Discipline: Mechanical Engg.	**Semester:2nd**	**Name of the Teaching Faculty:** APARNA TRIPATHY (Lect. in Mathematics)
Subject: Engg. Math-II	**No.ofdays/weekclass allotted:** 6P (5Lectures+1 Tutorial)	**Semester from date:** **Todate:** **No. of weeks: 16**
Week	**ClassDay**	**TheoryTopics**
1st	1st	**Chapter2:LIMITSand CONTINUITY:** a) Definitionofafunction(Basedonsettheory) b) Typesoffunctions i) Constantfunction, ii) Identityfunction iii) Absolutevaluefunction iv) TheGreatestIntegerFunction
	2nd	v) Trigonometricfunctionwithexample vi) Exponentialfunction vii) Logarithmic function With examples
	3rd	c) Introductionoflimit:definition,example d) Existenceoflimitwithexample
	4th	e)Methodsofevaluationoflimit
	5th	Methodsofevaluationoflimitcontinueswithsomeexamples
	6th(Tutorialclass)	Problemsonexistenceoflimitandevaluationoflimit
2nd	1st	*i)* $\lim_{x\to a}\frac{x^n-a^n}{x-a}=na^{n-1}$ *ii)* $\lim_{x\to 0}\frac{a^x-1}{x}=\ln a=\log_e a$ Someproblemsusingtheseformulae
	2nd	**iii)** $\lim_{x\to 0}\frac{e^x-1}{x}=1$ ***iv)*** $\lim_{x\to 0}(1+x)^{\frac{1}{x}}=e$ Someproblemsusingtheseformulae
	3rd	***v)*** $\lim_{x\to\infty}(1+\frac{1}{x})^x=e$ ***vi)*** $\lim_{x\to 0}\frac{\log(1+x)}{x}=1$ Someproblemsusingtheseformulae
	4th	**vii)** $\lim_{x\to 0}\frac{\sin x}{x}=1$ **viii)** $\lim_{x\to 0}\frac{\tan x}{x}=1$ Someproblemsusingthese

		formulae
	5th	f) Definitionofcontinuityofafunctionatapoint, Existence of continuity with example
	6th(Tutorialclass)	Problemsonlimitandcontinuity
3rd	1st	**Chapter3: DERIVATIVES:** **a)** Derivativeofafunctionatapoint **b)** Algebraofderivative
	2nd	**c)**Derivativeofstandardfunctions: $x^n, a^x, \log_a x, e^x$
	3rd	Derivativeofstandardfunctionscontinues: $\sin x, \cos x, \tan x$
	4th	Derivativeofstandardfunctionscontinues: $\cot x, \sec x, \csc x, \sin^{-1} x$
	5th	Derivativeofstandardfunctionscontinues: $\cos^{-1} x, \tan^{-1} x, \cot^{-1} x$
	6th(Tutorialclass)	Problemsolvingontrigonometricfunctions
4th	1st	Derivativeofstandardfunctionscontinues: $\sec^{-1} x, \csc^{-1} x,$ **d)** Derivativesofcompositefunction
	2nd	Derivativesofcompositefunction(Chainrule)continueswith examples
	3rd	Derivativesofcompositefunction(Chainrule)continueswith examples
	4th	**e)** Methodsofdifferentiationof i) Parametricfunctionwithexamples
	5th	Methodsofdifferentiationof ii) Implicitfunctionwithexamples
	6th(Tutorialclass)	Solvingproblemsonderivativesofparametricfunction and implicit function
5th	1st	Methodsofdifferentiationof iii) Logarithmicfunctionwithexample
	2nd	Methodsofdifferentiationof iv) Afunctionwrtanotherfunctionwithexample
	3rd	**f)** Applicationsofderivatives: i) Successivedifferentiation(uptosecondorder) Some problems on successivedifferentiation
	4th	Solvingproblemsonsuccessivedifferentiation
	5th	ii) Partialdifferentiation(functionoftwo variables up to second order)
	6th(Tutorialclass)	Problemsonderivativeoflogarithmicfunction and successive differentiation.
6th	1st	Partialdifferentiationcontinues
	2nd	Somemoreproblemsonpartialdifferentiation
	3rd	Revisionofderivative
	4th	**Chapter4:INTEGRATION:**

		a) Definitionofintegrationasinverseofdifferentiation **b)** Integralofstandardfunctions
	5th	**c)** Methodsofintegration: i) Integrationbysubstitutionwithexamples
	6th(Tutorialclass)	Problemsonintegrationbysubstitution
7th	1st	ii) Integrationbypartswithexamples
	2nd	Problemsonintegrationbyparts
	3rd	**d)Integrationofthefollowingforms** **i)** $\int \frac{dx}{x^2+a^2}$ **ii)** $\int \frac{dx}{x^2-a^2}$ **iii)** $\int \frac{dx}{a^2-x^2}$ Iv) $\int \frac{dx}{\sqrt{x+a}}$ **with**examples
	4th	**Integrationofthefollowingforms** **v)** $\int \frac{dx}{\sqrt{a^2-x^2}}$ **vi)** $\int \frac{dx}{\sqrt{x-a}}$ **vii)** $\int \frac{dx}{x\sqrt{x^2+a^2}}$ **viii)** $\sqrt{a^2-x^2}dx$ **with examples**
	5th	**Integrationofthefollowingforms** **ix)** $\sqrt{a^2+x^2}dx$ **x)** $\sqrt{x^2-a^2}dx$ **withproblems**
	6th(Tutorialclass)	Problemsonintegrationbyparts
8th	1st	**e)** **D**efiniteintegralsandproperties *i)* $\int_0^a f(x)dx=\int_0^a f(a-x)dx$ *ii)* $\int_a^b f(x)dx=-\int_b^a f(x)dx$ With problems
	2nd	*iii)* $\int_a^c f(x)dx=\int_a^b f(x)dx+\int_b^c f(x)dx, a<b<c$ $\int_{-a}^{a} f(x)dx=0, if f(x)=odd$ *iv)* $=2\int_0^a f(x)dx, if \quad f(x)=even$ With examples
	3rd	Solvingproblemsonpropertiesofdefiniteintegration
	4th	**f)** **A**pplicationofintegration

		i) Areaenclosedbyacurveand X-axisand example
	5th	ii) Areaofacirclewithcentreatorigin
	6th(Tutorialclass)	Solvingproblemsonapplicationofintegration
9th	1st	**Chapter5:DIFFERENTIALEQUATION:** Definition,ODE,PDE, a)Orderanddegreeofadifferential equation
	2nd	DeterminingOrderanddegreeofadifferentialequationwith examples
	3rd	b) Solution of differential equation Definition i) Bymethodofseparationof variablewithexamples
	4th	methodofseparationofvariablecontinueswithproblem solving
	5th	**Somemoreproblemsonseparationofvariables**
	6th(Tutorialclass)	Problemsondeterminationofdegreeandorderofa differential equation
10th	1st	**ii)** Linearequation example
	2nd	Solvinglinearequation $\frac{dy}{dx}+Py=Q$,whereP,Qare functionsofx
	3rd	Problemsonlineardifferentialequation
	4th	SomemoreProblemsonlineardifferential equation
	5th	**Revisionofdifferentialequation**
	6th(Tutorialclass)	**Revisionofdifferentialequation**
11th	1st	**Chapter1:VECTORALGEBRA:** a) Introduction:definitionofscalar,vectorwith examples b) Typesofvectors:nullvector,parallelvector,collinear vectors withexamples
	2nd	**c)**Representationofavector
	3rd	d)Magnitudeanddirectionofvectorswithexamples
	4th	e)Additionandsubtractionofvectorswithexamples
	5th	Propertiesofvectoradditionandpositionvector
	6th(Tutorialclass)	Problemsonmagnitudeand f) positionvector
12th	1st	g)scalarproductof twovectorswithexamples
	2nd	h)Geometricalmeaningofdotproduct
	3rd	Problemsondotproduct
	4th	i) Anglebetweentwovectorswithexample
	5th	j) Scalarandvectorprojectionoftwovectorswith examples
	6th(Tutorialclass)	ProblemsonScalarandvectorprojectionoftwo vectors

13th	1st	k)Vectorproductandgeometricalmeaning
	2nd	Problemsonvectorproduct
	3rd	**Revision**
	4th	
	5th	
	6th	
14th	1st	**Previousyearquestiondiscussion**
	2nd	
	3rd	
	4th	
	5th	
	6th	
15th	1st	**Previousyearquestiondiscussion**
	2nd	
	3rd	
	4th	
	5th	
	6th	
16th	1st	**Previousyearquestiondiscussion**
	2nd	
	3rd	
	4th	
	5th	
	6th	

LearningResources:

1. ElementsofMathematics_Vol-1&2(Odisha StateBureauofTextBookPreparation&Production)

2. MathematicsPart-I&Part-IITextbookfor ClassXII,NCERTPublication

3. TextBookOfEngg.MathematicsPart-II(KalyaniPublication)