



Rayat Skikshan Sanstha's

**Arts, Science & Commerce College, Mokhada**  
**Dist. Palghar 401604**

**Department of Chemistry**

**Short Term Course**

**2021-2022**

**“Instrumental Methods in Chemical Analysis”**



Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada, Dist. Palghar

Department of Chemistry

Date: 12/02/2021

Short Term Course: "Instrumental Methods in Chemical Analysis"  
Board of Studies – 2020-2021

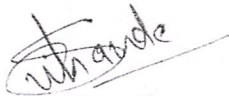
Sr.No.	Designation	Name of Person
1	Chairman	• Dr J. G. Jadhav ( Principal)
2	Member	• Dr D.R. Nagargoje ( HOD Chemistry)
3	Member	• Dr V.B. Gade ( Expert)
4	Member	• Prof. D.H. Arekar (Chairman Short Term Course Committee)
5	Member	• Prof. S.R. Vhande (Co-ordinator, "Instrumental Methods in Chemical Analysis" short term course)


Minutes of Meeting

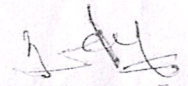
Board of studies meeting of the short term Course of Certificate Course in "Instrumental Methods in Chemical Analysis" was conducted on 12/02/2021 at 12.30 pm in the department of Chemistry.

The following points are discussed in the meeting.

- Syllabus formation of instrumental method in chemical analysis short term course
- Distribution of work
- Fee structure
- Encouragement of students

  
Course Coordinator

  
Head / विभागाध्यक्ष  
Head, Dept. of Chemistry / विभाग  
Department of Chemistry

  
PRINCIPAL  
Arts, Science & Commerce College  
Mokhada, Dist. Palghar





Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada,  
Dist. Palghar



Department of Chemistry

Date:27/01/2022

**Notice**

All students of chemistry short-term course are hereby informed that, the department of chemistry short term course "**Instrumental Methods in Chemical Analysis**" will be conducted on **02/02/2022** at **10.00 - 11.00 am**. Absent students will not be entertained. All students should remain present.

**Course Coordinator**

**Head,**

**Department of Chemistry**



**Principal**

**Arts, Science & Commerce, College  
Mokhada, Dist. Palghar**

RayatShikshanSanstha's,  
**Arts, Science and Commerce College, Mokhada, Dist. Palghar**

Department of Chemistry  
Short Term Course: **"Instrumental Methods in Chemical Analysis"**

**Time Table 2021-2022**

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
10.00 am to 11.00 am	DRN	SRV	VBG	RAK	--	--
2.00 pm to 4.00 pm	--	--	--	Practical	Practical	--

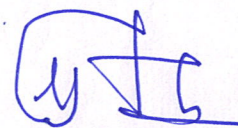


Course Co-ordinator





Head,  
Department of Chemistry



Principal  
Arts, Science & Commerce, College  
Mokhada, Dist. Palghar



Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College,  
Mokhada, Dist. Palghar 401604



## Department of Chemistry

### Short Term Course: "Instrumental Methods in Chemical Analysis"

#### Course Objectives:

1. To make students understand to determine the concentration of a solute in solution.
2. To make students understand the potentiometry, types of electrode and applications.
3. To measure the pH of various solutions using pH indicators and meter.
4. To determine the value of  $K_a$  for an unknown acid.
5. To create and study the properties of buffer solutions.
6. To make students understands colorimetry, measurement of the wavelength and the intensity of electromagnetic radiation in the visible region of the spectrum.
7. To make understands for identification and determination of concentrations of substances that absorb light.
8. To make students understand the working principle of colorimetry, pH metry and their applications.
9. To make understands of UV- Visible Spectroscopy (or Spectrophotometry) is a quantitative technique used to measure how much a chemical substance absorbs light.
10. To make students understand UV-Visible spectroscopy, Beer-Lamberts law, working and applications.
11. To make students understand conductivity cell, Ostwald's dilution law and applications in neutralization reactions.



## Course Syllabus

2020-2021

- 1. Potentiometry:** (8 L)  
Principle, Instrumentation, Types of electrodes-Reference and indicator electrode, Role of reference and indicator electrode and its working, Application in neutralization reactions with strong acid against strong base and strong acid against weak base.
- 2. Colorimetry:** (8 L)  
Principle, construction and working, Applications of colorimetry, advantages and limitations.
- 3. pH metry:** (8 L)  
Principle, Instrumentation, Types of pH meters, Applications in biological and environmental analysis and its applications.
- 4. UV-Visible Spectroscopy:** (8 L)  
Basic terms- Radiant power, absorbance, transmittance, monochromatic and polychromatic light, absorptivity, Lamberts law, Beers law, Lambert-Beers law, its statement and equation.  
Principle, construction and working, Applications of UV-Visible spectroscopy.
- 5. Conductometry:** (8 L)  
Principle, Instrumentation, conductivity cell-Construction and care, Types of conductometric titrations, Ostwald's dilution law, Application in neutralization titrimetric, Advantages and limitations of conductometric titrations.



**Practical's (Any Five):**

(20 L)

1. To verify Ostwald dilution law for weak acid conductometrically.
2. To determine dissociation constant of weak acid conductometrically.
3. To determine acidic and basic dissociation constants of amino acid hence to calculate isoelectric point.
4. To determine amount of Fe (III) present in the given solution by using salicylic acid by colorimetric titration. (Static method  $\lambda = 525 \text{ nm}$ )
5. To determine the amount of Fe (II) in the given solution by titration with a std.  $\text{K}_2\text{Cr}_2\text{O}_7$  solution and hence to find the formal redox potential of  $\text{Fe}^{3+}/\text{Fe}^{2+}$ .
6. To determine the velocity constant of alkaline hydrolysis of ethyl acetate by conductometric method.
7. Determination of Vitamin C content of a given tablet by titration with sodium hydroxide pH metrically.
8. Determination of Cr (VI) in the given solution as dichromate by method of least squares spectrophotometrically.
9. To determine the strength of strong acid (HCl) by potentiometric titration using quinhydrone electrode. (Calculation of pH from  $E_{\text{cell}}$  and the plot of a.  $\Delta E/\Delta V$  against V, b. pH against V plots are expected.)
10. Determine  $E_{\text{cal}}$  at room temperature and using this value, determine standard reduction potential of  $\text{Ag}/\text{Ag}^+$  electrode at RT.

**Course Outcomes:**

1. Student should learn potentiometry, role of reference and indicator electrode in potentiometric titrations.
2. Student should learn colorimetry and applications of colorimetry.
3. Student should learn pH metry, types, analysis and its applications.
4. Student should learn how to apply Beer-Lamberts law, its equation and working of UV-Visible spectroscopy and its applications.
5. Student should learn the quantitative determination of analytes, such as transition metal ions, highly conjugated organic compounds, and biological macromolecules.
6. Student should learn about how to classify electroanalytical methods & how to evaluate conductometry and conductometric titrations.
7. Student should learn about conductivity cell, Ostwald's dilution law and application in neutralization titrations.



**References:**

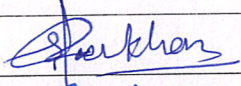
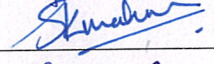
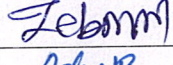
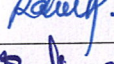
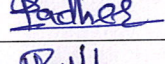
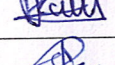
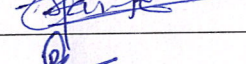

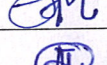
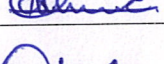
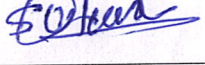
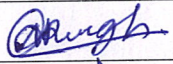
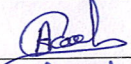
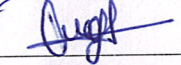
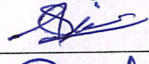
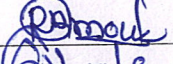
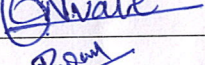
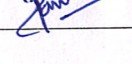
1. Practical physical chemistry 3<sup>rd</sup> edition- A. M. James and F.E. Prichard, Longman Publication.
2. Experiments in physical chemistry- R. C. Das and B. Behra, Tata McGraw Hill.
3. Advanced practical physical chemistry- J. B. Yadav, Goel Publishing House.
4. Advanced Experimental Chemistry, Vol-I, - J. N. Gurtu and R. Kapoor, S. Chand and Co.
5. Experimental Physical Chemistry – V. D. Athawale





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**Department of Chemistry**

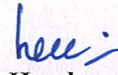
Short Term Course: **“Instrumental Methods in Chemical Analysis”**  
**Admitted Student List-2021-2022**

Sr. No.	Roll No.	Name of Students	Mobile No.	Sign
01.	7016/21	Lakhan Suresh Prakash	8263094966	
02.	7017/21	Mahale Subhash Krushna	8554048208	
03.	7018/21	<b>Memon Zeba Mustak</b>	9970184284	
04.	7019/21	Padavi Rahul Bharatsingh	7218004224	
05.	7020/21	Padher Sandip Narayan	9370875109	
06.	7021/21	<b>Patil Harshada Janardan</b>	9225779222	
07.	7022/21	<b>Pithole Lina Prakash</b>	8626027449	
08.	7023/21	<b>Sah Rani Vinod</b>	7559469575	
09.	7024/21	Sarakate Manoj Ramdas	9322633487	
10.	7025/21	Thalekar Amol Ramdas	8329015798	
11.	7026/21	<b>Vartha Sunita Kamalakar</b>	8550905865 / 9326241255	
12.	7027/21	Wagh Ajit Ramchandra	9699805220	
13.	7028/21	<b>Wagh Ashwini Chhabildas</b>	9322579277	
14.	7029/21	Wagh Vrushabh Nivrutti	7219185249	
15.	7030/21	Warghade Ritesh Bhaskar	9209681240	
16.	9011/21	<b>Moule Rupali Bhau</b>	9527380391	
17.	9012/21	Navale Chetan Madhukar	8446733215	
18.	9014/21	Pawar Dharmendra Bhalchandra	9130156769	



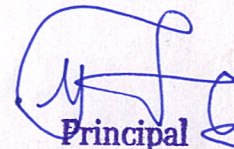
Course Co-Ordinator





Head

Department of Chemistry



Principal

Arts, Science & Commerce, College  
Mokhada, Dist. Palghar



Sr. No.	Name of the Student	02-02-	03-02-	07-02-	08-02-	09-02-	10-02-	14-02-
		2022	2022	2022	2022	2022	2022	2022
		VBG	RAK	DRN	SRV	VBG	RAK	DRN
1.	Lakhan Suresh Prakash	Parkhan	Parkhan	Parkhan	A	Parkhan	Parkhan	Parkhan
2.	Mahale Subhash Krushna	Sum.	Sum.	Sum.	Sum.	Sum.	Sum.	A
3.	Memon Zeba Mustak	Zebam	Zebam	Zebam	A	Zebam	A	Zebam
4.	Padavi Rahul Bharatsingh	Rahup.	Rahup.	Rahup.	Rahup.	A	Rahup.	Rahup.
5.	Padher Sandip Narayan	Padher	Padher	Padher	Padher	A	Padher	Padher
6.	Patil Harshada Janardan	Patil	Patil	Patil	Patil	Patil	Patil	Patil
7.	Pithole Lina Prakash	Pithole	Pithole	Pithole	Pithole	Pithole	Pithole	A
8.	Sah Rani Vinod	R	R	R	R	R	R	R
9.	Sarakate Manoj Ramdas	SM	SM	SM	A	SM	SM	SM
10.	Thalekar Amol Ramdas	Amol	Amol	Amol	Amol	Amol	Amol	Amol
11.	Vartha Sunita Kamalakar	Sunita	Sunita	Sunita	Sunita	Sunita	Sunita	A
12.	Wagh Ajit Ramchandra	Wagh	Wagh	Wagh	A	Wagh	Wagh	Wagh

13.	Wagh Ashwini Chhabildas	Real	Real	Real	Real	Real	Real	Real	Real
14.	Wagh Vrushabh Nivrutti	Quest	Quest	Quest	Quest	Quest	Quest	Quest	Quest
15.	Warghade Ritesh Bhaskar	Sci	Sci	Sci	Sci	Sci	Sci	Sci	Sci
16.	Moule Rupali Bhau	Practical	Practical	Practical	Practical	Practical	Practical	Practical	Practical
17.	Navale Chetan Madhukar	Practical	Practical	Practical	Practical	Practical	Practical	Practical	Practical
18.	Pawar Dharmendra Bhalchandra	Practical	Practical	A	Practical	Practical	Practical	Practical	Practical

*Wagh*

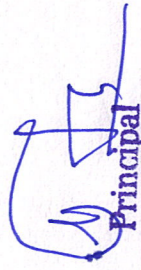
Course Coordinator



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Head,

Department of Chemistry



Principal

Arts, Science & Commerce, College  
Mokhada, Dist. Palghar



13.	Wagh Ashwini Chhabildas	Beach	Beach	Beach	Beach	Beach	Beach	Beach
14.	Wagh Vrushabh Nivrutti	Quest	Quest	Quest	Quest	Quest	Quest	Quest
15.	Warghade Ritesh Bhaskar	Sci	Sci	Sci	Sci	Sci	Sci	A
16.	Moule Rupali Bhau	Practical	Practical	Practical	Practical	Practical	Practical	Practical
17.	Navale Chetan Madhukar	Practical	Practical	Practical	Practical	Practical	Practical	Practical
18.	Pawar Dharmendra Bhalchandra	Practical	Practical	Practical	Practical	Practical	Practical	Practical

*Wagh Ashwini*  
Course Coordinator



*heer*  
Head,

Department of Chemistry

*Wagh Ashwini*  
Principal  
Arts, Science & Commerce, College  
Mokhada, Dist. Palghar

Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada, Dist. Palghar  
Department of Chemistry

Short Term Course: "Instrumental Methods in Chemical Analysis"  
Theory Attendance Report 2021-2022



Sr. No.	Name of the Student	28-02-2022	02-03-2022	03-03-2022	07-03-2022	08-03-2022	09-03-2022	10-03-2022
		DRN	VBG	RAK	DRN	SRV	VBG	RAK
1.	Lakhan Suresh Prakash							
2.	Mahale Subhash Krushna							
3.	Memon Zeba Mustak							
4.	Padavi Rahul Bharatsingh							
5.	Padher Sandip Narayan							
6.	Patil Harshada Janardan							
7.	Pithole Lina Prakash							
8.	Sah Rani Vinod							
9.	Sarakate Manoj Ramdas							
10.	Thalekar Amol Ramdas							
11.	Vartha Sunita Kamalakar							
12.	Wagh Ajit Ramchandra							

13.	Wagh Ashwini Chhabildas	Book	Book	Book	Book	Book	Book	Book	Book
14.	Wagh Vrushabh Nivrutti	Quest	Quest	Quest	Quest	Quest	Quest	Quest	Quest
15.	Warghade Ritesh Bhaskar	Sci	Sci	Sci	Sci	Sci	Sci	Sci	Sci
16.	Moule Rupali Bhau	Practical	Practical	Practical	Practical	Practical	Practical	Practical	Practical
17.	Navale Chetan Madhukar	Practical	Practical	Practical	Practical	Practical	Practical	Practical	Practical
18.	Pawar Dharmendra Bhalchandra	Practical	Practical	Practical	Practical	Practical	Practical	Practical	Practical



here:  
Head,

Department of Chemistry

*[Signature]*  
Course Coordinator

*[Signature]*  
Principal  
Arts, Science & Commerce, College  
Mokhada, Dist. Palghar





11.	Vartha Sunita Kamalakar									
12.	Wagh Aji Ramchandra	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy
13.	Wagh Ashwini Chhabildas	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy
14.	Wagh Vrushabh Nivrutti	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy
15.	Warghade Ritesh Bhaskar	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy
16.	Moule Rupali Bhau	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy
17.	Navale Chetan Madhukar	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy
18.	Pawar Dharmendra Bhalchandra	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy	Prunoy

Head  
Department of Chemistry



Principal  
Arts, Science & Commerce, College  
Mokhada, Dist. Palghar



13.	Wagh Ashwini Chhabildas	Beed	Beed	Beed	Beed	Beed	Beed	Beed	Beed	Beed
14.	Wagh Vrushabh Nivrutti	Dist	Dist	Dist	Dist	Dist	Dist	Dist	Dist	Dist
15.	Warghade Ritesh Bhaskar	Sci	Sci	Sci	Sci	Sci	Sci	Sci	Sci	Sci
16.	Moule Rupali Bhau	Dist	Dist	Dist	Dist	Dist	Dist	Dist	Dist	Dist
17.	Navale Chetan Madhukar	Chavale	Chavale	Chavale	Chavale	Chavale	Chavale	Chavale	Chavale	Chavale
18.	Pawar Dharmendra Bhalchandra	Dist	Dist	Dist	Dist	Dist	Dist	Dist	Dist	Dist



*Navale*  
Course Coordinator

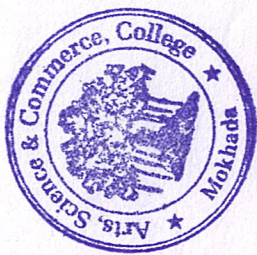
*heer*  
Head,

Department of Chemistry

*GS*  
Principal

Arts, Science & Commerce, College  
Mokhada, Dist. Palghar

Short Term Course: "Instrumental Methods in Chemical Analysis"  
Practical's Attendance Report 2021-2022



Sr. No.	Name of the Student	10-02-2022	11-02-2022	17-02-2022	18-02-2022	24-02-2022
		DRN	SRV	RAK	VBG	DRN
1.	Lakhan Suresh Prakash			A		
2.	Mahale Subhash Krushna		A			
3.	Memon Zeba Mustak	Zebarn	Zebarn	Zebarn	Zebarn	- A
4.	Padavi Rahul Bharatsingh	A	rahulp.	Rehulp.	Rehulp.	Rehulp.
5.	Padher Sandip Narayan	Padher	Padher	A	Padher	Padher
6.	Patil Harshada Janardan	Patil	Patil	Patil	Patil	Patil
7.	Pithole Lina Prakash				A	A
8.	Sah Rani Vinod				A	
9.	Sarakate Manoj Ramdas	SRK	SRK	SRK	SRK	SRK
10.	Thalekar Amol Ramdas					
11.	Vartha Sunita Kamalakar	SUNITA	A			
12.	Wagh Ajit Ramchandra					

13.	Wagh Ashwini Chhabildas	Beed	Beed	Beed	Beed	
14.	Wagh Vrushabh Nivrutti	Amal	Amal	Amal	Amal	Amal
15.	Warghade Ritesh Bhaskar	Beas	Beas	Beas	Beas	Beas
16.	Moule Rupali Bhau	Amal	Amal	Amal	Amal	Amal
17.	Navale Chetan Madhukar	Navale	Navale	Navale	Navale	Navale
18.	Pawar Dharmendra Bhalchandra	X	Amal	Amal	Amal	Amal



*Navale*

Course Coordinator

*Navale*  
Head,

Department of Chemistry

*Navale*  
Principal

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Mokhada, Dist. Palghar

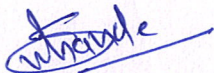
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**Department of Chemistry**

Date: 01/02/2022

**Notice**

All students of Chemistry short course are hereby informed that, practical of the short-term course "**Instrumental Methods in Chemical Analysis**" will be conducted on every Thursday & Friday **at 2.00 - 4.00 pm**. Absent students will not be entertained. All students should remain present.

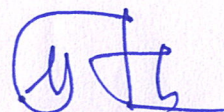


Course Coordinator



Head,

Department of Chemistry



**Principal**

**Arts, Science & Commerce, College  
Mokhada, Dist. Palghar**

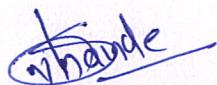
Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada, Dist. Palghar

## Department of Chemistry

Date: 01/04/2022

### Notice

All students of Short term course are hereby informed that, theory examination for the short term course "**Instrumental Methods in Chemical Analysis**" will be conducted on **8/04/2022** at **11.00 am**. The test will be of **50** marks objective type. Absent students will not be entertained. All students should remain present.

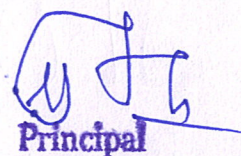


Course Coordinator



Head,

Department of Chemistry



Principal

Arts, Science & Commerce, College  
Mokhada, Dist. Palghar

Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada, Dist. Palghar  
Department of Chemistry  
Short term Course Examination 2021-2022  
"Instrumental Methods in Chemical Analysis"

Class: B.Sc. Chemistry

Marks: 50

Time: 11:00 to 12:00 pm

Date: 08/04/2022

- Instructions:
1. All questions are compulsory
  2. All questions carry equal marks
  3. Choose the correct alternative

1. Potentiometric biosensors use \_\_\_\_\_ in order to transduce the biological reaction into an electrical signal.
  - a) ion-selective electrodes
  - b) Clark oxygen electrode
  - c) thermistors
  - d) colorimetric test strips
2. Which of these is not an ion-selective electrode?
  - a) Thermistors
  - b) Glass electrodes
  - c) Glass pH electrodes
  - d) Solid-state electrodes
3. Which of the following is a specific conductivity reagent?
  - a) KCl
  - b) HCl
  - c) NaCl
  - d)  $MgCl_2$
4. In an electrolytic cell, metal passes in to ions at -----
  - a. Cathode
  - b. Anode
  - c. Salt bridge
  - d. No oxidation or reduction
5. Which of the following ion-selective electrode consist of gas permeable membrane?
  - a) Glass electrode
  - b) Solid-state electrode
  - c) Glass pH electrode
  - d) Clark oxygen electrode
6. An electrode has the standard electrode potential as +2.50V. The electrode will be ----  
-----
  - a. Higher the oxidizing capacity





- c. Composition
  - d. Volume
15. Lambert's law states that the intensity of light decreases with respect to \_\_\_\_\_
- a. Concentration
  - b. Distance
  - c. Composition
  - d. Volume
16. The representation of Beer Lambert's law is given as  $A = abc$ . If 'b' represents distance, 'c' represents concentration and 'A' represents absorption, what does 'a' represent?
- a. Intensity
  - b. Transmittance
  - c. Absorptivity
  - d. Admittance
17. Which of the following is not true about Absorption spectroscopy?
- a. It involves transmission
  - b. Scattering is kept minimum
  - c. Reflection is kept maximum
  - d. Intensity of radiation leaving the substance is an indication of concentration
18. Transmittance is given as  $T = P/P_0$ . If  $P_0$  is the power incident on the sample, what does P represent?
- a. Radiant power transmitted by the sample
  - b. Radiant power absorbed by the sample
  - c. Sum of powers absorbed and scattered
  - d. Sum of powers transmitted and reflected
19. What is the unit of absorbance which can be derived from Beer Lambert's law?
- a.  $L \text{ mol}^{-1} \text{ cm}^{-1}$
  - b.  $L \text{ gm}^{-1} \text{ cm}^{-1}$
  - c. Cm
  - d. No unit
20. What is the unit of molar absorptivity or absorptivity which is used to determine absorbance A in Beer Lambert's formula?
- a.  $L \text{ mol}^{-1} \text{ cm}^{-1}$
  - b.  $L \text{ gm}^{-1} \text{ cm}^{-1}$
  - c. Cm
  - d. No unit
21. Range of pH scale is -----
- a. 7 to 10
  - b. 0 to 10
  - c. 0 to 14
  - d. 7 to 14
22. Which of the following is the formula for pH calculation?



40. Which compound is increased UV absorption?
- Auxochrome
  - Chromophore
  - Inorganic compound
  - All of the above
41. Which is working principal of conductometry?
- Measurement of potention.
  - Measurement of conductivity of solution.
  - Measurement of emf.
  - None of the above
42. Which equation is explained Ohm's law?
- $K = G L/A$
  - $I = E/R$
  - $\lambda_{eq} = 1000k/c_{eq}$
  - $\lambda = 1000k/c$
43. The specific conductance (k) of a solution containing 1 gm equivalent of solute in  $1000 \text{ cm}^3$  of solution." this sentence shows which term definition?
- Ohm's Law
  - SPECIFIC CONDUCTANCE
  - Molar conductance
  - Equivalent conductance ( $\lambda_{eq}$ )
44. Which is not application of conductometry?
- determine of moisture and water contain
  - Purity of water
  - Ionic product of water.
  - Conductometric titration & precipitation titration
45. In conductometry solution if temp. is increase by  $1^\circ\text{C}$
- 1% rise in mobility of ions.
  - 2% rise in mobility of ions.
  - 3% rise in mobility of ions.
  - 4% rise in mobility of ions.
46. If the ion size is decrease in solutions...
- Conductance decrease
  - Conductance increase
  - a and b
  - None of the above
47. Conductivity cells are made up of -----
- Two silver rods
  - Two parallel sheets of platinum
  - Glass membrane of Ag/AgCl
  - Sb-Sb<sub>2</sub>O<sub>3</sub>
48. The units for specific conductance are -----
- Ohms
  - Ohms cm
  - Mhos
  - Mhos cm
49. Which is not type of conductivity cells?
- TYPE-A
  - TYPE-B



- c. TYPE-C
  - d. TYPE-D
50. The reciprocal of conductivity is \_\_\_\_\_
- a) Viscosity
  - b) Resistivity
  - c) Turbidity
  - d) None of the mentioned.



Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada, Dist. Palghar

Department of Chemistry  
Short term Course: "Instrumental Methods in Chemical Analysis"

**Mark list Report**

Sr. No.	Roll No.	Name of Students	Marks 50
01.	7016/21	Lakhan Suresh Prakash	42
02.	7017/21	Mahale Subhash Krushna	37
03.	7018/21	<b>Memon Zeba Mustak</b>	37
04.	7019/21	Padavi Rahul Bharatsingh	41
05.	7020/21	Padher Sandip Narayan	41
06.	7021/21	<b>Patil Harshada Janardan</b>	38
07.	7022/21	<b>Pithole Lina Prakash</b>	35
08.	7023/21	<b>Sah Rani Vinod</b>	39
09.	7024/21	Sarakate Manoj Ramdas	40
10.	7025/21	Thalekar Amol Ramdas	43
11.	7026/21	<b>Vartha Sunita Kamalakar</b>	43
12.	7027/21	Wagh Ajit Ramchandra	44
13.	7028/21	<b>Wagh Ashwini Chhabildas</b>	36
14.	7029/21	Wagh Vrushabh Nivrutti	36
15.	7030/21	Warghade Ritesh Bhaskar	41
16.	9011/21	<b>Moule Rupali Bhau</b>	42
17.	9012/21	Navale Chetan Madhukar	43
18.	9014/21	Pawar Dharmendra Bhalchandra	44



*(Signature)*  
Course Coordinator

**Principal**  
Arts, Science & Commerce, College  
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Rayat Shikshan Sanstha's,  
Arts, Science and Commerce College, Mokhada, Dist. Palghar

**Department of Chemistry**

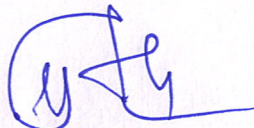
Short term Course: "Instrumental Methods in chemical analysis"

**Answer key**

Que. No.	Answer	Que. No.	Answer	Que. No.	Answer
01.	A	19.	D	37.	C
02.	A	20.	A	38.	A
03.	A	21.	C	39.	C
04.	A	22.	B	40.	D
05.	C	23.	A	41.	B
06.	A	24.	A	42.	B
07.	A	25.	A	43.	D
08.	B	26.	A	44.	A
09.	B	27.	C	45.	B
10.	C	28.	A	46.	B
11.	C	29.	A	47.	B
12.	C	30.	B	48.	B
13.	B	31.	B	49.	D
14.	A	32.	B	50.	B
15.	B	33.	A		
16.	C	34.	D		
17.	C	35.	A		
18.	A	36.	A		

  
**Course Coordinator**



  
**Principal**  
Arts, Science & Commerce, College  
Mokhada, Dist. Palghar



Rayat Shikshan Sanstha's,  
**Arts, Science & Commerce College, Mokhada**  
**Dist. Palghar 401604**  
**Department of Chemistry**  
**Short Term Course: 2021-2022**  
**"Instrumental Methods in Chemical Analysis"**



Date: 12-04-2022

## Report

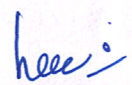
In the academic year 2021-2022, a short-term course entitled "**Instrumental Methods in Chemical Analysis**" was carried out by department of chemistry. Total **(18)** students were participated in this course. The Duration of course was three months. The course contained curriculum to develop skills of operating instruments and using various methods in analysis of chemical compounds. The level of knowledge and skills they obtained was assessed through the exam conducted during this course. The knowledge will be useful to the students for self-employment and entrepreneurship in future. All the participated students have completed this course successfully.

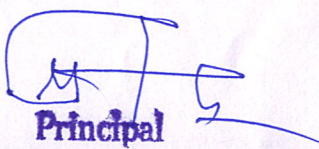
### Outcomes:

1. Students learns the operating instruments and analysis of chemical compounds.
2. Students learn about conductometric titration of weak acids weak bases and mixture of weak acid and weak base.
3. Students learn about pH metry its working and applications.
4. Student learn the quantitative determination of analytes, such as transition metal ions.
5. Student learn about conductivity cell, Ostwald's dilution law and application in neutralization titrations.
6. Students promotes self- employment and entrepreneurship in future.

  
**Course Coordinator**



  
**Head,**  
**Department of Chemistry**

  
**Principal**  
Arts, Science & Commerce College  
Mokhada, Dist. Palghar



**Rayat Shikshan Sanstha, Satara**  
**Karmaveer Vidya Prabodhini**



# CERTIFICATE

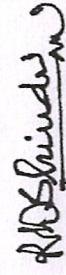
This is to certify that Shri / Smt. Mahale Subhash Krushna .....  
..... (Class F.Y. B.Sc ) of

(College) Rayat shikshan sanstha's Arts, science and  
commerce college, mokhada ..... has successfully completed  
a short term course in Instrumented methods in chemical Analysis .....


Academic year 2021 2022 ( From ..... To ..... ) and  
secured A ..... Grade.

  
**PRINCIPAL**  
**PRINCIPAL**

Arts Science and Commerce College  
Mokhada, Dist. Palghar

  
Executive Director

Karmaveer Vidya Prabodhini

  
Chairman

Karmaveer Vidya Prabodhini





**Rayat Shikshan Sanstha, Satara**  
**Karmaveer Vidya Prabodhini**



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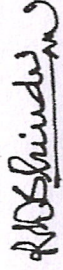
This is to certify that Shri / Smt Memon Zeba mustak .....  
..... (Class F.Y. B.Sc ) of

(College) Rayat Shikshan Sanstha's Arts Science and  
Commerce College, Mokhada ..... has successfully completed  
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**Executive Director**  
**Karmaveer Vidyaprabodhini**



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**Karmaveer Vidyaprabodhi**







**Rayat Shikshan Sanstha, Satara**  
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This is to certify that Shri / Smt. Pacher Sandip Narayan  
 ..... (Class F.Y.B.Sc ) of

(College) Rayat Shikshan Sanstha's Arts, Science and  
Commerce College Mokhada ..... has successfully completed  
 a short term course in Instrumental method in chemical analysis

Academic year 2021 2022 ( From ..... To ..... ) and  
 secured A ..... Grade.

  
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**PRINCIPAL**  
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 Karmaveer Vidyaprabodhini



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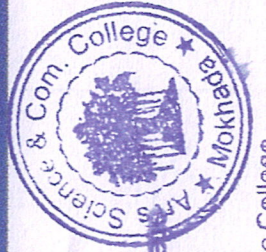
This is to certify that Shri / Smt. Vartha Sunita Kamalakar  
..... (Class F.Y.B.Sc) of

(College) Rayat Shikshan Sanstha's Arts Science and Commerce  
College, Mulchewda ..... has successfully completed

a short term course in Instrumental methods in Chemical Analysis .....

Academic year 2021 2022 ( From ..... To ..... ) and

secured A ..... Grade.



[Signature]  
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**PRINCIPAL**

Arts Science and Commerce College  
Mokhad, Dist. Solapur

[Signature]  
Executive Director

**Karmaveer Vidyaprabodhini**

[Signature]  
Chairman

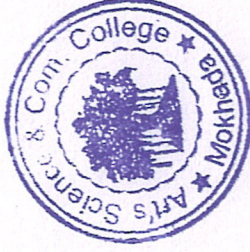
**Karmaveer Vidyaprabodhi**



**Rayat Shikshan Sanstha, Satara**  
**Karmaveer Vidya Prabodhini**

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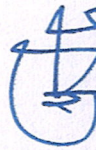


This is to certify that Shri / Smt. Pitthole Ling Prakash .....  
 ..... (Class F.Y.B.Sc ..... ) of

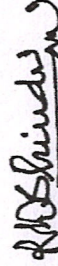
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Arts Science and Commerce College  
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