Meeting held on : 11-12 Feb 2020 – Session 2020-21 & Onwards

Class : M.Sc./M.A. (Semester-IV)

	Paper	Title of Paper	Max. Marks		Min. Marks		Total Marks
			Theory	CCE	Theory	CCE	
Compulsory Paper							
		Applied Functional Analysis	40	10	15	04	50
Four papers out of the following have to be chosen, opting not more than one from each group.							
Group I	1	Advanced Functional Analysis - II	40	10	15	04	50
	2	Partial Differential Equations - II					
	3	Spline Theory					
Group II	1	Algebraic Topology - II	40	10	15	04	50
	2	Spherical Trigonometry & Astronomy - II					
	3	Advanced Graph Theory - II					
Group III	1	Mechanics - II	40	10	15	04	50
	2	Fuzzy Sets & Their Applications-II					
	3	Advanced Numerical Analysis - II					
Group IV	1	Operations Research - II	40	10	15	04	50
	2	Infinite Matrix and Divergent Serie					
	3	Integral Equations & Boundary Value Problems - II					
Group V	1	Integral Transform - II	40	10	15	04	50
	2	Theory of linear Operators - II					
	3	Approximation by Trigonometric and Algebraic Polynomials					
Job Oriented Project Work & Comprehensive Viva - Voce			Max. Marks - 100 Min. Pass. Marks - 40				
Grand Total			**350**				

Board Of Studies :

I. Chairman Dr RK Sonwane

II. Subject Expert -

1.

2. Dr Rajesh Tiwari

3. Kamal (Dr Kamal Wadhwa)

4. 12/02/2020 (Dr. J.K. Maitra)

5. A C Tanda

The Scheme of examination and the allotment of marks shall be as under : -

Sections/Part	Questions Type	Marks Distribution	Remark
Section - A	Objective Type Questions (One question to be set from each unit)	1 x 5 = 5 Marks	
Section - B	Short Answer Type Questions (Two questions to be set from each unit and one from each unit to be attempted)	2 x 5 = 10 Marks	
Section - C	Long Answer Type Questions (Two questions to be set from each unit and one from each unit to be attempted)	5 x 5 = 25 Marks	
	Total	40 Marks	Passing Marks 15

Note 1 : The Optional paper chosen by candidates in M.Sc./M.A. Third Semester can not be changed in Fourth Semester. The same optional paper must be selected in Fourth Semester.

Note 2 : Walk-out paper will not be held again.

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	I	
Title	:	Applied Functional Analysis	
Compulsory/Optional	:	Compulsory	

Unit I

Hilbert spaces obtained from Hilbert spaces, Cartesian and Tensor product of Hilbert spaces, convex sets and projections. Projection on a cone and a linear subspace.

Unit II

Weak convergence, Weak compactness properties, Baire's Category Theorem, sequence of continuous linear functional, Banach Saks, Theorem, Weak semi continuity, Continuity of Projection on a closed convex set.

Unit III

Convex sets and convex programming elementary notions, internal, bounding and external points. Support functional of a Convex set, simple example, Minkowski functional support plane through a boundary point, support mapping, Separation theorem.

Unit-IV

Functions transformations and operators, Linear operators and their adjoints, bounded and unbounded operators projection operator and differential operator.

Unit-V

Spectral theory of operators, resolvent of operator, resolvent set and spectrum. Spectral radius, Compact operators, its characterizing property.

Text Books :

V. Balakrishnan : Applied Functional Analysis, Springer Verlag, New York.

Reference:

1. Ervin Kreyszig : introductiory Functional Analysis with Applications, Join Wiley and Sons.
2. B.V. Limaye : Functional Analysis II Edition, New Age International Publishers.

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Advanced Functional Analysis-II	
Optional : Group/Paper	:	Optional : Gr-I / 1	

Unit –I

Finite dimensional topological vector spaces, Locally convex topological vector spaces,

Unit –II

Normable and metrizable topological vector spaces, complete topological vector spaces.

Unit –III

Frechet space, Uniform-boundedness principle, Open mapping theorem andclosed graph theorem for Frechet spaces,

Unit-IV

Banach - Alaoglu theorem. Variation Inequalities, Lions-Stampacchia theory,

Unit-V

Physical phenomena represented by variation inequalities, points and External sets Krein Miliman's theorem.

Text Books:-

1- Functional Analysis with Applications by A.H. Siddiqi, Tala Mc. Graw Hill PublishingCompany.
2- Linear Topological Spaces by Kelley J.L. , Van Nostrand East West Press, New Delhi.

Reference Books:-

1- Toposigical Vector spaces and Distributions by John Horvath, Addison-WesleyPublishing Company, 1966.
2- Modern methods in Topological vecotr spaces by albert Wilansky, Mcgraw-Hill, 1978.
3- Functional Analysis by K. Chandra Sekhar Rao, Narosa 2002.

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Partial Differential Equations-II	
Optional : Group/Paper	:	Optional : Gr- I / 2	

Unit 1

Nonlinear First order PDE. Complete integrals, Envelopes, Characteristics,

Unit 2-

Hamilton Jacobi Equation, Calulus of Variations, Hamilton's ODE, Legendre Transform, Hopf-Lax formulae, weak solution, Uniqueness.

Unit 3

Conservation Laws (Shocks, Entropy Condition, Lax – Oleinic formula, Weak solutions, Uniqueness. Riemann's Problem, Long Time behavior) Representation of Solution - Separation of Variables, Similarity Solutions (Plane and Traveling Waves, Solitions, Similarity under Scaling).

Unit 4

Fourier and Laplace Transform, Hopf - Cole Transform, Hodograph and Legendre Transforms, Potential Functions, Asymptoties (Singular Perturbations, Laplace's Method, Geometric Optics)

Unit 5

Stationary Phase Homogenization, Power Series (Non-characteristic surface, Real Analytic functions, Cauchy - Kovalevskaya Theorem).

Text Books :

L.C. Evans, Partial Differential Equations, 1998.

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1. 2. 3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Spline Theory	
Optional : Group/Paper	:	Optional : Gr- I / 3	

Unit I

Polynomial Interpolation: Lagrange form, divided difference and Newton form, K-th divided difference, Osculatory interpolation, Limitation of polynomial approximation, Runge example.

Unit II

Piecewise linear approximation: Broken line interpolation is nearly optimal, Least-squares approximation by broken lines, Good meshes, square root example.

Unit III

Piecewise cubic interpolation: Cubic Hermite interpolation, Cubic Bessel interpolation, Akimainterpolation, Cubic spline interpolation, Boundary conditions, Best approximation properties of complete cubic spline and its error, Truncated power function, Pythagoras theorem, smoothest interpolation property, Best approximation property.

Unit IV

Parabolic spline interpolation: Difference of two parabolic splines, interpolation of data values given at mid points of mesh intervals, Existence and uniqueness of parabolic splines, Piecewise polynomial representation for P ^ .

Unit V

The space P^v and truncated power basis: The smoothing of a histogram by parabolic splines, truncated power basis, truncated power function, representation of a function of Pk^v, There presentation of pp function by B-splines, The support of B-splines, Partition of unity by B-splines, Spline function as a combination of B-splines.

Text Book:

1. C. De Boor, A Practical Guide to Splines, Springer-Verlag, New York, 1978.

Reference Books:

1. L.L. Shumaker, Spline Functions Basic Theory, John Wiley & Sons, New York, 1981.
2. P.J. Davis, Interpolation and Approximation, Dover Publications, INC, New York, 1975.

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Algebraic Topology - II	
Optional :Group/Paper	:	Optional : Gr-II / 1	

Unit-I:

The Fundamental Group: Introduction, Homotopy, Definition and Examples, Contractible space, Homotopy Equivalence and Homotopy Type, Comb space, Retract, Deformation retract, and Strong deformation retract.

Unit-II:

Fundamental Group and its properties: Path and path homotopy, Path homotopy is an equivalence relation, Homotopy class, The set $\pi_1(X,x_0)$ is a group, Properties of fundamental groups, Homomorphism induced by a continuous map, Properties of induced homomorphism.

Unit-III:

Simply connected space, S^n is simply connected for $n \geq 2$, Results for computing fundamental groups of Disk D^n and the product space $X \times Y$, Path Lifting and Homotopy Lifting Property, Theorem 2.6.3 (Statement only), Fundamental group of Circle, Punctured plane, Torus, and Cylinder.

Unit-IV:

Covering Projections: Definition and Examples, Properties of Covering Projections, Lift of a map, Uniqueness of lifts, Path Lifting and Homotopy Lifting Property (Statement only).

Unit-V:

Applications of Homotopy Lifting Theorem: The Monodromy Theorem, Proposition 5.3.2 (Statement only), Lifting Theorem, Covering homomorphism, Group of Deck Transformations, Necessary and sufficient conditions for homomorphism and isomorphism of covering spaces.

Text Book:

Satya Deo, Algebraic Topology - A Primer, Hindustan Book Agency, TRIM Series # 27, New Delhi, 2003.

Reference Books :

1. Fred H. Croom, Basic Concepts of Algebraic Topology, Springer Verlag, 1978.
2. James R. Munkres, Topology, 2nd Edition, PHI, 2002.

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Spherical Trigonometry and Astronomy - II	
Optional : Group/Paper	:	Optional : Gr - II / 2	

Unit -I

Spherical Astronomy-Celestial sphere. Various system of references and related topics.

Unit -II

Rising and setting of stars, rate of zenith distance and azimuth. Twilight.

Unit-III

Transit instrument.(Astronomical instruments), Atmospheric Retraction.

Unit IV

Time, planetary phenomena.

Unit-V

Kepler's law of planetary motions, Aberration

(Chapters as per Text Book)

TEXT BOOKS:-

A text book of spherical Astronomy : Gorakh Prasad.

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Advanced Graph Theory-II	
Optional : Group/Paper	:	Optional : Gr-II / 3	

Unit-I:

Connectivity and separability in graphs Abstract graphs geometric graphs planar graphs Kurtowski two graphs embedding and regions of a planar graphs Detection of planarity.

Unit-II:

Geometric dual and combination dual.

Unit-III:

Coloring and covering of graphs, Chromatic, Polynomial chromatic partitioning Dimmer problem Domination sets independent sets, Four colour conjecture.

Unit-IV:

Digraph and types of digraphs, Digraph and binary relation Equivalence relation ina graph Directed path walk circuit and connectedness Euleriandigraph, arborescence matrices A, B and C of digraphs.

Unit-V:

Adjacency metric of a digraph, Algorithms, Kruskal algorithm, Prism algorithm, Dijkastra Algorithm.

Text Book:

Graph Theory with Application to Engineering and Computer Science By Narsingh Deo.

Reference Books:

Graph Theory by Harary.

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3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Mechanics - II	
Optional : Group/Paper	:	Optional : Gr - III / 1	

Unit – I

Fundamental lemma of calculus of variations Euler's equation for one dependent function and its generalization to (i) n dependent function (ii) higher order derivatives. Conditional extermum. Lagranges equations of second kind independent coordinates. The equation of motion in a potential field. Canonical equations of Hemilton.

Unit-II

Conditional extermum under geometric constraints and under integral constraints. Hamilton's Principle of least action Poincare CartenIntegal invariant Whittaker equation Jacobi's equations. Statement of lee HWA Chung's theorem.

Unit–III

Hamilton – Jacobi equation. Jacobi theorem. Method of separation of variables. Lagrange Brackets.

Unit–IV

Condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets Invariance of Lagrange brackets and Poisson brackets under canonical transformation.

Unit-V

Distribution for a given potential. Equipotent surfaces. Surface and solid harmonic. Surface density in terms of surface harmonics. Potential of a finite rod. Potential of a circular disc. Poission theorem Cartesian and polar form. Laplace theorem for Cartesian and polar form.

Text Books:

1. F. Gantmacher, Lectures in Analytic Mechanics MIR Publishers.
2. H. Goldstein Classical Mechanics (2nd Edition), Narosa Publishing House, New Delhi.
3. J.C. Upadhyaya – Classical Mechanics. (Himalaya Publication House)

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Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Fuzzy Sets and Their Application - II	
Optional : Group/Paper	:	Optional : Gr- III / 2	

Unit – I

Fuzzy sets: Basic Definitions, α-level sets, Convex fuzzy set, Basic operations on fuzzy sets, types of fuzzy sets, Extensions: Types of fuzzy sets, Further operations on fuzzy sets, Cartesian product, Algebraic products, Bounded sum and Difference, t-norm & t-conorm.

Unit – II

Extension principle and applications, Zadeh extension principle, image and inverse image of fuzzy sets, fuzzy numbers, algebraic operations with fuzzy numbers, extended operation and its properties, Special extended operation, addition, subtraction, product and division of fuzzy numbers.

Unit – III

Fuzzy relations on fuzzy sets, The union & intersection of fuzzy relations, Composition of fuzzy relations, max-* and max-product compositions, min-max composition and its properties, reflexivity, symmetry, transitivity, and their examples, special fuzzy relations, similarity relation.

Unit-IV

Fuzzy graphs: Definition and Examples, Fuzzy sub-graph, Spanning sub-graph, path in a fuzzy graph, strength and length of a path, -length and -distances, connected nodes, fuzzy forest, fuzzy tree, Examples, Fuzzy Analysis: Fuzzy functions on fuzzy sets, classical function, fuzzy function, Examples.

Unit – V

Fuzzy Logic; classical logic an overview, multi-valued logic, Fuzzy proposition unconditional and un qualified proposition, unconditional and qualified propositions conditional and unqualified proposition, conditional and qualified proposition, Fuzzy qualifiers, Linguistic hedges An overview of classical logic, Its connectives, Tautologies, Contradiction, Fuzzy.

Text Book:

1. Fuzzy set theory and its Applications by H.J. Zimmermann, Allied Publishers Ltd., New Delhi, 1991 (For Units I to IV).
2. Fuzzy sets and Fuzzy Logic Theory & Application by G.J. Klir and B. Yuan, Prentice Hall of India, New Delhi, (2000) (For Unit V).

Reference Books :

Fuzzy Logic with Engineering Applications by T.J. Ross, John Wiley & Sons, II[nd] Ed., 2005

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1. 2. 3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Advanced Numerical Analysis - II	
Optional :Group/Paper	:	Optional : Gr-III / 3	

Unit-I:

Extrapolation Methods for Numerical Differentiation. Multistep methods for Numerical Solution of initial value problems. Explicit and implicit Multi step methods

Unit-II:

General Multistep methods : $\rho(\xi)$ ans $\sigma(\xi)$ for linear multiple step methods . Convergence of Multi step methods. Predictor correctior methods.

Unit-III:

Stability analysis of Multistep methods: First order differential Equations. Stability of Predictor- Corrector Methods. Stability of PMp CMc methods , second Ordinary Differential.

Unit-IV:

Ordinary differential Equations: Three kind of Boundary conditions . Finite Difference methods, Linear second order differential Equations, Non linear second order differential Equations.

Unit-V:

Finite element method : Finite element Ritz Finite element method methods. Linear Boundary Value Problems, mixed boundary conditions.

Text Book:

Numerical Method for scientific and Engineering computation by M.K. Jain, S.R.K. Iyenger, R.K. Jain south Edition (2003) New Age.

Reference Books :

2. Finite Differences and numerical analysis, H.C. Saxena – S Chand Publication.
3. Atkinson, K. Elementary Numerical Analysis, Wiley New York, 1985

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1. 2. 3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Operations Research -II	
Optional : Group/Paper	:	Optional : Gr- IV / 1	

Unit-I

Replacement Problems : Replacement of Items that deteriorate . Replacement policy for items whose maintenance cost increase with time and money value is constant. Money value . present worth factor (PWF) and discount rate . Replacement policy for items whose maintenance cost increase with time and money value with constant rate. Individual Replacement policy, Mortality theorem, Group replacement policy.

Unit-II

Assignment problems : Mathematical formulation, Fundamental theorems, Hungarian method for assignment problem. Unbalanced assignment problem . The Travelling Salesman (Routing) problem, Job sequencing Processing n Jobs through 2 machines , Processing n Jobs through 3 machines, a graphical method.

Unit-III

Transportation problems : North - West Corner Method Least – Cost Method. Vogel's Approximation Method, MODI Method, Exceptional cases and problem of degeneracy.

Unit-IV

Network analysis, constraints in Network, Construction of network, Critical Path Method (CPM) PERT, PERT Calculation, Resource Leveling by Network Techniques and advances of network (PERT/CPM)

Unit-V

Game theory - Two persons, Zero - Sum Games, Maximix – Minimax principle, games without saddle points -Mixed strategies, Graphical solution of 2xm and mx2 games, Solution by Linear Programming, Non- Linear programming Techniques - Kuhn - Tucker Conditions, Non - negative Constraints.

Text Book:

1 S.D. Sharma, Operation Research,
2 Kanti Swarup, P.K. Gupta and Manmohan, Operations Research, Sultan Chand & Sons, New Delhi.
3 F.S. Hiller and G.J. Lieberman, Industrial Engineering Series, 1995 (This book comes with a CD containing software
4 G. Hadley . Linear Programming, Narosa Publishing House. 1995.
5 G. Hadley, Linear and Dynamic programming, Addison - Wesley Reading Mass.
6 H.A. Taha, Operations Research - An introduction, Macmillan Publishing co. Inc. New york.

Reference Books :

1 Prem Kumar Gupta and D.S. Hira, Operation Reasearch, an Introdution, S. Chand & Company Ltd. New Delhi
2 N.S. Kambo, Mathematical Programming Techniques, Affilated East - West Pvt. Ltd. New Delhi. Madras

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3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Infinite Matrix and Divergent Series	
Optional : Group/Paper	:	Optional : Gr- IV / 2	

Unit I

Difference between finite and infinite matrices, Basic Properties, Kojima matrix, Toeplitz matrix, some special type of matrices, The structure, The exponential function of an infinite matrix, Semi continuous and continuous matrices. Exercise-**I**

Unit II

Reciprocal of Infinite matrices Reciprocal of lower semi - metrices and some simple general results, The bound of a matrix, two general theorems on reciprocal Exercise-2

Unit III

Norlund summability, transformation matrix for Norlund means, Regularity, Consistency, Equivalence theorem 21, Inclusion theorem 19.

Unit IV

Inclusion of Norlund method , Theorem 21, 22, 23, 24 of G.H. Hardy, Examples,(N, 1/n+l) c (C, K) c (N, e1/n).

Unit V

Limitation Methods, Examples of Limitation methods, Matrix Limitation methods, Theorem 1.3.2 (Without proof), Norlund and Riesz Means, Theorems 1.4.6, 1.4.7, 1.4.8 (Without proof), Schur Matrices, Theorems 1.5.2, 1.5.4 (Without proof).

Text Book:

1. R.G. Cooke, " Infinite Matrices and Sequence Spaces
2. GH Hardy, " Divergent Series", Oxford 1948.
3. G.M Petersen, "Regular Matrix Transformations", McGraw Hill Publishing Company Ltd., 1966.

Reference Books

1. Konrad Knopp, " Theory and Application of infinite Series " London and Glasgow 1921.
2. W. L. Ferrar, "A text book of convergence " Oxford, Clarendon Press 1937.
3. P.L. Bhatnagar and C.N. Shrinivas iengar, "Theory of Infinite Series, " National Publication House, 1964.

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1. 2.
3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Integral Equations & boundary value problems - II	
Optional : Group/Paper	:	Optional : Gr- IV / 3	

Unit – I

Eigen values and Eigen functions. Fredholm Integral equations of second kind with Saperable Kernels. Iterared kernels, Resolvent kernels.

Unit– II

Volterra integral equation of the second kind, Fredholm alternative theorem. Fredholm integral equation of first kind. Volterra integral equation of first kind.

Unit– III

Gauss differential equations, Legendre differential equations, Bessel's differential equations

Unit– IV

Hilbert-Schmidt theory, Orthogonality and orthonormality of Eigen-functions. Bessel's inequality, Hilbert Schmidt's expansion theorem.

Unit– V

Green's function, properties of Green's function and its construction. Application of Green's function to Solving BVP involving ODE.

Text Book:

1. Lectures on Differential & Integral equations; Vol X, Kosaku Yosida, Innterscience Publishers London1960.
2. Integral Equations and Boundary Value Problems:, M.D. Raisinghania, S.Chand Publications, New Delhi

Reference Books :

1. Integral equations; (Vol 4) (Translation), S.G. Mikhlin, Pergamon Press London.
2. Integral equations- Ashort course, L. G. chambers International Suggested Books Compan East kilbridge, Scotland.
3. A course of higher Mathematics, Vol.IV, (Translation); V. I. Smirnov, Pergmon Press, Oxford,(chapter I: , Integral equations, chapter IV: Boundary value Problems)
4. Integral equations & Applications, C. Corduneanu, Cambridge University Press, Cambridge.
5. Differential & Integral Equations; BP Parashar, CBS Publishers & Distribution, Sahdara, Delhi.

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3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Integral Transforms - II	
Optional : Group/Paper	:	Optional : Gr-V / 1	

Unit - I

Application of Laplace Transform to boundary value problems.

Unit - II

Electric Circuits problems, related to application of Electric Circuits. Application to dynamics, application to heat conduction equation, application to wave equations, Application to Beams.

Unit -III

The complex Fourier Transform, Inversion Formula, Fourier cosine and sine transform.

Unit-IV

Properties of Fourier Transforms, Convolution & Parseval's identity.

Unit-V

Fourier Transform of the derivatives, Finite Fourier Sine & Cosine Transform, Inversion Operational and combined properties Fourier transform.

Texts Books :-

1. Integral Transforms by Goyal & Gupta.
2. Integral Transforms by Sneddon.

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3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Theory of Linear Operators - II	
Optional : Group/Paper	:	Optional : Gr- V / 2	

Unit –I

Spectral properties of compact linear operators on normed spaces.

Unit-II

Behaviours of Compact linear operators with respect to solvability of operators equation.

Unit-III

Fredholm type theorems. fredholm alternative theorem. Fredhoml alternative for integral equation. spectral properties of bounded self – adjoint linear operator on complete Hilbert space.

Unit-IV

Positive operators Monotone sequence theorem for bounded self – adjoint operators on a complex Hilbert space

Unit-V

Square roots of a positive operator. projection operators.

Text Books:

E. Kreyszig Introductory functional analysis with applications, Jhon wiley & Sons, New York, 1978.

Reference Books.

1 P. R. Halmos Introduction to Hilbert space and the theory of Spectral Multiplicity, Second edition, Chelsea publishing co. N.Y. 1957.
2 N. Dundford and J.T. Schwartz, linear operator -3 part, Interscience / Wiley, New York 1958-71.
3 G. Bachman and L. Narci, Functional analysis, Academic press New York, 1966.

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3. 4. 5.

Class	:	M.Sc./M.A. (Semester-IV)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks - 15
Paper	:	II / III / IV / V	
Title	:	Approximation by Trigonometric and Algebraic Polynomials	
Optional : Group/Paper	:	Optional : Gr- V / 3	

Unit I

Fourier Series, Preliminaries, convergence of Fourier series, summability convergence of trigonometric series.

Unit II

The degree of approximation by trigonometric polynomial Generalities, Theorem of Jackson, The degree of approximation of differentiable functions, Inverse theorems, Differential functions.

Unit III

The degree of approximation by Algebraic polynomials, Preliminaries, The approximation theorems, Inequalities for the derivatives of polynomials, Inverse theorems.

Unit IV

Approximation by linear polynomials operators, sums of de la Vallee Poussion-positive operators, The principle of uniform boundedness, operators that preserve trigonometric polynomials, Trigonometric saturation classes.

Unit V

Least First Power of Approximation, Approximation on an Interval, Some computational aspects.

Text Books:

1. Hrushikesh N Mhaskar and D.V. Pai; Fundamentals of Approximation Theory, Narosa Publishing House, 2000.
2. G.G., Lorentz, Approximation of Functions, Holt, Rinehart and Wiston, Inc. 1966.
3. T.J. Rivilin, An Introduction to the Approximation of Functions.

Reference Books :

1. Timan, A.F., Theory of Functions of Real Variable, New York, Mackmillan, 1963.
2. G. Meinnardus, Approximation of Functions, Theory and Numerical Methods, Springer VerlagVol-13, 1967.

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