JECRC Foundation

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

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Year & Sem. – B. Tech I year, Sem.-I
Subject –Engineering Mathematics- I
Syllabus and Course Plan

VISION OF INSTITUTE

To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities.

MISSION OF INSTITUTE

❖**Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.**

❖**Identify, based on informed perception of Indian, regional and global needs, the areas of focus and provide platform to gain knowledge and solutions.**

❖**Offer opportunities for interaction between academia and industry.**

❖**Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders may emerge in a range of profession.**

Syllabus of Engineering Mathematics -I

SYLLABUS
I Semester
Common to all branches of UG Engineering & Technology

1FY2-01: Engineering Mathematics-I

Credit: 4 **Max. Marks: 200 (IA:40, ETE:160)**
3L+1T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	**Calculus:** Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	8
2	**Sequences and Series:** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.	6
3	**Fourier Series:** Periodic functions, Fourier series, Euler's formula, Change of intervals,Half range sine and cosine series, Parseval's theorem.	6
4	**Multivariable Calculus (Differentiation):** Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.	10
5	**Multivariable Calculus (Integration):** Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.	10
	TOTAL	40

Course Outcome of Engineering Mathematics –I Semester I

On completion of this course students will be expected to:

CO1. Recognize odd, even and periodic function and express them in Fourier series using Euler's formulae.

CO2. Understand fundamental concepts of improper integrals, beta and gamma functions and their properties. Evaluation of Multiple Integrals in finding the areas, volume enclosed by **several curves after its tracing** and its application in proving certain theorems.

CO3. Understand the concept of limits, continuity and differentiability of functions of several variables. Analytical definition of partial derivative. **Maxima and minima of functions of one** and several variables. Define gradient, divergence and curl of scalar and vector functions.

CO4. Interpret the concept of a series as the sum of a sequence, and use the sequence of partial sums to determine convergence of a series. Understand derivatives of power, trigonometric, exponential, hyperbolic, logarithmic series.

CO-PO mapping

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	1	1	-	1
CO2	3	1	-	-	-	-	-	-	1	1	-	1
CO3	3	1	-	-	-	-	-	-	1	1	-	1
CO4	3	1	-	-	-	-	-	-	1	1	-	1

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Course Plan
Subject: Engineering Mathematics –I(2018-19)
Semester-I

S. No.	*Topic to be discussed*	*Objective of lecture*	*Outcome of Lecture*	*Book referred*	*From page to*
1	Improper integrals (Beta functions)	To make students understand the concept of improper integrals and some special functions.	Understand fundamental concepts of improper integrals, beta and gamma functions and their properties.	Engg. Mathematics for Sem I &II by C.B. Gupta, Mc. Graw Hill Education , Chennai.	6.29 to 6.46 and 5.31 to 5.43
2	Properties				
3	Improper integrals (Beta and Gamma functions)				
4	Properties				
5	Relation Between Beta and Gamma Function, definite integral				
6	Applications of definite integrals to evaluate surface areas	Enable students to learn to find surface area and volume of solid of revolutions using definite integrals.	Finding the areas, volume enclosed by several curves after its tracing .		
7	Applications of definite integrals to evaluate surface areas				
8	Applications of definite integrals to evaluate volume of revolution.				

9	**Convergence of sequence and series,**	**To make students understand sequence and series with their sum and convergence tests.**	**Interpret the concept of a series as the sum of a sequence, and use the sequence of partial sums to determine convergence of a series. Understand derivatives of power, trigonometric, exponential, hyperbolic, logarithmic series.**	**Advanced Engg. Mathematics by H.K. Das, S.C. Chand & Co. Company**	**10.13 to 10..51**
10	Test For convergence:- Power series				
11	Test For convergence:- Series for exponential,				
12	Test For convergence:- Trigonometric functions	To introduce the properties of some special types of series.			
13	Test For convergence:- logarithm functions.				
14	Test For convergence:- Taylor's series,				

15	**Periodic functions, Fourier series,**	**To enable students to learn the Expansion of periodic function in the series of sines and cosines and their modifications according to the type of function and limits.**	**Recognize odd, even and periodic function and express them in Fourier series using Euler's formulae.**	**Advanced Engg. Mathematics by ERWIN KREYSZIG, John Wiley & Sons.**	**526-541**
16	Euler's formula				
17	Change of intervals				
18	Half range sine series				
19	Half range cosine series				
20	Parseval`s Theorem			Engg. Mathematics for Sem I &II by C.B. Gupta, Mc. Graw Hill Education , Chennai.	9.31 to 9.32

21	**Defination of Limit, continuity**	**To introduce students with the concept of limit and continuity of two variables, solving equations for extreme points.**	**Understand the concept of limits, continuity and differentiability of functions of several variables. Analytical definition of partial derivative. Maxima and minima of functions of several variables**	**Higher Engg. Mathematics by B.V. Ramanna**	**3.1 to 3.18**
22	Partial differentiation,				
23	Total derivative				
24	Tangent plane and normal lines				
25	Directional derivative			Higher Engg. Mathematics by B.V. Ramanna	4.1 to 4.10
26	Maxima, minima and saddle points				
27	Method of Lagrange multipliers				
28	Method of Lagrange multipliers				
29	Gradient	Introduce them to vector space and the terms of gradient curl and divergence.	Define gradient, divergence and curl of scalar and vector functions.	Higher Engg. Mathematics by B.V. Ramanna	15.1 to 15.14
30	curl and divergence				

31	**Multiple Integration: Double integrals (Cartesian)**	**To make students learn double and triple integrals with their applications in deriving Gauss, Green's and Stoke's theorem.**	**Evaluation of Multiple Integrals in finding the areas, volume enclosed by several curves and its applications in line , surface and volume integral.**	**Engg. Mathematics for Sem I &II by C.B. Gupta, Mc. Graw Hill Education , Chennai.**	**5.63 to 5.104** **5.43 to 5.54**
32	change of order of integration in double integrals				
33	Change of variables (Cartesian to polar)				
34	Applications: areas and volumes,				
35	Applications: Centre of mass and Gravity (constant and variable densities)				
36	Triple integrals (Cartesian)				
37	Simple applications involving cubes, sphere and rectangular parallelepipeds;				
38	Scalar line integrals, vector line integrals, scalar surface integrals			Advanced Engg. Mathematics by ERWIN KREYSZIG, John Wiley & Sons.	464 to 515
39	vector surface integrals, Theorems of Green				
40	Gauss and Stokes theoems.				

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Thank you!