

**Rajarshi Shakti Mahavidyalaya, Latur**

**(Autonomous)**

**Structured Work Plan for Teaching**

**First Term**

**(5<sup>th</sup> July 2021 to 2<sup>nd</sup> Nov 2022)**

- **Details of Classes to be taught**

Sr. No.	Class	Name of Faculty	Subject	Paper
1.	B.Sc. II	Pimple N.S.	Mathematics	Real Analysis(T) Problems in Real Analysis (P)
2.	B.Sc. III			Metric Spaces (T) Problems in Metric spaces (P)
3.	M.Sc. II			Functional Analysis (T)

• **Summary of Lesson Plan**  
**Name of Teacher: Pimple N.S.**      **Class: - B.Sc. II**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Real Analysis)	<p><b>Unit - I</b>  Sequences: Sequences and their limits, limit theorems, Monotone Sequences, Subsequences and Bolzano Weierstrass theorem, The Cauchy's criterion, properly divergent sequences</p> <p><b>Unit-II</b>  Sequence of functions Pointwise and uniform convergence, Interchange of limits, The exponential and Logarithmic functions, The trigonometric functions</p> <p><b>Unit-III</b>  Infinite Series  Introduction to series, Cauchy's criterion for series, Comparison tests, Absolute convergence Test for Absolute convergence, Test for Non-absolute convergence, series of functions.</p>	<p><b>15 July 2021</b>  To  <b>20 Aug 2021</b></p> <p><b>23 Jul 2021</b>  to  <b>04 Sept 2021</b></p> <p><b>01 Oct 2021</b>  to  <b>02 Nov 2021</b></p>	<p>15</p> <p>15</p> <p>16</p>	<p>Assignments  NPTEL Course registration  Madhava Quiz  Competition  Ramanujan Quiz  Competition  ITT-JAM Entrance preparation</p> <p>Seminars  Poster Presentation</p>	<p>Unit Test-1</p> <p>Unit Test-2</p>

• **Summary of Lesson Plan**  
**Name of Teacher: Pimple N.S.**      **Class: - B.Sc. III**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Metric Spaces)	<b>Unit I</b> Metric Space, Introduction, Metric, Neighborhood, Limit Point, Isolated Point Closed Set, Boundary Sets, Interior point, Interior, Open Set.  <b>Unit-II</b> Cauchy Sequence, Complete Metric spaces, Baire category Theorem, Compactness & Connectedness.  <b>Unit-III</b> Weierstrass Theorem, Sequentially Compactness, totally boundedness, Lebesgue number, Lebesgue Covering lemma, Continuity and Uniform Continuity.	5July 2021 To 10 Aug 2021	14	Assignments NPTEL Course registration Madhava Quiz Competition Ramanujan Quiz Competition IIT-JAM Entrance preparation	Unit Test-1
			10Aug 2021 to 24Sept 2021	15		
			25Sept 2021 to 02Nov 2021	16	Seminars Poster Presentation	Unit Test-2

### Summary of Lesson Plan

Name of Teacher: Pimple N.S.

Class: M.Sc. II

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Functional Analysis)	<p><b>Unit-I:</b> Definition and some Examples of Banach Spaces, continuous linear transformations, The Hahn-Banach Theorem, The Natural embedding of <math>N</math> in <math>N^{**}</math>.</p> <p><b>Unit-II:</b> The open Mapping Theorem, The conjugate of an operator. The definition and some simple properties of Hilbert Spaces, orthogonal complements, orthonormal sets.</p> <p><b>Unit-III:</b> The conjugate space <math>H^*</math>, The adjoint of an operator, self-adjoint operators, Normal and Unitary Operators, projections.</p> <p><b>Unit-IV:</b> Finite Dimensional Spectral Theory: Introduction, Matrices, Determinants and spectrum of an operator, The spectral Theorem.</p>	<p>5 July 2021 to 30 July 2021</p> <p>1 Aug 2021 to 25 Aug 2021</p> <p>26 Aug 2021 to 28 Sept 2021</p> <p>28 Aug 2021 to 02 Nov 2021</p>	15	<p>Assignments NPTEL Course registration</p> <p>Seminars</p> <p>Poster Presentation</p> <p>Guest lecture</p>	<p>Unit Test -1</p> <p>Unit Test -2</p>

Signature of Staff

Pimple N.S.

HoD

M.S. Wavare

Principal

Rajarsi Shahu Mahavidyalaya  
(Autonomous), Latur

HEAD.

Dept. of Mathematics  
Rajarsi Shahu College,  
LATUR - 413 512.

**Rajarshi Shahu Mahavidyalaya, Latjur**

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**(5<sup>th</sup> July 2021 to 2<sup>nd</sup> Nov 2022)**

- **Details of Classes to be taught**

Sr. No.	Class	Name of Faculty	Subject	Paper
1.	B.Sc. II	Pimple N.S.	Mathematics	Real Analysis (T)
				Problems in Real Analysis (P)
2.	B.Sc. III			Metric Spaces (T)
				Problems in Metric spaces (P)
3.	M.Sc. I		Advanced Calculus (T)	
4.	M.Sc. II		Functional Analysis (T)	

• **Summary of Lesson Plan**

**Name of Teacher:** Pimple N.S.

**Class:** - B.Sc. II

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Real Analysis)	<p><b>Unit-I</b> Sequences: Sequences and their limits, limit theorems, Monotone Sequences, Subsequences and Bolzano Weierstrass theorem, The Cauchy's criterion, properly divergent sequences</p> <p><b>Unit-II</b> Sequence of functions Pointwise and uniform convergence, Interchange of limits, The exponential and Logarithmic functions, The trigonometric functions</p> <p><b>Unit-III</b> Infinite Series Introduction to series, Cauchy's criterion for series, Comparison tests, Absolute convergence Test for Absolute convergence, Test for Non-absolute convergence, series of functions.</p>	<p>13 July 2021 To 20 Aug 2021</p> <p>23 Jul 2021 to 04 Sept 2021</p> <p>01 Oct 2021 to 02 Nov 2021</p>	<p>15</p> <p>15</p> <p>16</p>	<p>Assignments NPTEL Course registration Madhava Quiz Competition Ramarujan Quiz Competition IIT-JAM Entrance preparation</p> <p>Seminars Poster Presentation</p>	<p>Unit Test-1</p> <p>Unit Test-2</p>

• **Summary of Lesson Plan**  
**Name of Teacher: Pimple N.S.**      **Class: - B.Sc. III**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Metric Spaces)	<b>Unit I</b> Metric Space, Introduction, Metric, Neighborhood, Limit Point, Isolated Point, Closed Set, Boundary Sets, Interior point, Interior, Open Set.  <b>Unit-II</b> Cauchy Sequence, Complete Metric spaces, Baire category Theorem, Compactness & Connectedness.  <b>Unit-III</b> Weierstrass Theorem, Sequentially Compactness, totally boundedness, Lebesgue number, Lebesgue Covering lemma, Continuity and Uniform Continuity.	<b>5 July 2021</b> To <b>10 Aug 2021</b>	14	Assignments NPTEL Course registration Madhava Quiz Competition Ramanujan Quiz Competition ITT-JAM Entrance preparation	Unit Test-1
			<b>10 Aug 2021</b> to <b>24 Sept 2021</b>	15	Seminars Poster Presentation	Unit Test-2
			<b>25 Sept 2021</b> to <b>02 Nov 2021</b>	16		

### Summary of Lesson Plan

Name of Teacher: Pimple N.S.

Class: M.Sc. I

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Advanced Calculus)	<p><b>Unit-I:</b> Sequences and series of functions: Pointwise convergence of sequences of functions, Examples of sequences of real valued functions, Definition of uniform convergence, Uniform convergence and continuity, Cauchy condition for uniform convergence, Uniform convergence and Riemann integration, Uniform convergence and differentiation, Equicontinuous family of functions.</p> <p><b>Unit-II:</b> Multivariable differential Calculus: The Directional derivatives, directional derivatives and continuity, total derivative, total derivatives expressed in terms of partial derivatives, The matrix of linear function, mean value theorem for differentiable functions, A sufficient condition for differentiability, sufficient condition for equality of mixed partial derivatives, Taylor's formula for functions from <math>\mathbb{R}^n</math> to <math>\mathbb{R}</math>.</p> <p><b>Unit-III:</b> Implicit functions: Functions of several variables, Linear transformations, Differentiation,</p>	<p>27 Sept 2021 to 25 Oct 2021</p> <p>26 Oct 2021 to 20 Nov 2021</p>	15	<p>Assignments NPTEL Course registration</p> <p>Seminars</p>	Unit Test -1
			21 Nov 2021 to 05 Dec 2021	15	Poster Presentation	



		<p>Contraction principle, The inverse function theorem, The implicit function theorem and their applications.</p> <p><b>Unit-IV:</b>  Integral Calculus: Path and line integrals, Multiple integrals Double integral (Theorems without proof) Application to area and volume.(Theorems without proof)Greens theorem in the plane. Application of Green's Theorem. Necessary condition for a vector field to be gradient. Length of the curve. Change of variables, special cases of transformation formula.Surface integral, change of parametric representation. Other notations for surface integrals, Stoke's Theorem Curl and divergence of a Vector field. Gauss divergence Theorem.</p>	<p><b>06Dec 2021</b> to <b>31 Dec 2021</b></p>	<p><b>15</b></p>	<p><b>Guest lecture</b></p>	<p><b>Unit Test -2</b></p>
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13-11-2021  
13-11-2021  
13-11-2021


**Summary of Lesson Plan**

Name of Teacher: **Pimple N.S.**

Class: **M.Sc. II**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1.	Mathematics (Functional Analysis)	<p><b>Unit-I:</b> Definition and some Examples of Banach Spaces, continuous linear transformations, The Hahn-Banach Theorem, The Natural embedding of <math>N</math> in <math>N^{**}</math>.</p> <p><b>Unit-II:</b> The open Mapping Theorem, The conjugate of an operator. The definition and some simple properties of Hilbert Spaces, orthogonal complements, orthonormal sets.</p> <p><b>Unit-III:</b> The conjugate space <math>H^*</math>, The adjoint of an operator, self-adjoint operators, Normal and Unitary Operators, projections.</p> <p><b>Unit-IV:</b> Finite Dimensional Spectral Theory: Introduction, Matrices, Determinants and spectrum of an operator, The spectral Theorem.</p>	<p>5 July 2021 to 30 July 2021</p> <p>1 Aug 2021 to 25 Aug 2021</p> <p>26 Aug 2021 to 28 Sept 2021</p> <p>28 Aug 2021 to 02 Nov 2021</p>	15	<p>Assignments NPTEL Course registration</p> <p>Seminars</p> <p>Poster Presentation</p> <p>Guest lecture</p>	<p>Unit Test -1</p> <p>Unit Test -2</p>

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