

ADVANCED CALCULUS

I B. TECH- II SEMESTER								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A4BS04	BSC	3	1	-	4	30	70	100
COURSE OBJECTIVES:								
To learn								
1. Evaluation of length, areas & volumes of different curves of revolution.								
2. The partial derivatives of several variable functions.								
3. Concept and application of Laplace transforms.								
4. Fourier series for periodic functions.								
5. Classification of second order partial differential equations.								
COURSE OUTCOMES:								
Upon successful completion of the course, the student is able to								
1. Evaluate the improper integrals using beta and gamma functions.								
2. Find the Maxima and Minima of several variable functions.								
3. Solve the differential equations using Laplace transform techniques.								
4. Find the Fourier series of the periodic functions.								
5. Solve one dimensional heat equation, wave equation using method of separation of variables.								
UNIT-I	BETA GAMMA FUNCTIONS AND APPLICATIONS OF DEFINITE INTEGRALS						Classes: 11	
Beta- Gamma Functions and their Properties-Relation between them- Evaluation of improper integrals using Gamma and Beta functions. Application of definite integrals: Lengths, evaluate surface areas and volumes of revolution of curves (only in Cartesian co-ordinates).								
UNIT-II	CALCULUS OF SEVERAL VARIABLES						Classes: 11	
Limit, Continuity - Partial derivative- Partial derivatives of higher order -Total derivative - Chain rule, Jacobians -functional dependence & independence. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints)								
UNIT-III	LAPLACE TRANSFORMS						Classes: 12	
Laplace transforms of elementary functions- First shifting theorem - Change of scale property – Multiplication by t^n - Division by t – Laplace transforms of derivatives and integrals – Unit step function – Second shifting theorem – Periodic function – Evaluation of integrals by Laplace transforms – Inverse Laplace transforms- Method of partial fractions – Other methods of finding inverse transforms – Convolution theorem – Applications of Laplace transforms to ordinary differential equations.								
UNIT-IV	FOURIER SERIES						Classes:10	
Periodic function-Determination of Fourier Coefficients-Fourier Series-Even and Odd functions-Fourier series in arbitrary interval-Even Odd periodic continuation-Half range Fourier sine and cosine expansions.								
UNIT-V	PARTIAL DIFFERENTIAL EQUATIONS OF SECOND ORDER AND APPLICATIONS						Classes: 08	
Method of separation of variables. Classification of second order partial differential equations. Applications of Partial differential equations- one dimensional wave equation, Heat equation.								
TEXT BOOKS:								
1. Ervin Kreyszig, Advanced Engineering Mathematics, 9 th Edition, John Wiley & Sons, 2006.								
2. B.S.Grewal, Higher Engineering Mathematics, Khanna publishers, 36 th Edition, 2010.								
REFERENCE BOOKS:								
1. G.B.Thomas, calculus and analytical geometry,9 th Edition, Pearson Reprint 2006.								
2. N.P Bali and Manish Goyal ,A Text of Engineering Mathematics,Laxmi publications,2008.								
3. E.L.Ince, Ordinary differential Equations,Dover publications,1958.								
WEB REFERENCES:								

1. https://www.efunda.com/math/math_home/math.cfm
2. <https://www.ocw.mit.edu/resources/#Mathematics>
3. <https://www.sosmath.com/>
4. <https://www.mathworld.wolfram.com/>

E -TEXT BOOKS:

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>
2. <https://www.e-booksdirectory.com/details.php?ebook=10166>

MOOCS COURSE:

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>