DEPARTMENT OF MATHEMATICS

Integrated M.Sc. Mathematics

Semester: I **CC1 Differential and Integral Calculus (060090105)** **Academic Year : 2019-20**

Teaching Schedule

Course Objectives:

To study fundamental concepts related to real world problems so that students get sound Knowledge and important aspects of the subject.

Course Outcomes: Upon completion of the course, students shall be able to

CO1: understand the differentiation of hyperbolic functions and derive n^{th} order derivative of function.

CO2: verify the value of the limit of a function at a point using the definition of the limit.

CO3: calculate the limit of a function at a point numerically and algebraically using L'hospital's rule.

CO4: understand concept of parameterized curve from algebraic, geometric and physical standpoints.

CO5: evaluate the reduction formula of integration and derive the length of arc, area of surface and volume of solid.

CO6: formulate the region of structured and unstructured solid into the form of double and triple integrals and obtained their area, mass and volume.

Unit	Sub Unit	No. of Lecture (s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used	Active Learning Activities	Evaluation Parameters
Differential calculus :Hyperbolic functions [21]							
1	1.1	5	Hyperbolic functions	Ch# 7 – 416 - 421	Chalk & Talk	**For Slow Learner:** Students must write answer of question(s) given by teacher after completion of Unit. **For Active Learner:** Students read at least one research paper based on DIP and mapping content with Unit	Unit test
	1.2	5	Higher order derivatives	Ch#3 – 121 122,152,771			
	1.3	6	Leibnitz rule and its applications	Ch# 5 - 306			
	1.4	5	concavity and inflection points, asymptotes	Ch# 4 – 203-206,188,209			
Differential calculus : L'Hospital's rule [17]							
2	2.1	7	Indeterminate form, L'Hospital's rule, applications in business, economics and life sciences	Ch# 7 – 396-402,600-601	Chalk & Talk	**For Slow Learner:** Study methods from book/papers and discuss within group. ***For Active Learner:** Apply different methods in selected application and show the results	Unit test
	2.2	10	applications in business, economics and life sciences, Curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves	Ch# 7 – 396-402,600-601			

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						with analysis.	
Integral calculus							[21]
3	3.1	3	Reduction formulae	G.B #8 : 435-439	Chalk & Talk	**For Slow Learner**: Provide calculation based question by teacher and Students solve them. *__For Active Learner:__ Apply different methods in selected application and show the results with analysis	Unit test
	3.2	5	Derivations and illustrations of reduction formulae of the type $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int \sec^n x dx$,	G.B #8 : 440-448			
	3.3	5	Volumes by slicing, disks and washers methods	G.B #8 : 308-318			
	3.4	4	Volumes by cylindrical shells, parametric equations, parameterizing a curve, arc	G.B #8 : 319-337			
	3.5	4	Length arc, length of parametric curves, area of surface of revolution.	G.B #8 : 319-337			
Multiple Integral and its application							[16]
4	4.1	2	Reorientation of concepts of integrals	G.B #8	Chalk & Talk	**For Slow Learner**: Provide calculation based question by teacher and Students solve them. *__For Active Learner:__ Apply different methods in selected application and show the results with analysis	assignment
	4.2	3	Double and triple integrals	G.B #8			
	4.3	2	Evaluation techniques	G.B #8			
	4.4	3	Change of order of Integration	K.S #6	Chalk & Talk		
	4.5	1	Change of variable	K.S #6			
	4.6	5	Application of double and triple integrals for evaluation of area, volume and mass	K.S #6			

Text books:

1. G.B. Thomas and R.L. Finney – "Calculus", 9th Edition, Pearson Education, Delhi, 2005
2. M.J.Strauss, G.L. Bradley and K. J. Smith – "Calculus", 3rd Edition, Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

Reference books:

1. H. Anton, I. Bivens and S. Davis – "Calculus", 7th Edition, John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
2. R. Courant and F. John – " Introduction to Calculus and Analysis (Volumes I & II)", Springer-Verlag, New York, Inc., 1989.
3. Rudra Pratap – "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford University Press, 2002.

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Course Objectives and Course Outcomes Mapping:

- To study Differential Calculus and get knowledge about how to plot the graph - CO1, CO2, CO3, CO4.
- To study Difference between double and triple integration and how to change the order of the Integration also application of multiple integral – CO5, CO6
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Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Differential calculus : Hyperbolic functions	✓					
2	Differential calculus : L'Hospital's rule		✓	✓			
3	Integral Calculus				✓		
4	Multiple Integral and its application					✓	✓

Programme Outcomes (PO)

PO1: Knowledge

Provides knowledge about the fundamentals of pure, applied and computing mathematics and its applications to students that creates the opportunities in industries and research centers.

PO2: Core Competence

Creates competency in science and mathematics to formulate, analyses and solve problem and/or also to pursue advanced study or research.

PO3: Breadth

Trains students having good knowledge in unearth core of academia and industry by the roots of mathematics.

PO4: Evaluation

Imparts in students to raise trial and error-based curiosity and problem-solving functionality with research based advanced tutorial for higher level decision makings tools.

Programme Outcomes and Course Outcomes Mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓					✓
PO2		✓			✓	
PO3			✓		✓	
PO4	✓			✓		✓