



Rayat Shikshan Sanstha's  
Shri Sadguru Gangageer Maharaj Science, Gautam Arts & Sanjivani Commerce  
College Kopargaon-423601  
Dist-Ahmednagar, State: Maharashtra (India)  
Internal Quality Assurance Cell (IQAC)

### Syllabus Approval Letter

2018-19

The IQAC committee has approved the submitted syllabus of short term /Certificate course planned to be conducted by the Department of Chemistry .

Sr.NO	Name of Course	Type of Course
01	Instrumental Methods in Chemical Analysis	Short term course

HOD OF Chemistry Department may Proceed accordingly .

Date :- 11/09/2018

Place :- Kopargaon

  
IQAC Coordinator  
IQAC-Coordinator  
S.S.G.M.College,Kopargaon



  
Head  
Department of Chemistry

***T.Y.B.Sc. SHORT TERM COURSE  
INSTRUMENTAL METHODS IN  
CHEMICAL ANALYSIS***

# **Instrumental Methods of Chemical Analysis**

**2018-2019**

**(Skill Development Course)**

Co-ordinate by :	Department of Chemistry.
Class:	T. Y. B. Sc.
Batch Capacity:	25
No. of students Admitted:	3 Months
Duration of the course:	3 Months
Fee of Course:	200/-
Lecture and Practical started:	December, January, February and March
Tentative date of Examination:	1 <sup>st</sup> week of March
Tentative date of examination:	2 <sup>nd</sup> week of March
Syllabus:	4 credits (Theory+Practicals).

Co-ordinator:



Head



Department of Chemistry  
SSGM College Kopergaon  
Dist: Ahmednagar

Rayat Shikshan Sanstha's  
S.S.G.M. College, Kopergaon  
Short Term Course

**INSTRUMENTAL METHODS IN CHEMICAL ANALYSIS**

**INDEX**

Sr.No.	Particulars	Page No.
1.	BOS meeting	01
2.	Syllabus	03
3.	List of Students	17
4.	Notice to Students	19
5.	Application Form	20
6.	Timetable	21
7.	Attendance sheet	23
8.	Question Paper	35
9.	Result	39
10.	Certificate	41
11.	Feedback Form	43
12.	Report	61



Royat Shikshan Sanstha's

**S.S.G.M. College, Kopargaon, Dist- Ahmednagar**  
Department of Chemistry  
**2018-19**

**CERTIFICATE COURSE IN INSTRUMENTAL METHODS IN  
CHEMICAL ANALYSIS**

**Board of Studies (BOS)**

Department of Chemistry have decided to start Certificate Course in Instrumental Methods in Chemical Analysis . For framing the Syllabus of said course, committee was constituted as follow.

**Board of Studies Member (BOS)**

- |                          |   |
|--------------------------|---|
| 1. Prin. Dr. Thopte S.S. | : Chairman                              |
| 2. Mr. Deshmukh A.K.     | :HOD of Chemistry                       |
| 3. Prof. JadhavAjit      | :Placement Officer                      |
| 4. Dr. Malpure N. V.     | :IQAC- Coordinator                      |
| 5. Dr. Konda Rakesh      | :Professional Expert                    |
| 6. Mr. MAITRIYA A D.     | :Director of Shodh Advantech,Aurangabad |

**Aims and Objectives of the course:**

- 1)To provide an adequate knowledge of the principles
- 2)instrumentation and applications of common analytical techniques
- 3)including atomic and molecular absorption spectroscopy
- 4) electrochemical and separation methods
- 5)Understand the operational framework for best practices in Company .



**S.S.G.M College Kopargaon**  
**Department of Chemistry**  
**Class- T.Y.B.Sc**

**Short Term Course :- A Certificate course in Instrumental Method  
of Chemical Analysis**  
**Credits :- 4**

**Aim of course :-**

The students will acquire excellent knowledge of analytical chemistry and sound analytical skill which help them for their bright prospects for research ,self employment and excellent Opportunities for job.

**Skills and Opportunities :-**

Instrumental methods of chemical analysis technique is concerned primarily with quantitative analysis technique and includes discussion of how to design an analytical method which depends on what information is needed in first year Course of "Certificate course in Instrumental methods of chemical analysis .

The student will get basic knowledge of analytical chemistry and different analytical technique .The students will get Familiar with basic principles of colorimeter ,conductivity water ,potentiometer ,ph meter ,from this course students will become more eligible to work in all type of research and industrial laboratories in the future it will also help them for getting employment.



## Theory Topics ( 2Credit )- 3 month

### Instrumental methods of chemical analysis

#### 1) General Introduction

- A) Analysis – What is mean by analysis ?  
Types of analysis : Qualitative and quantitative analysis  
Quatitative – Volumetric / gravimetric analysis .
- B) What is analytical chemistry ?
- C) Sampling
- D) Classification of Instrumental Methods
- E) Electromagnetic radiation and properties
- F) Numerical Problems

#### 2) Conductivity

- A) Ohm's law
- B) Resistance
- C) Specific resistance
- D) Conductance
- E) Specific conductance
- F) Equivalent Conductance
- G) Wheatstone bridge
- H) Conductivity cells
- I) Cell Constant
- J) Numerical Problems



### 3) Colorimeter

- A) Colors
- B) Colors comparators
- C) Visual comparators
- D) Fundamental laws of colorimeter
- E) Lambert's Law
- F) Beer's law
- G) Lambert's – Beer's law
- H) Terminology
- I) Schematics diagram of colorimeter and instrumentation
- J) Beer's Law
- K) Numerical Problem's

### 4) Potentiometer

- A) Electrolytes and non electrolytes
- B) Arrhenius theory
- C) Electromotive force
- D) Electrochemical cells
- E) Voltaic cell
- F) Galvanic cell
- G) Poggendorff's compensation principle
- H) Standardization of potentiometer



I) Western standard cells

j) Nernst Equation

K) Numerical Problem

5) pH Meter

A) Definition of pH and pOH

B) Operational definition of pH

C) Electrodes – glass electrodes, calomel electrode

D) pH meter's :- Potentiometric pH meter

E) Buffer and buffer action

F) Numerical Problem

6) Chromatography

A) Introduction to Chromatography

B) Classification of chromatography

C) Paper Chromatography

D) Types of Paper Chromatography

E) Experimental details for qualitative analysis – choice of proper Chromatographic techniques, Choice of filters, Paper, Proper developing solvent, Preparation of samples, spotting, physical methods, calculation of R<sub>F</sub> Values, Experimental details of quantitative analysis.

## 7) Thermal Methods

- A) Introduction to thermal methods of analysis
- B) Thermal analysis techniques
- C) Thermogravimetry
- D) Results ,information from TG CURVE
- E) Factors affecting thermogravimetric curve
- F) Instrumentation of thermogravimetry
- G) Application of thermogravimetry

## 8) Solvent Extraction

- A) Introduction
- B) Principles of solvent extraction
- C) Distribution Law , efficiency of extraction
- D) Sequence of the extraction process
- E) Extraction techniques
- F) Numerical Problems

## Practicals :-

### Part-A-

- 1) Use of electronic balance
- 2) Measurement of conductance of electrolytes
- 3) Determination of cell constant
- 4) Determination of pH of given solution by pH meter

### Part-B-

- 1) Introduction and understanding of working of conductivity meter, colorimeter.

### Part-C-

- 1) Determination of maximum wavelength of potassium permanganate.
- 2) Variation of absorbance with concentration of potassium dichromate.

### Part-D-

- 1) Determination of e.m.f of calomel electrode
- 2) Determination of pH of given solution by potentiometer.
- 3) Determination of maximum wavelength of Copper sulphate
- 4) Determination of maximum wavelength of Potassium Dichromate

### Part-E-

- 1) Determine partition coefficient of I<sub>2</sub> in CCl<sub>4</sub> and H<sub>2</sub>O.
- 2) Identify radicals from given mixture
- 3) Identify radicals by using paper chromatography



4) Determine the R<sub>f</sub> value of given organic compound

#### Part-F

- 1) Introduction and understanding of working of potentiometer ,ph meter
- 2) Use of electronic balance
- 3) Determination of cell constant
- 4) Determination of ph of given solution by ph meter.
- 5) Variation of absorbance with concentration of potassium dichromate .

#### References :

- 1) Instrumental Methods of Chemical Analysis – Gurudip Chatwal ,Sham Anand
- 2) Introduction to Instrumental Analysis –Robert Braun
- 3) Fundamental of Analytical Chemistry – D.A.Skoog ,D.M .West ,F.J.James
- 4) Principles of physical chemistry -4<sup>th</sup> Edition Prutton and Marron.
- 5) Basic concept of analytical chemistry – 2<sup>nd</sup> Edition ,S.M.Khopkar
- 6) Instrumental Methods of Chemical analysis 6<sup>th</sup> Edition ,Willard,Merritt,Dean
- 7) Vogel's Textbook of Quantitative analysis -4<sup>th</sup> Edition – S.M Khopkar

Rayat Shikshan Sanstha's  
SSGM College, Kopergaon

Short term Course – Instrumental Methods of Chemical Analysis

Class: T.Y.B.Sc.

2018-2019

List of Enrolled Students

Sr. No.	Name of the Student	Sign
1	Abhale Gaurav Ramesh	Gaurav
2	Abhale Pooja Sudhakar	Pooja
3	Abhale Rohini Namdeo	Rohini
4	Bankar Anuja Rajendra	Ankora
5	Barhate Arti Sanjay	Barhate
6	Barshile Seema Maruti	Barshile S.M.
7	Bhabhare Devendra Sudhakar	Dev
8	Bhagure Nitin Subhash	Nitin
9	Bhalerao Shubangi Gajanan	Shubangi
10	Chaudhari Sujata Annasaheb	Sujata
11	Dawange Aniket Prakash	Aniket
12	Dhanwate Dhananjay Sambhaji	Dhananjay
13	dhanwate Shubhangi Dashrath	Shubhangi
14	Gade Shivam Ramnath	Shivam
15	Gadhe Pooja Vishwanath	Pooja
16	Gaikwad Ashwini santosh	Ashwini
17	Gaikwad Bhavana Sanjay	Bhavana
18	Gavhane Bhakti Ramnath	Bhakti
19	Ghoderao Shraddha Ramesh	Shraddha
20	Girme Priyanka Shankar	Girme P.S.
21	Girme Tejal Mahesh	Girme
22	Gorde Deepali Anandrao	Gorde D.A
23	Hulekar Rupali Shankar	Rupali



**Rayat Shikshan Sanstha's  
SSGM College, Kopargaon  
Department of Chemistry,  
Class- T. Y. B.Sc.  
2018-2019**

**Short Term Course- A Certificate Course in Instrumental Methods of  
Chemical Analysis**

**Notice**

**Date: 11/09/2018**

All Students of T.Y. B.Sc. Class who have enrolled for Short Term Course "Instrumental Methods of Chemical Analysis" will have their lectures from 03-12-2018 at 2.30 pm. The attendance to the lectures are compulsory.

Venue: Hall No. :- A-102

*Remangule*

Course Co-ordinator,

*[Signature]*

Head,

Department of Chemistry.



**Rayat Shikshan Sanstha's**

**SSGM College ,Kopargaon**

**Short Term Course –A certificate course Instrumental Methods of  
Chemical Analysis**

**Class:-T.Y.B.Sc (Chemistry)**

**Time table:- 2018-2019**

**December 2018**

<b>Monday (Theory)</b>	<b>Tuesdady (Theory)</b>	<b>Wednesday (Theory)</b>
03/12/18 (AMN)	04/12/18 (AMN)	05/12/18 (DNG)
10/12/18 (DMS)	11/12/18 (DMS)	12/12/18 (DMS)
17/12/18 (NMC)	18/12/18 (NMC)	19/12/18 (NMC)
24/12/18 (AMN)	25/12/18 (PDK)	-

**January 2019**

<b>Monday (Theory)</b>	<b>Tuesdady (Theory)</b>	<b>Wednesday (Theory)</b>
07/01/2019 (DNG)	08/1/2019 (AMN)	09/01/2019 (AMN)
14/01/2019 (AMN)	25/01/2019 (DMS)	16/01/2019 (DMS)
21/01/2019 (NMC)	22/01/2019 (NMC)	23/01/2019 (NMC)

**February 2019**

<b>Monday (Practical )</b>	<b>Tuesdady (Practical)</b>	<b>Wednesday (Practical)</b>
4/2/2019 (PDK)	5/2/2019(DNG)	6/2/2019 (AMN)
11/2/2019 (DNG)	12/2/2019 (PDK)	13/2/2019(DNG)
18/2/2019 (AMN)	19/2/2019 (AMN)	-



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SSGM College, Kopargaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2018-2019  
Theory

Sr No	Name of Students	Date:				
		3/12/18	4/12	5/12	10/12	11/12
		1	2	3	4	5
1	Abhale Gaurav Ramesh	P	P	P	Ab	P
2	Abhale Pooja Sudhakar	P	P	Ab	P	P
3	Abhale Rohini Namdeo	Ab	P	P	P	P
4	Bankar Anuja Rajendra	P	P	P	P	Ab
5	Barhate Arti Sanjay	P	P	P	Ab	P
6	Barshile Seema Maruti	P	P	P	P	P
7	Bhabhare Devendra Sudhakar	P	P	Ab	P	P
8	Bhagure Nitin Subhash	Ab	P	P	P	P
9	Bhalerao Shubangi Gajanan	P	Ab	P	P	P
10	Chaudhari Sujata Annasaheb	P	P	P	P	P
11	Dawange Aniket Prakash	P	Ab	P	P	P
12	Dhanwate Dhananjay Sambhaji	P	P	Ab	P	P
13	dhanwate Shubhangi Dashrath	P	P	P	P	Ab
14	Gade Shivam Ramnath	P	Ab	P	P	P
15	Gadhe Pooja Vishwanath	P	Ab	P	P	P
16	Gaikwad Ashwini santosh	P	P	P	P	P
17	Gaikwad Bhavana Sanjay	P	P	P	P	Ab
18	Gavhane Bhakti Ramnath	P	P	P	Ab	P
19	Ghoderao Shraddha Ramesh	P	P	P	P	P
20	Girme Priyanka Shankar	P	P	P	P	P
21	Girme Tejal Mahesh	P	P	P	P	P
22	Gorde Deepali Anandrao	P	P	P	P	P
23	Hulekar Rupali Shankar	P	P	Ab	P	P

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Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2018-2019 Theory

Sr No	Name of Students	Date:				
		12/12	17/12	18/12	19/12	22/12
		1	2	3	4	5
1	Abhale Gaurav Ramesh	P	P	P	P	Ab
2	Abhale Pooja Sudhakar	P	Ab	P	P	P
3	Abhale Rohini Namdeo	P	P	P	P	P
4	Bankar Anuja Rajendra	P	P	P	Ab	P
5	Barhate Arti Sanjay	P	P	P	P	P
6	Barshile Seema Maruti	Ab	P	P	P	P
7	Bhabhare Devendra Sudhakar	P	P	P	P	Ab
8	Bhagure Nitin Subhash	P	P	P	P	P
9	Bhalerao Shubangi Gajanan	Ab	P	P	P	P
10	Chaudhari Sujata Annasaheb	P	Ab	P	P	P
11	Dawange Aniket Prakash	P	P	P	P	P
12	Dhanwate Dhananjay Sambhaji	P	P	Ab	P	Ab
13	dhanwate Shubhangi Dashrath	P	P	P	P	P
14	Gade Shivam Ramnath	P	Ab	P	P	P
15	Gadhe Pooja Vishwanath	Ab	P	P	P	P
16	Gaikwad Ashwini santosh	P	P	P	P	P
17	Gaikwad Bhavana Sanjay	P	P	P	P	P
18	Gavhane Bhakti Ramnath	P	P	P	P	P
19	Ghoderao Shraddha Ramesh	P	P	Ab	P	P
20	Girme Priyanka Shankar	P	P	P	Ab	P
21	Girme Tejal Mahesh	P	P	P	Ab	Ab
22	Gorde Deepali Anandrao	Ab	P	P	P	P
23	Hulekar Rupali Shankar	P	Ab	P	P	P

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SSGM College, Kopargaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2018-2019 Theory

Sr No	Name of Students	Date:				
		25/12	7/1	8/1	9/1	14/1
		1	2	3	4	5
1	Abhale Gaurav Ramesh	P	P	P	P	Ab
2	Abhale Pooja Sudhakar	P	P	P	P	P
3	Abhale Rohini Namdeo	Ab	P	P	P	P
4	Bankar Anuja Rajendra	P	P	P	P	P
5	Barhate Arti Sanjay	P	Ab	P	Ab	P
6	Barshile Seema Maruti	P	P	P	P	P
7	Bhabhare Devendra Sudhakar	P	P	Ab	P	P
8	Bhagure Nitin Subhash	P	P	P	P	P
9	Bhalerao Shubangi Gajanan	P	P	P	P	P
10	Chaudhari Sujata Annasaheb	P	Ab	P	P	Ab
11	Dawange Aniket Prakash	P	P	P	P	P
12	Dhanwate Dhananjay Sambhaji	P	P	P	P	P
13	dhanwate Shubhangi Dashrath	P	P	P	P	P
14	Gade Shivam Ramnath	Ab	P	P	P	P
15	Gadhe Pooja Vishwanath	P	P	P	P	P
16	Gaikwad Ashwini santosh	P	P	P	Ab	P
17	Gaikwad Bhavana Sanjay	P	Ab	P	P	Ab
18	Gavhane Bhakti Ramnath	P	P	P	P	P
19	Ghoderao Shraddha Ramesh	P	P	P	P	P
20	Girme Priyanka Shankar	P	P	Ab	P	P
21	Girme Tejal Mahesh	Ab	P	P	P	P
22	Gorde Deepali Anandrao	P	P	P	P	P
23	Hulekar Rupali Shankar	P	P	P	P	Ab

20      20      21      21      19



29

Rayat shikshan Sanstha's  
SSGM College, Kopergaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2018-2019  
Theory

Sr No	Name of Students	Date:				
		15/11	25/11	21/11	22/11	23/11
		1	2	3	4	5
1	Abhale Gaurav Ramesh	P	P	P	P	P
2	Abhale Pooja Sudhakar	P	P	P	P	Ab
3	Abhale Rohini Namdeo	P	P	Ab	P	P
4	Bankar Anuja Rajendra	P	P	P	P	P
5	Barhate Arti Sanjay	P	Ab	P	P	P
6	Barshile Seema Maruti	P	P	P	P	P
7	Bhabhare Devendra Sudhakar	P	P	P	Ab	P
8	Bhagure Nitin Subhash	P	P	P	P	P
9	Bhalerao Shubangi Gajanan	P	P	P	P	P
10	Chaudhari Sujata Annasaheb	Ab	P	P	P	P
11	Dawange Aniket Prakash	P	P	Ab	P	P
12	Dhanwate Dhananjay Sambhaji	P	P	P	P	P
13	dhanwate Shubhangi Dashrath	P	Ab	P	Ab	P
14	Gade Shivam Ramnath	P	P	P	P	P
15	Gadhe Pooja Vishwanath	Ab	P	P	P	Ab
16	Gaikwad Ashwini santosh	P	P	P	P	P
17	Gaikwad Bhavana Sanjay	P	P	Ab	P	P
18	Gavhane Bhakti Ramnath	P	P	P	P	P
19	Ghoderao Shraddha Ramesh	P	Ab	P	Ab	P
20	Girme Priyanka Shankar	P	P	P	P	P
21	Girme Tejal Mahesh	P	P	P	P	Ab
22	Gorde Deepali Anandrao	Ab	P	P	P	P
23	Hulekar Rupali Shankar	P	P	P	P	P
		<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>



31

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SSGM College, Kopergaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2018-2019

Practical

Sr No	Name of Students	Date:				
		4/2	5/2	6/2	11/2	12/2
		1	2	3	4	5
1	Abhale Gaurav Ramesh	P	P	P	P	P
2	Abhale Pooja Sudhakar	P	P	P	P	P
3	Abhale Rohini Namdeo	P	P	P	Ab	P
4	Bankar Anuja Rajendra	P	P	Ab	P	P
5	Barhate Arti Sanjay	P	P	P	P	P
6	Barshile Seema Maruti	P	P	P	P	Ab
7	Bhabhare Devendra Sudhakar	P	Ab	P	P	P
8	Bhagure Nitin Subhash	Ab	P	P	P	P
9	Bhalerao Shubangi Gajanan	P	P	P	P	P
10	Chaudhari Sujata Annasaheb	P	P	P	P	P
11	Dawange Aniket Prakash	P	Ab	P	P	P
12	Dhanwate Dhananjay Sambhaji	P	P	P	P	P
13	dhanwate Shubhangi Dashrath	P	P	P	P	P
14	Gade Shivam Ramnath	P	P	P	P	P
15	Gadhe Pooja Vishwanath	Ab	P	P	P	P
16	Gaikwad Ashwini santosh	P	P	P	P	Ab
17	Gaikwad Bhavana Sanjay	P	P	P	P	P
18	Gavhane Bhakti Ramnath	P	Ab	P	P	P
19	Ghoderao Shraddha Ramesh	P	P	P	P	P
20	Girme Priyanka Shankar	P	P	P	P	P
21	Girme Tejal Mahesh	P	P	P	P	P
22	Gorde Deepali Anandrao	P	P	P	P	P
23	Hulekar Rupali Shankar	P	P	P	P	Ab



21

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33

Rayat shikshan Sanstha's  
SSGM College, Kopergaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2018-2019

Practical

Sr No	Name of Students	Date:				
		13/2	18/2	19/2	20/2	21/2
		1	2	3	4	5
1	Abhale Gaurav Ramesh	P	P	P	P	P
2	Abhale Pooja Sudhakar	P	Ab	P	P	P
3	Abhale Rohini Namdeo	P	P	P	P	P
4	Bankar Anuja Rajendra	P	P	P	P	P
5	Barhate Arti Sanjay	P	P	P	P	P
6	Barshile Seema Maruti	Ab	P	P	P	P
7	Bhabhare Devendra Sudhakar	P	P	P	P	P
8	Bhagure Nitin Subhash	P	P	Ab	P	P
9	Bhalerao Shubangi Gajanan	P	P	P	P	P
10	Chaudhari Sujata Annasaheb	P	P	P	P	P
11	Dawange Aniket Prakash	P	P	P	Ab	P
12	Dhanwate Dhananjay Sambhaji	P	P	P	P	P
13	dhanwate Shubhangi Dashrath	P	P	P	P	P
14	Gade Shivam Ramnath	P	P	P	P	P
15	Gadhe Pooja Vishwanath	P	P	P	P	Ab
16	Gaikwad Ashwini santosh	P	P	P	P	P
17	Gaikwad Bhavana Sanjay	P	P	P	P	P
18	Gavhane Bhakti Ramnath	P	P	Ab	P	P
19	Ghoderao Shraddha Ramesh	P	Ab	P	P	P
20	Girme Priyanka Shankar	P	P	P	Ab	P
21	Girme Tejal Mahesh	P	Ab	P	P	P
22	Gorde Deepali Anandrao	P	P	Ab	P	P
23	Hulekar Rupali Shankar	P	P	P	P	P

22  
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20  
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20  
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21  
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22  
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CERTIFICATE COURSE IN INSTRUMENTAL METHODS IN CHEMICAL  
ANALYSIS  
Question Paper

Mark :- 50 Mark

**Q.1. Multiple Choice Questions & Answers (MCQs) Each Carry 2 Mark**

1. Spectroscopy deals with interaction of electromagnetic radiation with matter. What is the speed of this radiation in vacuum in m/s?

- a)  $6 \times 10^8$
- b)  $5 \times 10^8$
- c)  $7 \times 10^8$
- d)  $3 \times 10^8$

2. Which type of Quantum Transition takes place in Ultra Violet and Visible spectroscopy?

- a) Rotation of molecules
- b) Nuclear
- c) Bonding electrons
- d) Spin of nuclei in a magnetic field

3. Which of the following is not a property or parameter of electromagnetic radiation?

- a) Wavelength
- b) Voltage
- c) Wave number
- d) Amplitude

4. Which of the following is not a type of Spectroscopy?

- a) Gamma ray
- b) X ray
- c) Nuclear magnetic resonance
- d) Sound

5. Which of the following is the wavelength of microwave radiation?

- a) 10 – 780nm
- b) 0.78 – 30 $\mu$ m
- c) 0.6 – 10 m
- d) 0.75 – 3.75 mm

6. Which of the following is the principle of Flame emission photometers?

- a) Radiation is absorbed by non-excited atoms in vapour state and are excited to higher states
- b) Medium absorbs radiation and transmitted radiation is measured
- c) Colour and wavelength of the flame is measured
- d) Only wavelength of the flame is measured

7. In Flame emission photometers, the measurement of \_\_\_\_\_ is used for qualitative analysis.

- a) Colour
- b) Intensity
- c) Velocity
- d) Frequency



8. Which of the following is not a detector used in Flame emission photometers?
- Photronic cell
  - Photovoltaic cell
  - Photoemissive tube
  - Chromatogram
9. Which of the following is not a feature of carrier gas used in gas chromatography?
- It must be chemically inert
  - It should be suitable for the detector employed
  - It should not be completely pure
  - It should be cheap
10. Which of the following is the commonly used support material for the packed column in gas chromatography?
- Glass
  - Metal
  - Diatomaceous earth
  - Stainless steel
11. Which of the following is not a detector used in mid Infrared Spectrophotometer?
- Thermopile
  - Thermistor
  - Pyroelectric cell
  - Golay cell
12. Which of the following is used as a source in the simple infrared analyzer for gas analysis?
- Tungsten filament lamp
  - Nernst glower
  - Hot-wire spiral
  - Mercury arc lamp
13. Which of the following is the principle of Atomic Absorption Spectroscopy?
- Radiation is absorbed by non-excited atoms in vapour state and are excited to higher states
  - Medium absorbs radiation and transmitted radiation is measured
  - Colour is measured
  - Colour is simply observed
14. In Atomic Absorption Spectroscopy, which of the following is the generally used radiation source?
- Tungsten lamp
  - Xenon mercury arc lamp
  - Hydrogen or deuterium discharge lamp
  - Hollow cathode lamp
15. Which of the following is the function of the Flame or Emission system in Atomic Absorption Spectroscopy?
- To split the beam into two
  - To break the steady light into pulsating light
  - To filter unwanted components
  - To reduce the sample into atomic state
16. Which of the following is not a fuel used in flame photometry?
- Acetylene
  - Propane
  - Hydrogen
  - Camphor oil



17. Which of the following is not true about Fourier Transform Infrared (FTIR) spectrometer?
- It is of non-dispersive type
  - It is useful where repetitive analysis is required
  - Size has been reduced over the years
  - Size has increased over the years
18. Which of the following is not the advantage of Fourier Transform Spectrometers?
- Signal to noise ratio is high
  - Information could be obtained on all frequencies
  - Retrieval of data is possible
  - Easy to maintain
19. In Michelson's interferometer, the frequency of the detector output can be determined by translating the \_\_\_\_\_ of movable mirror and the \_\_\_\_\_ of monochromatic radiation.
- Velocity, wavelength
  - Thickness, intensity
  - Length, velocity
  - Angle, intensity
20. Which of the following is the formula for pH calculation?
- $\log_{10}[\text{H}^+]$
  - $-\log_{10}[\text{H}^+]$
  - $\log_2[\text{H}^+]$
  - $-\log_2[\text{H}^+]$
21. pH meters can be considered as voltage sources with which of the following internal resistances?
- Very low resistance
  - Moderate resistance
  - Very high resistance
  - No resistance
22. Which of the following is not a failure in pH meters?
- Defective electrodes
  - Defective input circuitry
  - Defective electronic circuitry
  - Defective calibration
23. Which of the following is the simplest of pH meters?
- Null-detector type pH meter
  - Direct reading type pH meter
  - Digital pH meter
  - Modern pH meter
24. Fourier transform NMR spectrometer has which of the following characteristics?
- Increased sensitivity, long time to obtain data
  - Decreased sensitivity, long time to obtain data
  - Increased sensitivity, reduced time to obtain data
  - Decreased sensitivity, reduced time to obtain data
25. Only \_\_\_\_\_ percent of the effluent of the liquid chromatography must be introduced in the mass spectrometer.
- 1-2 %
  - 1-5 %
  - 1-20 %
  - 1-15 %





Rayat shikshan Sanstha's  
SSGM College, Kopargaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Internal Test Mark List: 2018-2019

Sr No	Name of Students	Marks (internal test)
1	Abhale Gaurav Ramesh	45/50
2	Abhale Pooja Sudhakar	48/50
3	Abhale Rohini Namdeo	38/50
4	Bankar Anuja Rajendra	44/50
5	Barhate Arti Sanjay	46/50
6	Barshile Seema Maruti	39/50
7	Bhabhare Devendra Sudhakar	49/50
8	Bhagure Nitin Subhash	43/50
9	Bhalerao Shubangi Gajanan	42/50
10	Chaudhari Sujata Annasaheb	41/50
11	Dawange Aniket Prakash	45/50
12	Dhanwate Dhananjay Sambhaji	39/50
13	dhanwate Shubhangi Dashrath	48/50
14	Gade Shivam Ramnath	44/50
15	Gadhe Pooja Vishwanath	42/50
16	Gaikwad Ashwini santosh	46/50
17	Gaikwad Bhavana Sanjay	43/50
18	Gavhane Bhakti Ramnath	49/50
19	Ghoderao Shraddha Ramesh	42/50
20	Girme Priyanka Shankar	41/50
21	Girme Tejal Mahesh	46/50
22	Gorde Deepali Anandrao	48/50
23	Hulekar Rupali Shankar	40/50



**Rayat shikshan Sanstha's  
SSGM College, Kopargaon**

**Short term Course: Instrumental Methods of chemical Analysis**

**Class: T.Y.B.Sc. 2018-2019**

**Feedback form**

How you like this activity?

Please tick(✓) on the appropriate option

Criteria	Excellent	Very Good	Good	Average	Poor
Content of the curriculum		✓			
Quality of Lectures	✓				
Quality of practicals	✓				
Arrangement of tour and hands on training collaboratively organized	✓				
Is the course is applicable for entrepreneurship development in your future life	Yes				
Overall Evaluation of the Course		✓			
Is the course is beneficial for students & parents as far as environment & crop production is concerned	Yes				

Name of the student: Abhale Gaurav Ramesh.

Class : T.Y.B.Sc.



45

**Rayat shikshan Sanstha's**  
**SSGM College, Kopargaon**

**Short term Course: Instrumental Methods of chemical Analysis**

**Class: T.Y.B.Sc. 2018-2019**

**Feedback form**

How you like this activity?

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Quality of Lectures		✓			
Quality of practicals		✓			
Arrangement of tour and hands on training collaboratively organized	✓				
Is the course is applicable for entrepreneurship development in your future life	Yes				
Overall Evaluation of the Course	✓				
Is the course is beneficial for students & parents as far as environment & crop production is concerned	Yes.				

Name of the student: Abhale Pooja Sudhakar.

Class : T.Y.B.Sc.

47

**Rayat shikshan Sanstha's**  
**SSGM College, Kopargaon**

**Short term Course: Instrumental Methods of chemical Analysis**

**Class: T.Y.B.Sc. 2018-2019**

**Feedback form**

How you like this activity?

Please tick(✓) on the appropriate option

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Content of the curriculum	✓				
Quality of Lectures	✓				
Quality of practicals		✓			
Arrangement of tour and hands on training collaboratively organized	✓				
Is the course is applicable for entrepreneurship development in your future life	Yes				
Overall Evaluation of the Course	✓				
Is the course is beneficial for students& parents as far as environment& crop production is concerned	Yes.				

Name of the student: Banekar Anuja Rajendra

Class: T.Y. B.Sc.

Rayat shikshan Sanstha's  
SSGM College, Kopargaon

Short term Course: Instrumental Methods of chemical Analysis

Class: T.Y.B.Sc. 2018-2019

Feedback form

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Please tick(✓) on the appropriate option

Criteria	Excellent	Very Good	Good	Average	Poor
Content of the curriculum	✓				
Quality of Lectures		✓			
Quality of practicals	✓				
Arrangement of tour and hands on training collaboratively organized		✓			
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Overall Evaluation of the Course		✓			
Is the course is beneficial for students & parents as far as environment & crop production is concerned	Yes				

Name of the student: Bhabhare Devendra Sudhakar

Class : T.Y.B.Sc.

**Rayat shikshan Sanstha's**  
**SSGM College, Kopargaon**

**Short term Course: Instrumental Methods of chemical Analysis**

**Class: T.Y.B.Sc. 2018-2019**

**Feedback form**

How you like this activity?

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Content of the curriculum	✓				
Quality of Lectures	✓				
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Arrangement of tour and hands on training collaboratively organized	✓				
Is the course is applicable for entrepreneurship development in your future life	Yes				
Overall Evaluation of the Course	✓				
Is the course is beneficial for students& parents as far as environment& crop production is concerned	Yes.				

Name of the student: Dawange Aniket Prakash.

Class : T.Y.B.Sc.

Rayat shikshan Sanstha's  
SSGM College, Kopargaon

Short term Course: Instrumental Methods of chemical Analysis

Class: T.Y.B.Sc. 2018-2019

Feedback form

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Please tick(✓) on the appropriate option

Criteria	Excellent	Very Good	Good	Average	Poor
Content of the curriculum	✓				
Quality of Lectures	✓				
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Arrangement of tour and hands on training collaboratively organized	✓				
Is the course is applicable for entrepreneurship development in your future life	Yes				
Overall Evaluation of the Course	✓				
Is the course is beneficial for students& parents as far as environment& crop production is concerned	Yes.				

Name of the student: Gorde Deepali Anandrao.

Class : T.Y. B.Sc.



“Education Through Self - Help is our Motto” - Karmaveer

Rayat Shikshan Sanstha's

**Shri Sadguru Gangageer Maharaj Science,  
Gautam Arts & Sanjivani Commerce College**



Kopargaon, Dist. Ahmednagar (M.S.)

**Short Term Course**

**CERTIFICATE OF COMPLETION**

This is to Certify that Shri/Kum. \_\_\_\_\_  
of Class \_\_\_\_\_ has Completed Short Term Course in \_\_\_\_\_  
\_\_\_\_\_ conducted by the department of \_\_\_\_\_  
during the academic year 201 /201

**Course Co-ordinator**

**Co-ordinator**

**Principal**



SSGM College, Kopargaon

Department of Chemistry,

Class: T. Y. B.Sc.

2018-19

Date- 11/09/2018

**Short Term Course- A Certificate Course in Instrumental Methods of  
Chemical Analysis  
Meeting Notice**

Department of Chemistry conducts a short term course in instrumental methods of Chemical Analysis for T.Y.B.Sc. Students, the syllabus and working hours have been discussed and a complete programme has been prepared. Following members are requested to attend the meeting for the implementation of these academic year 2018-2019. The meeting will be held in Department of Chemistry

*Rkmanjule*  
Course Co-ordinator,



*[Signature]*

Head,

**HEAD**  
Department of chemistry  
Deptt. Of Chemistry  
S. S. G. M. College, Kopargaon

**Committee Members:**

1. Prof. A.M. Narode
2. Prof. P. D. Kashid
3. Prof. D. N. Gaikwad
4. Dr. D. M. Suryavanshi
5. Dr. N. M. Chavhan

SSGM College, Kopergaon

Department of Chemistry,

Class: T. Y. B.Sc.

2018-19

Date- 11/09/2018

**Short Term Course- A Certificate Course in Instrumental Methods of  
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*A. Manjule*

**Course Co-ordinator,**



*[Signature]*

**Head,**

**Department of chemistry**  
Deptt. Of Chemistry  
S. S. G. M. College, Kopergaon

**Committee Members:**

1. Prof. A.M. Narode
2. Prof. P. D. Kashid
3. Prof. D. N. Gaikwad
4. Dr. D. M. Suryavanshi
5. Dr. N. M. Chavhan

Rayat Shikshan Sanstha's  
SSGM College, Kopargaon

Department of Chemistry

Class: T.Y. B.Sc.

Date: 12/09/2018

Short Term Course- A certificate Course in Instrumental Method of  
Chemical Analysis

Minutes of Meeting

The meeting of the Short Term Course Committee has been conducted on  
11/09/2018 at Department of Chemistry. In the meeting the following  
resolutions and decisions were made:

1. It was decided to revise the syllabus of Short term Course- A Certificate Course in Instrumental Method of Chemical Analysis.
2. For conducting the course the complete program of Theory and Practicals was designed.
3. As per the requirements of completion of the syllabus of the short term course the working hours were decided.

*RK Marjule*

Course Co-ordinator,



*[Signature]*

Head

Department of Chemistry  
Deptt. Of Chemistry  
S. S. G. M. College, Kopargaon

Rayat Shikshan Sanstha's  
Shri Sadguru Gangageer Maharaj Science, Gautam Arts & Sanjivani Commerce  
College, Kopargaon. Dist-Ahmednagar-423601.

2018-19

## Report

The department of chemistry conducted a Short Term Course entitled **Instrumental Methods in Chemical Analysis**. Total 23 students of T.Y.B.Sc. Chemistry were admitted in the course. The duration of course was three months (3 Dec.2018 to 31 Mar.2019). The course was conducted satisfactorily by the Department of chemistry.



A handwritten signature in blue ink, consisting of a series of loops and a horizontal line extending to the left.

Head,  
Department of Chemistry,  
S.S.G.M. College, Kopargaon.