

**BM-242**

**(Semester-IV)**

**Special Functions And Integral Transforms**

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

**Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.**

**Section-I**

Series solution of differential equations – Power series method, Definitions of Beta and Gamma functions. Bessel equation and its solution: Bessel functions and their properties Convergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions.

**Section-II**

Legendre and Hermite differential equations and their solutions: Legendre and Hermite functions and their properties-Recurrence Relations and generating functions. Orthogonality of Legendre and Hermite polynomials. Rodrigues' Formula for Legendre & Hermite Polynomials, Laplace Integral Representation of Legendre polynomial.

**Section-III**

Laplace Transforms – Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, solution of ordinary differential equations using Laplace transform.

**Section-IV**

Fourier transforms: Linearity property, Shifting, Modulation, Convolution Theorem, Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, solution of differential Equations using Fourier Transforms.

## REFERENCES

- Erwin Kreyszing : Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999
- A.R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd.
- I.N. Sneddon : Special Functions on mathematics, Physics & Chemistry.
- W.W. Bell : Special Functions for Scientists & Engineers.
- I.N. Sneddon: the use of integral transform, McGraw Hill, 1972
- Murray R. Spiegel: Laplace transform, Schaum's Series