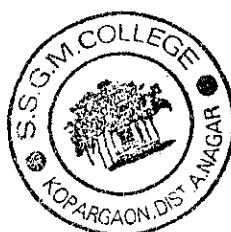


Rayat Shikshan Sanstha's  
S.S.G.M. College, Kopargaon  
Short Term Course

**INSTRUMENTAL METHODS IN CHEMICAL ANALYSIS**

INDEX

Sr.No.	Particulars	Page No.
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Rajat Shikshan Sanstha's

**S.S.G.M. College, Kopargaon, Dist- Ahmednagar**

**Department of Chemistry**

**2021-22**

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

### **Board of Studies (BOS)**

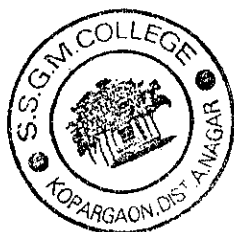
Department of Chemistry have decided to start Certificate Course in Instrumental Methods in Chemical Analysis . For framing the Syllabus of said course, committee was constituted as follow.

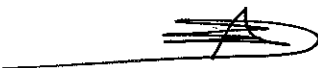
### **Board of Studies Member (BOS)**

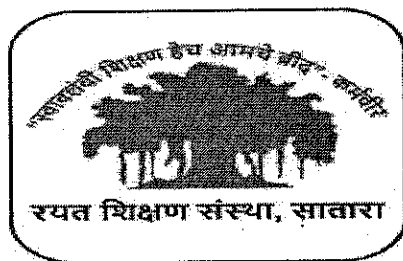
1. Prin. Dr. Thopte S.R.	: Chairman
2. Mr. Deshmukh A.K.	:HOD of Chemistry
3. Prof. JadhavAjit	:Placement Officer
4. Dr. Malpure N. V.	:IQAC- Coordinator
5. Dr. Konda Rakesh	:Professional Expert
6. Mr. MAITRIYA A D.	:Director of Shodh Advantech,Aurangabad

### **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 .



  
HEAD  
Deptt. Of Chemistry  
S. S. G. M. College, Kopargaon.



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**

2021-22

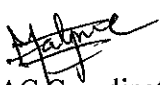
The IQAC committee has approved the submitted syllabus of short term /Certificate course planned to be conducted by the Department of Chemistry .

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 :- 15/11/2021

Place :- Kopargaon

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



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

**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 in neede 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 becomes more eligible to work in all type of research and industrial laboratories in the future it will also help them for getting employment.



5

**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

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

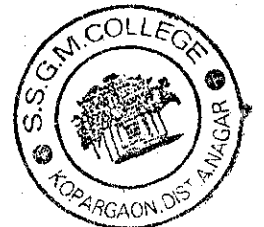
Rayat Shikshan Sanstha's  
SSGM College, Kopargaon

Short term Course – Instrumental Methods of Chemical Analysis

Class: T.Y.B.Sc. (2021-2022)

List of Enrolled Students

Sr. No	Name of Students	Sign
1	Cholke Charushila Valmik	
2	Yeole Sayali Kailas	
3	Ukirde Sonali Badrinath	
4	Somase Kalyani Valmik	
5	Kalaskar Akansha Vijay	
6	Gavande Gayatri Madhukar	
7	Aher Vaishnavi Sitaram	
8	Jadhav Varun Vasant	
9	Dube Hrushikesh Sopan	
10	Somase Mayur Ramesh	
11	Gavhale Vaibhav Subhash	
12	Sonawane Digamber Uttam	
13	Jagtap Jagdish Ashok	
14	More Sanket Changdev	
15	Dagale Shubham Laxman	
16	Kotame Paresh Sunil	
17	Tambe Nilesh Punjaba	
18	Gavali Yogesh Appasaheb	
19	Bagal Aishwariya Yogesh	
20	Shelar Poornima Ashok	
21	Mapari Shubhangi Subhash	
22	Dawange Manisha Ambadas	
23	Vaidya Monika Vishnu	



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

2021-2022

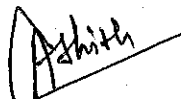
Short Term Course- A Certificate Course in Instrumental Methods of  
Chemical Analysis

Notice

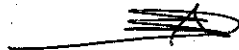
Date: 15/11/2021

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  
17-11-2021 at 2.30 pm. The attendance to the lectures are compulsory.

Venue: Hall No. :- A-102



Course Co-ordinator,



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

Rayat Shikshan Sanstha's  
SSGM College, Kopargaon

Class: T.Y.B.Sc.

Date: 15/11/2021

Academic Year: 2021-2022

**Short Term Course- A Certificate Course in instrumental Method of  
Chemical Analysis**

**Notice**

All students of T.Y.B.Sc. Class informed that Department of Chemistry will be conducting the ShortTerm Course entitled "Instrumental Method of Chemical Analysis". All the Students should submit their names to Asst.Prof. P. D. Kashid.

Course Fees: Nill /-



Co-ordinator,



Head,

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



Rayat Shikshan Sanstha's  
S.S.G.M. College, Kopargaon  
Dist: Ahmednagar.  
2021-2022



**Short term Course- Admission form**

Name	Chotke Charushila Valmik
Class	T.Y. Bsc.
Address	Vadangale Vasti, Station Road, kopargaon.
Mobile No	7507598752

To,  
The Principle,  
SSGM College, Kopargaon, Dist: Ahemednagar.

**Sub: Request to an admission in the following shortterm course  
Instrumental Method of Chemical Analysis**


Respected sir,  
I, the undersigned have been admitted in T.Y.B.Sc./M.Sc II (Analytical)  
Chemistry class in our college, I wish to complete above short term course ru.  
by our college. Kindly do me a favour by granting admission

Yours Faithfully


Sign: *Chotke*

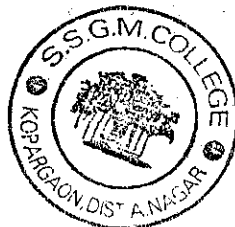
Name: Chotke Charushila Valmik

Recommended for an admission in the short term course.

  
Chairman  
Short term course

  
Course Co-ordinator

  
Head of department  
**HEAD**  
Deptt. Of Chemistry  
S. S. G. M. College, Kopargaon.





Rayat Shikshan Sanstha's  
S.S.G.M. College, Kopergaon  
Dist: Ahmednagar.  
2021-2022



**Short term Course- Admission form**

Name	Ukirde Sonali Badrinath
Class	T.Y.B.sc
Address	At. Sawalgaon Post. Shirasgaon T. Kopergaon D.A. Nagar
Mobile No	8806923149

To,  
The Principle,  
SSGM College, Kopergaon, Dist: Ahemednagar.

**Sub: Request to an admission in the following shortterm course  
Instrumental Method of Chemical Analysis**

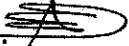
Respected sir,  
I, the undersigned have been admitted in T.Y.B.Sc./M.Sc II (Analytical)  
Chemistry class in our college, I wish to complete above short term course run  
by our college. Kindly do me a favour by granting admission

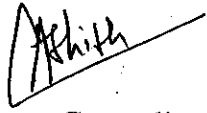
Yours Faithfully


Sign: 

Name: Ukirde Sonali Badrinath

Recommended for an admission in the short term course.

  
Chairman  
Short term course

  
Course Co-ordinator

  
Head of department  
**HEAD**  
Deptt. Of Chemistry  
S. S. G. M. College, Kopergaon





Rayat Shikshan Sanstha's  
S.S.G.M. College, Kopergaon  
Dist: Ahmednagar.  
2021-2022



**Short term Course- Admission form**

Name	Kalaskar Akanksha vijay
Class	T. Y. B. Sc. (Chemistry)
Address	Yesgaon, Tal - Kopergaon Dist - A. Nagar
Mobile No	8421254223

To,  
The Principle,  
SSGM College, Kopergaon, Dist: Ahemednagar.

**Sub: Request to an admission in the following shortterm course  
Instrumental Method of Chemical Analysis**

Respected sir,

I, the undersigned have been admitted in T.Y.B.Sc./M.Sc II (Analytical) Chemistry class in our college, I wish to complete above short term course run by our college. Kindly do me a favour by granting admission

Yours Faithfully

Sign: *Aak*

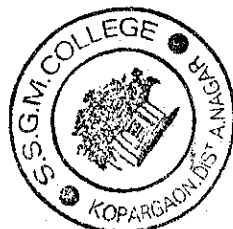
Name: Kalaskar Akanksha vijay

Recommended for an admission in the short term course.

*[Signature]*  
Chairman  
Short term course

*[Signature]*  
Course Co-ordinator

*[Signature]*  
Head of department  
HEAD  
Deptt. Of Chemistry  
S. S. G. M. College, Kopergaon



**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:- 2021-2022**

**December 2021**

<b>Monday (Theory)</b>	<b>Tuesdady (Theory)</b>	<b>Wednesday (Theory)</b>
06/12/21 (AMN)	07/12/21 (AMN)	08/12/21 (DNG)
13/12/21 (DMS)	14/12/21 (DMS)	15/12/21 (DMS)
20/12/21 (NMC)	21/12/21 (NMC)	22/12/21 (NMC)
27/12/21 (AMN)	28/12/21 (PDK)	-

**January 2022**

<b>Monday (Theory)</b>	<b>Tuesdady (Theory)</b>	<b>Wednesday (Theory)</b>
03/01/2022 (DNG)	04/1/2022 (AMN)	5/01/2022 (AMN)
10/01/2022 (AMN)	11/01/2022 (DMS)	12/01/2022 (DMS)
17/01/2022 (NMC)	18/01/2022 (NMC)	19/01/2022 (NMC)

**February 2022**

<b>Monday (Practical )</b>	<b>Tuesdady (Practical)</b>	<b>Wednesday (Practical)</b>
7/2/2022 (PDK)	8/2/2022 (DNG)	6/2/2022 (AMN)
14/2/2022 (DNG)	15/2/2022 (PDK)	16/2/2022 (DNG)
21/2/2022 (AMN)	22/2/2022 (AMN)	-





RayatshikshanSanstha's  
SSGM College, Kopargaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2021-2022

Theory

Sr No	Name of Students	Date:				
		1	2	3	4	5
1	Cholke Charushila Valmik	<u>Cholke</u>	<u>Cholke</u>	<u>Cholke</u>	<u>Cholke</u>	<u>Cholke</u>
2	Yeole Sayali Kailas	<u>Yeole</u>	<u>Yeole</u>	<u>Yeole</u>	<u>Yeole</u>	<u>Yeole</u>
3	Ukirde Sonali Badrinath	<u>Ukirde</u>	<u>Ukirde</u>	<u>Ukirde</u>	<u>Ukirde</u>	<u>Ukirde</u>
4	Somase Kalyani Valmik	<u>Somase</u>	<u>Somase</u>	<u>Somase</u>	<u>Somase</u>	<u>Somase</u>
5	Kalaskar Akansha Vijay	<u>Kalaskar</u>	<u>Kalaskar</u>	<u>Kalaskar</u>	<u>Kalaskar</u>	<u>Kalaskar</u>
6	Gavande Gayatri Madhukar	<u>Gavande</u>	<u>Gavande</u>	<u>Gavande</u>	<u>Gavande</u>	<u>Gavande</u>
7	Aher Vaishnavi Sitaram	<u>Aher</u>	<u>Aher</u>	<u>Aher</u>	<u>Aher</u>	<u>Aher</u>
8	Jadhav Varun Vasant	<u>Jadhav</u>	<u>Jadhav</u>	<u>Jadhav</u>	<u>Jadhav</u>	<u>Jadhav</u>
9	Dube Hrushikesh Sopan	<u>Dube</u>	<u>Dube</u>	<u>Dube</u>	<u>Dube</u>	<u>Dube</u>
10	Somase Mayur Ramesh	<u>Somase</u>	<u>Somase</u>	<u>Somase</u>	<u>Somase</u>	<u>Somase</u>
11	Gavhale Vaibhav Subhash	<u>Gavhale</u>	<u>Gavhale</u>	<u>Gavhale</u>	<u>Gavhale</u>	<u>Gavhale</u>
12	Sonawane Digamber Uttam	<u>Sonawane</u>	<u>Sonawane</u>	<u>Sonawane</u>	<u>Sonawane</u>	<u>Sonawane</u>
13	Jagtap Jagdish Ashok	<u>Jagtap</u>	<u>Jagtap</u>	<u>Jagtap</u>	<u>Jagtap</u>	<u>Jagtap</u>
14	More Sanket Changdev	<u>More</u>	<u>More</u>	<u>More</u>	<u>More</u>	<u>More</u>
15	Dagale Shubham Laxman	<u>Dagale</u>	<u>Dagale</u>	<u>Dagale</u>	<u>Dagale</u>	<u>Dagale</u>
16	Kotame Paresh Sunil	<u>Kotame</u>	<u>Kotame</u>	<u>Kotame</u>	<u>Kotame</u>	<u>Kotame</u>
17	Tambe Nilesh Punjaba	<u>Tambe</u>	<u>Tambe</u>	<u>Tambe</u>	<u>Tambe</u>	<u>Tambe</u>
18	Gavali Yogesh Appasaheb	<u>Gavali</u>	<u>Gavali</u>	<u>Gavali</u>	<u>Gavali</u>	<u>Gavali</u>
19	Bagal Aishwariya Yogesh	<u>A.Y. Bagal</u>	<u>A.Y. Bagal</u>	<u>A.Y. Bagal</u>	<u>A.Y. Bagal</u>	<u>A.Y. Bagal</u>
20	Shelar Poornima Ashok	<u>Shelar</u>	<u>Shelar</u>	<u>Shelar</u>	<u>Shelar</u>	<u>Shelar</u>
21	Mapari Shubhangi Subhash	<u>Mapari</u>	<u>Mapari</u>	<u>Mapari</u>	<u>Mapari</u>	<u>Mapari</u>
22	Dawange Manisha Ambadas	<u>Dawange</u>	<u>Dawange</u>	<u>Dawange</u>	<u>Dawange</u>	<u>Dawange</u>
23	Vaidya Monika Vishnu	<u>Vaidya</u>	<u>Vaidya</u>	<u>Vaidya</u>	<u>Vaidya</u>	<u>Vaidya</u>



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RayatshikshanSanstha's  
SSGM College, Kopargaon  
Short term Course: Instrumental Methods of chemical Analysis.  
Class: T.Y.B.Sc. Attendance: 2021-2022

Theory

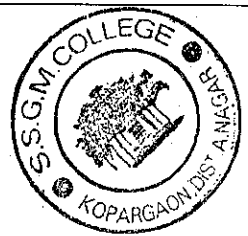
Sr No	Name of Students	Date:				
		1	2	3	4	5
1	Cholke Charushila Valmik	Cholke	Cholke	Cholke	Cholke	Cholke
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3	Ukirde Sonali Badrinath	Ukirde	Ukirde	Ukirde	Ukirde	Ukirde
4	Somase Kalyani, Valmik	Kalyani	Kalyani	Kalyani	Kalyani	Kalyani
5	Kalaskar Akansha Vijay	Kalaskar	Kalaskar	Kalaskar	Kalaskar	Kalaskar
6	Gavande Gayatri Madhukar	Gayatri	Gayatri	Gayatri	Gayatri	Gayatri
7	Aher Vaishnavi Sitaram	Aher	Aher	Aher	Aher	Aher
8	Jadhav Varun Vasant	Jadhav	Jadhav	Jadhav	Jadhav	Jadhav
9	Dube Hrushikesh Sopan	Dube	Dube	Dube	Dube	Dube
10	Somase Mayur Ramesh	Mayur	Mayur	Mayur	Mayur	Mayur
11	Gavhale Vaibhav Subhash	Gavhale	Gavhale	Gavhale	Gavhale	Gavhale
12	Sonawane Digamber Uttam	Sonawane	Sonawane	Sonawane	Sonawane	Sonawane
13	Jagtap Jagdish Ashok	Jagtap	Jagtap	Jagtap	Jagtap	Jagtap
14	More Sanket Changdev	SM	SM	SM	SM	SM
15	Dagale Shubham Laxman	Dagale	Dagale	Dagale	Dagale	Dagale
16	Kotame Paresh Sunil	Kotame	Kotame	Kotame	Kotame	Kotame
17	Tambe Nilesh Punjaba	Tambe	Tambe	Tambe	Tambe	Tambe
18	Gavali Yogesh Appasaheb	Gavali	Gavali	Gavali	Gavali	Gavali
19	Bagal Aishwariya Yogesh	A.Y. Bagal	A.Y. Bagal	A.Y. Bagal	A.Y. Bagal	A.Y. Bagal
20	Shelar Poornima Ashok	Shelar	Shelar	Shelar	Shelar	Shelar
21	Mapari Shubhangi Subhash	Mapari	Mapari	Mapari	Mapari	Mapari
22	Dawange Manisha Ambadas	Dawange	Dawange	Dawange	Dawange	Dawange
23	Vaidya Monika Vishnu	Vaidya	Vaidya	Vaidya	Vaidya	Vaidya



RayatshikshanSanstha's  
SSGM College, Kopargaon  
Short term Course: Instrumental Methods of chemical Analysis  
Class: T.Y.B.Sc. Attendance: 2021-2022

Theory

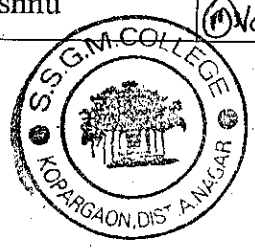
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		1	2	3	4	5
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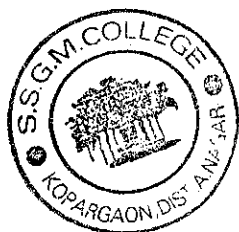
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9	Dube Hrushikesh Sopan	<u>Dubess</u>	<u>Dubess</u>	<u>Dubess</u>	<u>Dubess</u>	<u>Dubess</u>	<u>Dubess</u>
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Rayat Shikshan Sanstha's  
S.S.G.M. College, Kopargaon, Dist- Ahmednagar  
Department of Chemistry  
2021-22

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 %

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S.S.G.M. College Kopergaon  
Short Term Course of Instrumental Methods of Chemical Analysis 2021-22  
Mark list of students

Sr.No.	Roll No.	Name of the Student	Marks	Result
1.	8856	Aher Vaishnavi Bhaskar	28 / 50	Pass
2.	8860	Bagal Aishwarya Yogesh	30 / 50	Pass
3.	8865	CholkeCharushila Valmik	30 / 50	Pass
4.	8866	DAGALE SHUBHAM LAXMAN	34 / 50	Pass
5.	8869	Dawange Manisha Ambadas	26 / 50	Pass
6.	8875	Dube HrushikeshSopan	32 / 50	Pass
7.	8884	Gavali Yogesh Aappasaheb	32 / 50	Pass
8.	8885	Gavande Gayatri Madhukar	38 / 50	Pass
9.	8886	Gavhalevaibhavsubhash	24 / 50	Pass
10.	8895	Jadhav varunvasant	30 / 50	Pass
11.	8897	Jagtap Jagadish Ashok	28 / 50	Pass
12.	8901	Kalaskar Akanksha vijay	32 / 50	Pass
13.	8910	Kotame Paresh Sunil	26 / 50	Pass
14.	8921	MapariShubhangi Subhash	36 / 50	Pass
15.	8924	More SanketChangdev	32 / 50	Pass
16.	8944	ShelarPornima Ashok	34 / 50	Pass
17.	8949	Somasekalyanivalmik	24 / 50	Pass
18.	8950	Somasemayurramesh	26 / 50	Pass
19.	8952	Sonawane Digambar Uttam	32 / 50	Pass
20.	8954	Tambe Nilesh Punjaba	36 / 50	Pass
21.	8957	Ukirde Sonali Badrinath	32 / 50	Pass
22.	8960	Vaidya Monika Vishnu	26 / 50	Pass
23.	8963	Yeolesayalikailas	34 / 50	Pass





Rayat Shikshan Sanstha's  
**SHRI SADGURU GANGAGEER MAHARAJ SCIENCE, GAUTAM  
 ARTS & SANJIVANI COMMERCE COLLEGE, KOPARGAON**  
 DIST. AHMEDNAGAR 423 601, MAHARASHTRA, INDIA  
 AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE



**Certificate of appreciation**

This is to certify that.....of Class  
 ..... has Successfully completed short term course in  
 .....for academic  
 year .....from.....and secured .....Grade.

Co-ordinator

Head of Department



*[Signature]*

Dr. R. R. Sanap  
 I/C Principal

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Rayat Shikshan Sanstha's  
S.S.G.M College Kopargaon  
Dist:-Ahmednagar

Certificate Course  
Feedback form( Year 2021-2022)  
How you like this activity ?  
(Please tick(✓)on the appropriate option)

Sr. No	Criteria's	Excellent	Very Good	Good	Average	Poor
1	Content of curriculum	✓				
2	Quality of Lectures		✓			
3	Quality of Practical's	✓				
4	Arrangement of Tour and hands on training collaboratively organized		✓			
5	Is the course is applicable for entrepreneurship development in your future life			✓		
6	Is the course is beneficial for students and parents as far as environment & crop production is concerned		✓			

Any Suggestions :-

\_\_\_\_\_

Name of the Students :- Cholke Charushita Valmik.

Class:- T.Y.Bsc.

Signature :- Cholke



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Rayat Shikshan Sanstha's  
S.S.G.M College Kopergaon  
Dist:-Ahmednagar

Certificate Course  
Feedback form( Year 2021-2022)  
How you like this activity ?  
(Please tick(✓)on the appropriate option)

Sr. No	Criteria's	Excellent	Very Good	Good	Average	Poor
1	Content of curriculum	✓				
2	Quality of Lectures		✓			
3	Quality of Practical's	✓				
4	Arrangement of Tour and hands on training collaboratively organized		✓			
5	Is the course is applicable for entrepreneurship development in your future life	✓				
6	Is the course is beneficial for students and parents as far as environment & crop production is concerned	✓				

Any Suggestions :- No

Name of the Students :- Teale Sajali Kailas

Class:- T.P.Sc

Signature :- Teale

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Rayat Shikshan Sanstha's  
S.S.G.M College Kopergaon  
Dist:-Ahmednagar

Certificate Course  
Feedback form( Year 2021-2022)  
How you like this activity ?  
(Please tick(✓)on the appropriate option)

Sr. No	Criteria's	Excellent	Very Good	Good	Average	Poor
1	Content of curriculum	✓				
2	Quality of Lectures		✓			
3	Quality of Practical's	✓				
4	Arrangement of Tour and hands on training collaboratively organized		✓			
5	Is the course is applicable for entrepreneurship development in your future life	✓				
6	Is the course is beneficial for students and parents as far as environment & crop production is concerned	✓				

Any Suggestions :-

Name of the Students :- Ukirda Sanali Badrinath

Class:- T.Y. B.Sc

Signature :- Sakade

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Rayat Shikshan Sanstha's  
S.S.G.M College Kopergaon  
Dist:-Ahmednagar

Certificate Course  
Feedback form( Year 2021-2022)  
How you like this activity ?  
(Please tick(✓)on the appropriate option)

Sr. No	Criteria's	Excellent	Very Good	Good	Average	Poor
1	Content of curriculum	✓				
2	Quality of Lectures		✓			
3	Quality of Practical's	✓				
4	Arrangement of Tour and hands on training collaboratively organized	✓				
5	Is the course is applicable for entrepreneurship development in your future life		✓			
6	Is the course is beneficial for students and parents as far as environment & crop production is concerned	✓				

Any Suggestions :-

Name of the Students :- Somase.....kalyani.....Valmik.....

Class:- T.Y.B.sc.....(chemistry)

Signature :- Kalyani



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Rayat Shikshan Sanstha's  
S.S.G.M College Kopergaon  
Dist:-Ahmednagar

Certificate Course  
Feedback form( Year 2021-2022)  
How you like this activity ?  
(Please tick(✓)on the appropriate option)

Sr. No	Criteria's	Excellent	Very Good	Good	Average	Poor
1	Content of curriculum	✓				
2	Quality of Lectures	✓				
3	Quality of Practical's		✓			
4	Arrangement of Tour and hands on training collaboratively organized	✓				
5	Is the course is applicable for entrepreneurship development in your future life		✓			
6	Is the course is beneficial for students and parents as far as environment & crop production is concerned	✓				

Any Suggestions :-

Name of the Students :- Kalaskar Akanksha vijay .....

Class:- T. Y. B. sc. (Chemistry)

Signature :- Devik .....

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Rayat Shikshan Sanstha's  
S.S.G.M College Kopargaon  
Dist:-Ahmednagar

Certificate Course  
Feedback form( Year 2021-2022)  
How you like this activity ?  
(Please tick(✓)on the appropriate option)

Sr. No	Criteria's	Excellent	Very Good	Good	Average	Poor
1	Content of curriculum	✓				
2	Quality of Lectures		✓			
3	Quality of Practical's	✓				
4	Arrangement of Tour and hands on training collaboratively organized	✓				
5	Is the course is applicable for entrepreneurship development in your future life		✓			
6	Is the course is beneficial for students and parents as far as environment & crop production is concerned	✓				

Any Suggestions :-

Name of the Students :- Gavande Gayatri Madhukar

Class:- T.Y.BSC

Signature :- Gayatri

SSGM College, Kopargaon

Department of Chemistry,

Class: T. Y. B.Sc.

2021-22

Date- 15/11/2021

**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 2021-2022. The meeting will be held in Department of Chemistry

Course Co-ordinator,



Head,

Department of chemistry  
HEAD  
Department 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

Rayat Shikshan Sanstha's  
SSGM College, Kopargaon  
Department of Chemistry

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

Minutes of Meeting

Class: T.Y. B.Sc.

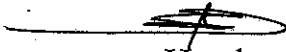
Date: 16/11/2021

The meeting of the ShortTerm Course Committee has been conducted on 15/11/2021 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.

  
Course Co-ordinator,



  
Head  
Department of Chemistry  
Deptt. Of Chemistry  
College, Kopargaon

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# Instrumental Methods of Chemical Analysis

(Skill Development Course)

Year 2021-2022

Co-ordinate by : Assit. Prof. Narode Ashish Madhuakar

Class: T. Y. B. Sc.

Batch Capacity: 23

No. of students Admitted: 3 Months

Duration of the course: 3 Months

Fee of Course: Nil /-

Lecture and Practical started: December, January, February and March

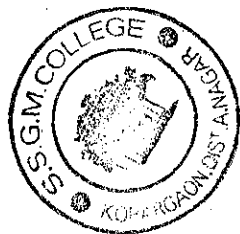
Tentative date of Examination: 1<sup>st</sup> week of March

Tentative date of examination: 2<sup>nd</sup> week of March

Syllabus: 4 credits (Theory+Practicals).



Co-ordinator



  
Head

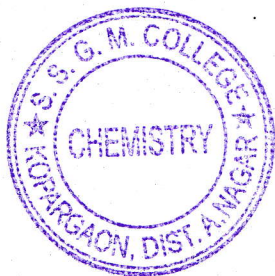
Department of Chemistry  
S.S.G.M. College, Kopergaon,  
Dist: Ahmednagar


Dist: Ahmednagar

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

## 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 (1 Dec.2021 to 20 Mar.2022). The course was conducted satisfactorily by the Department of chemistry.



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