20BSM306E					Special Functions					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To be able to understand the concept of important special functions.
- To be able to obtain the solution of equation in the form of special functions.
- To be able to analyze the use of special function in real life problems.
- To be able study the advantage of special function as solution of various real world problems.

UNIT 1 GAMMA AND BETA FUNCTIONS **08 Hrs.**

The Gamma and Beta Functions: Euler's integral for Γ(z), the beta function, factorial function.

UNIT 2 BESSEL EQUATION **10 Hrs.**

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 3 LEGENDRE EQUATION **10 Hrs.**

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 4 HYPERGEOMETRIC FUNCTION **12 Hrs.**

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

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Identify the use of special functions and polynomials
CO2 – Understand the concept of Beta and Gamma function in evaluation of integrals.
CO3 – Develop the ability to apply Bessel function to solve differential equations.
CO4 – Analyze the obtained solution in context with special functions.
CO5 – Appraise mathematical problems in term of special functions from real to complex domain.
CO6 – Evaluate problems on understanding of how physical phenomena are modeled using special functions.

TEXT/REFERENCE BOOKS

1. M.D. Raisinghania, Advanced differential equations, S Chand, (19th edition), 1995.
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.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 6 questions of 4 marks each	24 Marks
Part B: 6 questions of 8 marks each	48 Marks
Part C: 2 questions of 14 marks each	28 Marks