.Sen, Fundamentals of Abstract Algebra, McGraw-Hill International Edition, 1997.

उच्च शिक्षा विभाग, म.प्र. शासन

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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 : 50

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

: Particulars/ विवरण :

Unit -1 इकाई–1	Riemann integral. Integrability of continous 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 मध्यमान प्रमेय।
Unit -2 इकाई–2	Partial derivation and differentiability of real-valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Fourier series of half and full intervals.
	वास्तविक मान फलनों की दो चरों के आंशिक अवकलज एवं अवकलनीयता, स्वार्ज एवं यंग के प्रमेय, अस्पष्ट फलन प्रमेय, अर्द्ध एवं पूर्ण अंतराल की फोरियर श्रेणी।
Unit -3 इकाई–3	Improper integrals and their convergence. Comparison tests, Abel's and Dirichlet's tests Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of 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, संततता, प्राचलिक फलनों के रूप में अवकलनीयता एव समाकलनीयता।
Unit -4 इकाई–4	Definition and examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets.
	दूरीक समष्टि की परिभाषा एवं उदाहरण, सामीप्य, सीमा बिन्दु, अंतः बिन्दु, विवृत्त एवं संवृत समुच्चय,
Unit -5 इकाई–5	Closure and interior. Boundary points. Sub space of a metric space. Cauchy sequences. Completeness
	संवरणक एवं अभ्यंतर, परिसीमा बिन्दु, दूरीक समष्टि की उप समष्टि। कौशी अनुक्रम, पूर्णता,

Text Books :-

1. R.R Goldberg, Real Analysis, Oxford & IBH Publishing Co., New Delhi, 1970.
2. G.F. Simmons. Introduction to Topology and Modem Analysis. McGraw-Hill, 1963.

Reference Books :-

1 T.M Apostol, Mathematical Analysis. Norosa Publishing House. New Delhi, 1 985
2. S. Lang. Undergraduate Analysis, Springer-Veriag, 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.

उच्च शिक्षा विभाग, म.प्र. शासन

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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 : 50

Class/ कक्षा	:	B.Sc./B.A.
Semester/ सेमेस्टर	:	VI
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. Dimension of sums of subspaces. Quotient space and its dimension.
	आधार, परिमित विमीय सदिश समष्टियॉं, आधार का अस्तित्व प्रमेय, आधार समुच्चय में अवयवों की संख्या की अपरिर्वतनशीलता, विमा, परिमित विमीय सदिश समष्टि की उपसमष्टि की पूरक उपसमष्टि का अस्तित्व, उपसमष्टियों के योग की विमा, विभाग समष्टि एवं उसकी विमा।
Unit -3 इकाई–3	Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space, Bidual space and natural isomorphism. Adjoint of a linear transformation.
	रैखिक रूपांतरण एवं उनका आव्यूह निरूपण, रैखिक रूपांतरणों का बीज गणित, जाति शून्यता प्रमेय, आधार का परिवर्तन, द्वैत समष्टि, द्विद्वैत समष्टि एवं प्राकृत तुल्याकारिता, रैखिक रूपांतरण का संलग्न रूपांतरण।
Unit -4 इकाई–4	Eigen values and eigen vectors of a linear transformation. Diagonalisation Bilinear. Quadratic and Hermitian forms.
	रैखिक रूपांतरणों के आयगन मान एवं आयगन सदिश, विकर्णीकरण द्विएकघाती, द्विघाती एवं हरमिशियन समघात।
Unit -5	Inner Product Spaces - Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

इकाई–5	आंतर गुणन समष्टि– कौशी स्वार्ज असमिका, लांबिक सदिश, लांबिक पूरक, प्रसामान्य लांबिक समुच्चय एवं आधार, परिमित विमीय समष्टियों हेतु बैसल की असमिका, ग्राम श्मिट लांबिकता प्रक्रम।

Text Books :

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

Reference Books:

1 K.B. Datta. Matrix and Linear Algebra, Prentice hall of India Pvt Ltd., New Delhi, 20O0.
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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B.Sc./ BA Semester wise syllabus

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अधिकतम अंक / Max. Marks : 50

Theory Marks : 35 + Practical Marks :15

Class/ कक्षा	:	**B.Sc./B.A.**
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Principles of Computer Scince
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 1**

: Particulars/ विवरण :

Unit-1	Data Storage of bits Ram Memory. Mass srorage. 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,. Anthmetic/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. Interative Structures. Recursive Structure. Efficieny 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.

उच्च शिक्षा विभाग, म.प्र. शासन

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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- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-**Differential Geometry
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 2**

: Particulars/ विवरण :

Unit-1	Contravariant and covariant vectors. Definition of Tensor, Gradiant, 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 cunes, 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. Weiengarten map.

Text Book :

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

अधिकतम अंक / Max. Marks : 50

Class/ कक्षा	:	**B.Sc./B.A.**
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-**Elementary Discrete mathematics
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 3**

: Particulars/ विवरण :

Unit-1	Sets and Propositions – Cardinality. Mathematical Induction Principle of Inclusion and exclusion.
Unit-2	Relations and Functions – Binary Relations. Equivalence Relations and Partitions. Partial Order Relation Functions and Pigeonhole Principle.
Unit-3	Graphs – Basic Terminology Multigraphs. Weighted Graphs.
Unit-4	Paths and Circuits. Shortest Paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Trees and its Properties.
Unit-5	Planar graphs.

Text Books:

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

Reference Book:

1. Babu Ram, Discrete Mathematics, Vinayak Publication.

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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- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III- Dynamics of Rigid Bodies**
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 4**

: Particulars/ विवरण :

Unit-1	Moments and products of intertia.
Unit-2	The Momental Ellipsoid. Equimomental Systems. Principal axes.
Unit-3	D'Alembert's principle. The general equations of motion of a rigid body. Motion of the Centre of intertia 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- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Mathematical Modelling
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 5**

: 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 Biologv. John Wiley and Sons 1975.

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Class/ कक्षा	:	**B.Sc./B.A.**
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Applications of Mathematics in Finance
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 6**

: 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, specualtion 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 Englrewood 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- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Tensor and Special Theory of relativity
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 7**

: Particulars/ विवरण :

Unit-1	Contravarient and covariant vectors, Definition of Tensor. Gradient. Tensor field, Addition and subtractions 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	Review of Newtonian mechanics - Inertial frames. Speed of light and Galilean relativity. Michelson-Morley experiment. Loreniz-Fitzgerold contraction Hypothesis.
Unit-4	Relative character of space and time. Postulates of special theory of relativity. Lorentz transformation equations and its geometrical interpretation Group properties of Lorentz transformations
Unit-5	Relativistic kinematics - Composition of parallel velocities. Length contraction. Time dilation.

Text Book

1. A. W. Joshi Matrix and Tensor in Physics, Willey Eastern.
2. R.Resnick, Introduction to Special Relativity, Willey Eastern Pvt Ltd. 1972

References :

1. C. Moller The Theory of Relatativity. Oxford Clarendon Press, 1952
2. PG Bergmann, Introducdon to the Theory of Relativity, Prentice Hall of India, Pvt Ltd. 1969
3. J.L. Anderson, Principles of Relativity Physics, Academic Press, 1967.
4. W. Rindler, Essential Relativity, Nostrand Reinhold Company, 1969
5. V. A. Ugarov, Special Theory of Relativity, Mir Publishers. 1979.
7. J.L Synge, Relativity : Hie Special Theory. North-Holland Publishing Company, 1956
8. The W.G. Dixon, Special relativity : The Foundation of Macroscopic Physics, Cambridge-University Press, 1982

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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- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Elementary and Combinatorial Number Theory
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 8**

: 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, Dubugue, Iowa. 1989.
2. K. Ireland, and M. Rosen. A Classical Introduction to Modem 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, Dubugue, Iowa. 1989.
5. K. Ireland, and M. Rosen, A Classical Introduction to Modem 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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Class/ कक्षा	:	**B.Sc./B.A.**
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Computational Mathematics Laboratory
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 9**

: 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-imputation 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, MATHEMAT1CA, 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- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Probability Theory
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 10**

: 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 distnbution function. Discrete and continuous random vanables, Expectations, Mean, Variance, Moment generating function.
Unit-3	Discrete random variable . Bernoulli random variable, bmomiai random variable. Geometric random variable, Poisson random variable and corresponding distributions
Unit-4	Continuous landom 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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अधिकतम अंक / Max. Marks : 50

Theory Marks : 35 + Practical Marks :15

Class/ कक्षा	:	**B.Sc./B.A.**
Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III- Programming in C and Numerical Analysis**
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 11**

: Particulars/ विवरण :

Unit-1	Programmer's model of a computer. Algorithms, Flow Charts, Data Types, Artithical and input output instruction. Decisions control strucrures. Decision statements
Unit-2	Logical and Condiuonal operators. Loop. Case control structures. Functions.. Recursions. Arrays.
Unit-3	Solution of Equations : Bisection. Secant Regula Falsi. Newton's Method. Roots of second degree Polynomials
Unit-4	Interpolation Lagrange interpolation. Divided Differences, Interpolation Formulas using Differences, Numencal Quadrature . Newton-Cote's Formulas, Gauss Quadrature Formulas.
Unit-5	Linear Equations Direct Methods for Solving Systems of Linear Equations (Guass elimination LU Decomposition. Cholesky Decomposition), Interative methods (Jacobi. Gauss - SeideL Reduction Methods).

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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अधिकतम अंक / Max. Marks : 50

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Semester/ सेमेस्टर	:	VI
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics- III
Paper No. & Title / प्रश्नपत्र क्र. एवं शीर्षक	:	**III-** Elementary Statistics
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Optional- 12**

: Particulars/ विवरण :

Unit-1	Frequency distnbution - Measures of central tendency, Mean, Median, mode, G.M.. HM,. partition values
Unit-2	Measui'es 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, Shdksha Sahitya Prakash, Meerut
2. Fundamentals of Mathematical Statistics, Kapoor and Gupta