



**SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL  
SCIENCES, SEHORE**

**SYLLABUS M.SC MATHEMATICS – IV SEMESTER  
Functional Analysis-II  
MAT-401**

**UNIT-I**

Uniform boundedness theorem and some of its consequences, Open mapping and Closed graph theorems.

**UNIT-II**

Hahn-Banach theorem for real linear spaces, Hahn-Banach theorem for complex linear spaces and Normed linear spaces.

**UNIT-III**

Reflexive spaces, Hilbert spaces, Orthonormal Sets, Bessel's inequality, Complete orthonormal sets and Parseval's identity.

**UNIT-IV**

Projection Mapping , Projection theorem structure of Hilbert spaces, Riesz representation theorem.

**UNIT-V**

Adjoint of an operator on a Hilbert space, Reflexivity of Hilbert spaces, Self-adjoint operators, Positive operators, Projection, Normal and Unitary operators.

**Text Books:-**

1. E. Kreyszig, Introductory Functional Analysis with application, John Wiley and Sons New York.
2. G.F. Simmons, Introduction to Topology & Modern Analysis McGraw Hill, New York.

**Reference:-**

1. B. Choudary and Sudarshan Nanda. Functional Analysis with application Wiley Eastern Ltd.



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**SYLLABUS M.SC MATHEMATICS – IV SEMESTER  
ADVANCED SPECIAL FUNCTION-II  
MAT-402**

**UNIT-I**

**Bessel function and Legendre polynomials :** Definition of  $J_n(z)$ , Bessel's differential equation, Generating function, Bessel's integral with index half and an odd integer.

**UNIT-II**

Generating function for Legendre polynomials, Rodrigue's formula, Bateman's generating function, Additional generating functions, Hypergeometric forms of  $P_n(X)$ .

**UNIT-III**

Special properties of  $P_n(X)$ , Some more generating functions, Laplace's first integral form, Orthogonality.

**UNIT-IV**

Definition of Hermite polynomials  $H_n(X)$ , Pure recurrence relations, Differential recurrence relations, Rodrigue's formula, Other generating functions, Orthogonality, Expansion of polynomials, More generating functions.

**UNIT-V**

**Laguerre Polynomials :** The Laguerre Polynomials  $L_n(X)$ . Generating functions, Pure recurrence relations, Differential recurrence relation, Rodrigue's formula, Orthogonal, Expansion of polynomials, Special properties, Other generating functions.

**Books :-**

1. Rainville E. D., Special Functions, the Macmillan Co., New York 1971.
2. Srivastava H.M., Gupta K.C. and Goyal S.P., The H- Functions of one and two variables with applications, South Asian Publication, New Delhi.
3. Saran N., Sharma S.D. and Trivedi, Special Function with application, Pragati Prakashan 1986.
4. The Saxena V.P., I-Function, Anamaya New Delhi, 2008.

**Reference Books:-**

1. Lebedev N.N., Special Functions and Their Applications, Prentice Hall Englewood Cliffs, New Jersey, USA 1995.
2. Whittaker E.T. and Watson G.N., A Course of Modern Analysis, Cambridge University Press, London, 1963.



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**SYLLABUS M.SC MATHEMATICS – IV SEMESTER  
Theory of Linear Operators-II  
MAT-403**

**UNIT-I**

Spectral properties of compact linear operators on normed spaces.

**UNIT-II**

Behaviors' of Compact linear operators with respect to solvability of operators equation.

**UNIT-III**

Fredholm type theorems, Fredholm alternative theorem, Fredholm 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 with applications.

**Books :-**

1. E. Kreyszig, Introductory Functional Analysis with application, John Wiley and Sons New York.

**Reference Book:-**

1. P.R. Halmos, Introduction to Hilbert space and the theory of Spectral Multiplicity, Second edition, Chelsea publishing co. N. Y. 1957.
2. N. Dunford and J.T. Schwartz, linear operator-3 part, Inter science/ Wiley, New York 1958-1971.
3. G. Bachman and L. Narci, Functional analysis, Academic press New York. 1966.



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**SYLLABUS M.SC MATHEMATICS – IV SEMESTER  
Integral Transforms-II  
MAT-404**

**UNIT-I**

Application of Laplace Transform to Boundary Value Problems.

**UNIT-II**

Electric Circuits, 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 and Cosine Transform, Inversion Operational and Combined properties of Fourier transform.

**Books :-**

1. L. K. Vashisht ,Integral Transform, Krishna's Educational Publisher's India.

**Recommended Books :-**

1. J. K. Goyal and Gupta ,Integral Transform, Pragati Prakashan India.



**SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL  
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**SYLLABUS M.SC MATHEMATICS – IV SEMESTER  
Spherical Trigonometry and Astronomy-II  
MAT-405**

**UNIT-I**

Spherical Astronomy - Various system of references and related topics.

**UNIT-II**

Celestial sphere.

**UNIT-III**

Transit instrument.

**UNIT-IV**

Atmospheric Refraction.

**UNIT-V**

Time planetary phenomena

**Books :-**

1. W. M. Smart ,Textbook on Spherical Astronomy, Cambridge University Press.

**Recommended Books :-**

1. G. S. Malik , Spherical Astronomy, Kedar Nath Ram Nath Publication India .



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**SYLLABUS M.SC MATHEMATICS – IV SEMESTER  
Dissertation  
MAT-406**

- A Dissertation on any research topic of Mathematics such as:
1. Graph theory
  2. Probability (Discrete and Measure–theoretic)
  3. Analysis (real and functional)
  4. Algebra (linear and abstract)
  5. Fixed point theory
  6. Fuzzy sets, and Fuzzy logic
  7. Operational Research
  8. Numerical Methods
  9. Mathematical modeling
  10. Data Mining