19BSM506E Special Functions										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		TotalMarks
					MS	ES	IA	LW	LE/Viva	
3	1	--	4	4	25	50	25	--	--	100

OBJECTIVES

1. To study a variety of different methods for discovering the properties of Important special functions.
2. Understanding the use of special function in real life problems

SYLLABUS

Unit-I	**10**

The Gamma and Beta Functions: Euler's integral for Γ(z), the beta function, factorial function, Legendre equation and its solution. Legendre's polynomial of degree *n*. Recurrence relations, orthogonal properties of Legendre's polynomial,.Rodrigue's formula. Legendre's polynomial

UNIT II	**9**

Bessel equation and its solution, Bessel function of first and second kind of order *n*. Recurrence relations, Generating function, Orthogonality of Bessel's function.

UNIT III	**10**

Hermite Polynomial, Laguerre Polynomial and Chebyshev polynomial and their orthogonal properties

UNIT IV	**10**

The Hypergeometric function: An integral representation. Its differential equation and solutions. , F(a,b,c;1) as a function of the parameters, evaluation of F(a,b,c;1), contiguous function relations, the hypergeometric differential equation, logarithmic solutions of the hypergeometric equation, F(a,b,c;z) as a function of its parameters

APPROXIMATE TOTAL	**39 Hours**

OUTCOMES

1. Understand the infinite product and properties of Beta and Gamma functions
2. Analyze the properties of Hypergeometric functions.
3. Perform operations with Bessel, Hermite and Legendre differential equations along with the corresponding recurrence formulas of different functions.
4. Demonstrate their understanding of how physical phenomena are modeled using special functions.
5. Explain the applications and the usefulness of special

functions.

TEXTS AND REFERENCES

1. M.D. Raisinghania, Advanced differential equations, S Chand, (19^{th} edition)
2. L.C. Andrews ,Special Functions of Mathematics for Engineers, SPIE Press, 1992.
3. L.J. Slater,Generalized Hypergeometric Functions , Cambridge University Press; Reissue edition ,2008.
4. Z. X. Wang and D. R. Guo, Special Functions, World Scientific publishing Co., 1989.
5. Gabor Szego, Orthogonal Polynomials, American mathematical society, 1939.
6. L. Debnath, Integral transforms and their Applications, CRC Press, New YorkLondon- Tokyo, 1995.
7. Mathematical Methods for Physics George B. Arfken and Hans J. Weber, Academic Press, INC(Forth Edition)