Syllabus Prescribed for B.Sc. Third Year Examination

Semester V

5S Mathematics Paper– IX (Mathematical Analysis)

Unit– I: Riemann Integral: Integrability of continuous and monotonic functions, the fundamental theorem of integral calculus, mean value theorem of integral calculus.

Unit II : Improper integrals and their convergence, comparison and limit tests. Beta and gamma functions.

Unit- III: Continuity and differentiability of complex function, analytic function, Cauchy- Riemann equations, harmonic and conjugate functions, Milne- Thomson method.

Unit- IV: Elementary function, mapping by elementary function, Mobius transformation,fixed point, cross ratio, inverse and critical points, conformal mapping.

Unit- V: Metric spaces: Definition and examples of metric spaces, neighbourhood, limit point, interior point, open and closed sets, Cauchy sequences, completeness.

Reference Books :

1. R. R. Goldberg: Methods of Real Analysis, Oxford IBH publishing Co. New Delhi, 1970.
2. T. M. Karade, J . N. Salunke, K. S. Adhav, M. S. Bendre : Lectures on Analysis, Sonu Nilu Publication, Nagpur.
3. Walter Rudin: Principles of Mathematical Analysis, International students edition(Third edition)
4. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.,
5. S. Lang : Undergraduate Analysis, Springer- Verlag New York, 1983.
6. D. Somasundaram & B. Choudhari : A First Course in Mathematical Analysis, NewDelhi.1997.
7. Shanti Narayan : A Course of Mathematical Analysis, S. Chand & Co., New Delhi.
8. P. K. Jain & S. K. Kaushik : An Introduction to Real Analysis, S. Chand & Co. NewDelhi, 2000.
9. R. V. Churchiln and J .W.Brown, Complex Variables and Applications, 5th Edition,McGraw Hill, New York, 1990
10. Mark J Ablowitz and : A.S. Fokas, Complex Variable Introduction and Application,Cambridge University Press ,South Asian Edition ,1998.
11. Shanti Narayan : Theory of functions of Complex Variable,,S.Chand and Co. NewDelhi.
12. E.T.Coption,:Metric Spaces, Cambridge University Press ,1968.
13. P.K.Jain and K.Ahmed ,:Metric Spaces ,Narosa Publishing House, New Delhi 1996.

14. G.F. Simmons : Introduction to Topology and Modern Analysis, McGraw Hill, NewYork,1963.
15. T. M. Karade, J . N. Salunke, A. G. Deshmukh, M. S. Bendre: Lectures on AdvancedCalculus, Sonu-Nilu Publication, Nagpur.
16. Murray R. Spiegel: Theory and Problems of Advanced Calculus, Schaum OutlineSeries.
17. S. C. Malik and Arora : Mathematical Analysis, Wiley Estern Ltd., New Delhi.

Semester V

5S Mathematics Paper– X (Mathematical Methods)

Unit- I: Legendre's equation, Legendre's polynomials, generating function of $P_n(x)$, recurrence formulae for $P_n(x)$, Orthogonality of Legendre's polynomial, Rodrigue's formula,

Unit- II: Bessel's equation, solution of Bessel's equation, generating function for $J_n(x)$, Recurrence formulae for $J_n(x)$. Strun-Liouville boundary value problem.

Unit- III: Fourier series, Fourier series for odd and even functions, half-range Fouriersine series and half-range Fourier cosine series.

Unit- IV: Laplace transform: Laplace transform of some elementary functions, existence of Laplace transform. properties of Laplace transform. Laplace transform of derivatives and integrals, multiplications of t^n and division by t, inverse Laplace transform, convolution property, application of Laplace transform in solving ordinary and partial differential equations.

Unit- V: Fourier Transform: Finite Fourier sine transform, inverse finite Fourier sinetransform and cosine transform, Infinite Fourier transform, infinite Fourier sine transform and cosine transform, properties of Fourier transform, application to partial differential equations.

Reference Books :

1. Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley and Sons, Inc. New York, 1999.
2. A. R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd. , London.
3. Frank Ayres: Theory and Problems of Differential Equations. McGraw Hill Book Company, 1972.
4. B. Courant and D. Hilbert: Methods of Mathematical Physics, Vol. I & II , Wiley-interscience, 1953.
5. T. M. Karade : Lectures on Differential Equations, Sonu-Nilu Publication, Nagpur.
6. I. N. Sneddon : Fourier Transforms, McGrow Hill Book Co.
7. Goel and Gupta : Integral Transforms, Pragati Prakashan , Meerut.
8. Raisinghaniya, M. D., Integral Transform, S. Chand & Co., N.D.