

**NAGARJUNA GOVERNMENT COLLEGE,  
NALGONDA**

**Autonomous**

**Re-accredited by NAAC with 'A' grade**

**BOARD OF STUDIES MEETING 2014-15**

**DEPARTMENT OF INDUSTRIAL CHEMISTRY**

2014-15

# NAGARJUNA GOVT.COLLEGE, NALGONDA.

## (AUTONOMOUS)

### DEPARTMENT OF INDUSTRIAL CHEMISTRY

#### BOARD OF STUDIES MEETING

The member of Board of studies in Industrial chemistry department ,N.G.College,Nalgonda, met under the chairmanship of Sri .P.Yedukondalu on \_\_\_\_\_ and passed the following resolutions

#### AGENDA

1. To consider and approve the Choice Based Credit System (CBCS) and Cumulative Grade Point Average (CGPA) system for B.Sc I year students (I & II Semesters) for the academic year 2014-15.
2. To consider and approve the Syllabus for B.Sc I,II,III years (I,II,III,IV,V & VI Semesters) for the academic year 2014-15.
3. To consider and approve the modules and setting of Question papers as 70:30 for Theory External and Internal assignments for B.Sc I year (I & II Semesters) for the academic year 2014-15.
4. To consider and approve the Continuation of 80:20 pattern for External and Internal assignments for B.Sc II & III year (III,IV,V & VI semesters) for the academic year 2014-15. i.e. External exam 40 marks, Internal assessment-10 marks
5. To consider and approve the practical examinations at the end of II,IV,VI semesters for B.Sc I,II & III year Students.
6. To consider and approve the model Question Papers for B.Sc I,II & III year for the Academic year 2014-15.
7. To consider and approve the list examinations for paper setting and evaluation for the academic year 2014-15.

Any other related academic matters.

## Resolutions

1. The Choice Based Credit System (CBCS) and Cumulative Grade Point Average (CGPA) System can be implemented for the B.Sc I year (I & II semesters) Students for the academic year 2014-15.
2. The modules and allotted Credits is approved for B.Sc I year (I & II semesters) Students for the academic year 2014-15.
3. Unitization of Syllabus in to 4 Units for each paper (module)
4. The evaluation of the students for each Semester of I & II, Consists 100 marks in the ratio of 70:30 External End Theory exam-70 marks and internal exam Consist 30 marks.

i) The design of External end exam Question Paper for each module is in the following lines.

**Section – A (very short questions) 5 X 2 = 10**

Answer all the questions- 5 questions - 2 marks each

**Section – B (short questions) 4 X 5 = 20**

Answer any four – six questions given – 5 marks each

**Section – C (essay type questions) unit wise 4 X 10 =40**

Answer all questions – four questions given with internal choices

ii) For Internal assignments-30 marks, The written exam Consists 20 marks.

Assignment-5 marks and Student Seminars-5 marks. For Internal written exams two


should be conducted , the best of two is taken for consideration.


5. For B.Sc II & III year (III, IV, V & VI Semesters) continuation of old system is followed. The external consists-40 marks and Internal Assignments-10 marks.  
For Internal Assignments, two exams should be conducted; the best of two is taken for consideration. The Question paper is in the form of descriptive type for II & III year students.
6. Approved The syllabus for I, II, III, V, VI, VII & VIII papers and model Question Papers.

7. Approved to assign the project work for B.Sc Final year Students by giving grades.
8. Approved to conduct the Practical examination at the end of II, IV and VI Semesters. Each paper consists 50 marks. The Syllabus is approval.
9. Approved to prepare and supply of Question banks and model papers to the students.
10. Approved to evaluate the Progression of the students, Co-curriculum and extra Curriculum activities should be considered.
11. Approval the panel of examinations fee paper setting and evaluation for the academic year 2014-15.

1. Sri.P.Venkatanarsaiah, Lect.in Chemistry (Rtd),  
Principal at Kakatiya P.G College ,Nalgonda.

2. Smt.V.Anuradha, Asst.prof, MBA, Dept. of Management, MGU, Nalgonda.  
B.Tech. Chemical Engineering

  
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# NAGARJUNA GOVT.COLLEGE, NALGONDA

(AUTONOMOUS)

## DEPARTMENT OF INDUSTRIAL CHEMISTRY

CONSTITUTED OF BOARD OF STUDIES : 2014-2015

SNO	CATEGORY	NAME & DESIGNATION	CONTACT NOS
1	Chairman Board of studies	Sri.P.Yedukondalu.	9849056316 
2	University Nominee	Dr.M.Vasantha, Asso.prof. M.G.University,Nalgonda.	9849216947  HEAD Dept. of Chemistry Mahatma Gandhi Univer NALGONDA-508 254 9848385850
3	Subject expert from outside the college	Dr.A.BhanuPrasad,Principal.GDC, Ramanapet, Nalgonda.	 K. Manjula, M.Sc., B. 1462182 in Chemistry, Govt. Degree College for Worr NALGONDA.
4	Subject expert from outside the college	Smt.K.Manjula Lecturer in chemistry GDC(w),NLG.	
5	Members: All The Faculty members of the Dept.	1.K.Kishore Kumar, (Guest faculty). 2.V.Swamy, (Guest faculty).	9642284865  9666920711 
6	One representative from Industry/Corporate sector/Allied areas	K. Ravi Shastri Manager, operational Excellence, RA Chem pharma Ltd.	9785185274, 

Submitted by



In-Charge /Chairman BOS

proposals approved



Principal/ Chairman academic council

**NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS), NALGONDA**  
**ALLOCATION OF CREDITS AT SUBJECT LEVEL**  
**SUBJECT: INDUSTRIAL CHEMISTRY**  
**COURSE: B.Sc SCIENCE**

S.No.	SEMESTER	MODULE (PAPER)	HOURS PER WEEK	MAX. MARKS	CREDITS
1	I (core)	Chemical Engineering - Unit Operations & Material Science	4	100	3
2	II (core)	Utilities in Chemical Industry & Fuel, Fertilizer Chemistry	4	100	3
3	Practical's	simple Laboratory Techniques	3	50	2
4	III (core)	Material, Energy Balance calculations & Unit process in Chemical process	4	100	3
5	IV (core)	Process of Instrumentation & Oils, Fats, Waxes, Soaps, Paints	4	100	3
6	Practical's	Synthesis of simple organic compounds	3	50	2
7	V (core)	Advanced Polymer Chemistry	3	100	3
8	V Elective-I (Advanced)	Pharmaceutical Chemistry (OR)	3	100	2
9	V Elective-I (Advanced)	International Patent Rights	3	100	2
10	Practical's	Synthesis of advanced organic compounds	3	50	2
11	VI (core)	Drugs and Its manufacturing process	3	100	3
12	VI Elective (Skill Based)	Industrial Scientific Management (OR)	3	100	2
13	VI Elective (Skill Based)	Industrial safety and Its Measures	3	100	2
14	Practical's	Estimation of Organic compounds	3	50	02
15	Project Work				01
16	Others				

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*MSH*  
 DEPARTMENT OF INDUSTRIAL CHEMISTRY

N.G.COLLEGE, NALGONDA

*A. Anand*

**COMMISSIONERATE OF COLLEGIATE EDUCATION, A.P., HYDERABAD**

**BASIC CURRICULAR FORMAT UNDER MODULAR AND CBCS SYSTEM**

**COLLEGE: NAGARJUNA GOVT. COLLEGE, NALGONDA**

**COURSE: B.Sc.**

**SUBJECT: INDUSTRIAL CHEMISTRY**

**YEAR: 2014-15**

**Semester: I**

**NAME OF THE MODULE: Chemical Engineering - Unit Operations & Material Science**

**NATURE OF THE MODULE: CORE**

**MODE OF THE LEARNING: REGULAR**

MONTH & WEEK	No. of Hours	Topic	Curricular Activity	Co-Curricular Activity	Remarks
JUNE-III	4	Distillation, Absorption	Class-room teaching	Visit to library	
JUNE-IV	4	Evaporation, Filtration	Lecture method	Assignment	
JULY-I	4	Drying, Crystallisation	Demonstration	Visit to library	
JULY-II	4	Extraction, Mixing	Demonstration	Student seminar	
JULY-III	4	Iron Ores	Lecture method	Assignment	
JULY-IV	4	Copper Ores	Demonstration	Visit to library	
AUG-I	4	Zinc Ores	Lecture method	Assignment	
AUG-II	4	Alluminium & Lead Ores	Demonstration	Student seminar	
AUG-III	4	Cement	Class-room teaching	Assignment	
AUG-IV	4	Ceramics	Class-room teaching	Student seminar	
SEPT-I	4	Refractories	Demonstration	Visit to library	
SEPT-II	4	Glass	Lecture method	Quiz program	
SEPT-III	4	Corrosion passivity	Class-room teaching	Assignment	
SEPT-IV	4	Dry & Wet Corrosion	Demonstration	Quiz program	
OCT-I	4	Theories of Wet Corrosion	Class-room teaching	Visit to library	

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*W. N. S.*  
HEAD OF DEPT

*A. S. S.*

**COMMISSIONERATE OF COLLEGIATE EDUCATION, A.P, HYDERABAD**

**BASIC CURRICULAR FORMAT UNDER MODULAR AND CBCS SYSTEM**

**COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA**

**COURSE: B.Sc**

**SUBJECT: INDUSTRIAL CHEMISTRY**

**YEAR: 2014-15**

**Semester: II**

**NAME OF THE MODULE: Utilities in Chemical Industry & Fuel, Fertilizer Chemistry**

**NATURE OF THE MODULE: CORE**

**MODE OF THE LEARNING: REGULAR**

MONTH& WEEK	No.of Hours	Topic	Curricular Activity	Co-Curricular Activity	Remarks
NOV-II	4	Utilities in chemical industries	class-room teaching	Student seminar	
NOV-III	4	Water tube & Fire tube Boilers	Lecture method	Assignment	
NOV-IV	4	High Pressure Boilers	PPT	Visit to Library	
DEC-I	4	Steam Generators	Lecture method	Student seminar	
DEC-II	4	Flow measuring equipments	class-room teaching	Assignment	
DEC-III&IV	4	Flow measuring equipments	Demonstration	Visit to Library	
JAN-I&II	4	Heat transfer	Lecture method	Group Discussion	
JAN-III	4	Heat Exchangers	PPT	Student seminar	
JANIV	4	Hardness of water	class-room teaching	Visit to Library	
FEB-I	4	Removal of Temporary Hardness	Lecture method	Assignment	
FEB-II	4	Removal of Permanent Hardness	PPT	Group Discussion	



FEB-III	4	BOD & COD	class-room teaching	Student seminar	
FEB-IV	4	Fuels	Lecture method	Visit to Library	
MARCH-I	4	Fertilizers	Demonstration	Assignment	
MARCH-II	4	NPK Fertilizers	class-room teaching	Student seminar	

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# COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc

SUBJECT: INDUSTRIAL CHEMISTRY

YEAR: 2014-15

## Semester: I

NAME OF THE MODULE: Chemical Engineering - Unit Operations & Material Science

NATURE OF THE MODULE: CORE

MODE OF THE LEARNING: REGULAR

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### Unit -I

#### Unit Operations

15hrs

**Distillation:** introduction; Principle, construction, working of simple distillation.

**Evaporation:** introduction; equipment: Horizontal tube evaporator, short tube (vertical) evaporator, forced circulation evaporators, falling film evaporators, climbing film (upward flow) evaporators.

**Crystallization:** introduction, solubility, Crystallization theory: super saturation, nucleation crystal growth, Agitated Batch crystallizer.

**Filtration:** introduction; filter media and filter aids; Equipments: Principle, construction, working of rotary drum filter.

**Absorption:** introduction, equipments, packed columns

**Drying:** Introduction, free moisture, drying pounds moisture drying curve.

**Extraction:** Selection of solvents, equipments, packed column rotary disk column, mixer settler.

**Mixing:** introduction mixing of liquid, solid- solid systems.

### Unit -II

15hrs

#### Material Science

##### Metals & alloys

**Iron (Fe) :** Ores of Iron, occurrence of ores in India, effect of impurities on properties of iron, varieties of Iron, extraction of cost Iron from hematite Ore, Alloys of Iron and their uses.

**Copper(Cu):**Ores of copper, occurrence, extraction of copper from sulphid ore, Alloys of copper metal and their uses.

**Zinc(Zn):** ores of Zinc, Occurrence extraction of zinc from the principle ore, alloys of zinc and their uses.

**Aluminum (Al):** Ores of Aluminium and occurrence, Purification of the Bauxite ore, extraction of aluminium from bauxite alloys of aluminium and their uses.

**Lead (Pb):**Ores of Pb and Occurrence, extraction of Pb from the principal ores, uses of the metal, alloys of the metal and uses

### Unit –III

#### Cement - Ceramic- Refractories

15hrs

**Cement:** Types of Portland Cements, raw materials for the manufacture of cement, manufacture of Portland cement, dry and wet process, ISI specifications of cement.

**Ceramics:** introduction, raw materials for the manufacture of ceramics, classification of ceramic products based on reduction in porosity, white wear, manufacture of white wears.

**Refractories:** introduction, classification of refractories, manufacture o refractories, use of fire clay refractories, use of firebricks, such as silica bricks, magnetite bricks and chromate bricks.

**Glass:** Raw materials used in the manufacture of glass, manufacture of glass, chemical physical properties, of glass, characteristics of glass, shaping, amending, finishing of glass, special glasses, fibre glass, opal glass, borosilicate glass, high silica glass.

### Unit –IV

#### Corrosion passivity

15hrs

Definition of corrosion, various types of corrosion, direct chemical corrosion (dry corrosion), electro chemical corrosion (wet Corrosion), types of Direct chemical corrosion- oxidation corrosion, corrosion by other gases, liquid metal corrosion ,types of wet corrosion – General types-(Chemical corrosion ,under –water corrosion ,underground or soil corrosion )- theories of wet corrosion – (1) Acid theory (carbonate formation theory),(2)Peroxide theory, (3)Oxidation theory (4)Electrochemical theory, Mechanism of wet corrosion, prevention of corrosion a)purification of metals b) alloying c) electroplating.

#### Practical's:-

##### I. Simple Laboratory Techniques In Laboratory.

A).crystallization

b).Fractional Crystallization

c). Distillation

d). Elevation in boiling point


II.partition coefficient of benzoic acid


III. Partition coefficient of iodine between water and  $\text{CCl}_4$

IV. Surface tension of liquid

V. Determination of viscosity of oil

VI. Flash point of oil.

  
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**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**  
**(AUTONOMOUS)**  
**FACULTY OF SCIENCE**  
**B.Sc., I YEAR I SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-I**

**Time: 2 $\frac{1}{2}$  hours**

**Max. Marks.70 marks**

**Part-A**  
**(Very Short Questions)**

**Answer all the following questions**

**5x2=10M**

1. Define drying?
2. What are the raw materials used in manufacture of glass?
3. Write various types of Iron?
4. Define the ores & Alloys?
5. What is dry corrosion?

**Part-B**  
**(Short Questions)**

**Answer any four of the following questions**

**4x5=20M**

6. Define Evaporation? Write the classification of Evaporators.
7. Explain principle, construction and working process of Forced circulation Evaporator?
8. Write the ores of copper and zinc?
9. Write the Alloys of Aluminum and Lead?
10. Write the ISI specifications of Portland cement?
11. Briefly explain the types of wet corrosion?

**Part-C**  
**(Essay Type Questions)**

**Answer the following questions**

**10x4=40M**

12. (A) Explain principle construction and working process of simple Distillation.  
(B) Define crystallization? Explain Agitated batch crystallizer?  
(Or)  
(C) What are the differences between Horizontal and vertical tube Evaporators.  
(D) What is Filtration? Explain working process of Rotary drum filter.
13. (A) Describe methods of extracting cost iron from hematite.  
(B) Describe methods of extracting Zinc from Zinc blend.  
(Or)  
(C) Explain the Bayer's, Hall's, Serpeck's process of Aluminum extraction.  
(D) Describe methods of extracting Lead from principle Ore.
14. (A) What is cement? Explain its classification.  
(B) What are the Raw materials used in ceramics? Explain classification of ceramics.  
(Or)  
(C) How Portland cement can be manufactured from its raw materials?  
(D) Explain classification of Refractories.
15. (A) Define corrosion? Explain oxidation corrosion with mechanism.  
(B) Briefly explain Acid theory, Peroxide theory and Oxygen theory.  
(Or)  
(C) What is wet theory? Explain the Electro chemical theory with mechanism.  
(D) Write any three prevention methods of corrosion.

# COLLEGE: NAGARJUNA GOVT. COLLEGE, NALGONDA

COURSE; B.Sc

SUBJECT: INDUSTRIAL CHEMISTRY

YEAR: 2014-15

## Semester: II

NAME OF THE MODULE: Utilities in Chemical Industry & Fuel, Fertilizer Chemistry

NATURE OF THE MODULE: CORE

MODE OF THE LEARNING: REGULAR

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### Unit –I

Utilities in Chemical Industries

15hrs

#### Boilers –Steam

**Boilers:** Introduction; selection of boilers; classification of boilers, differences between water tube boilers and fire tube boilers, construction and working process of various boilers like short (fire) tube boiler, Cochran boiler, Cornish boiler, Lancashire boiler, Babcock and Wilcox boiler. **Pressure boilers:** Unique features and advantages of high pressure boilers Benson boiler, Lamont boiler, Vortex boiler, brief introduction about steam generators.

**Steam:** Generator and use, Air specifications for industrial use, processing of air fluid.

### Unit –II

Flow –Heat Transfer

15hrs

**Flow:** Principle, construction and working process of fans, blowers, compressors, vacuum pumps, Jet ejectors, reciprocating pumps and centrifugal pumps

**Heat Transfer:** Introduction, types of heat transfer.

**Heat Exchangers:** introduction, types of heat exchangers and shell and tube type heat exchangers

### Unit –III

Water Treatment

15hrs

**Water:** Hard water, temporary and permanent hardness of water, units of hardness of water, total solid content, removal of permanent hardness of water (Hot lime soda process, permutite process, ion – exchange method, Treatment of water for municipal purposes, chemical and physical methods of sterilization treatment of water used in boilers (phosphate treatment, treatment in complexing agents) water pollution biochemical oxygen demand and chemical oxygen demand.

## Unit -IV

### Fuels – Fertilizers

15hrs

**Fuels:** definition of fuels, classification of fuels solid, liquid gaseous fuels, calorific value of fuels and determination of calorific value, solid fuels, natural and artificial solid fuels, industrial solid fuels, proximate analysis of coal, liquid fuels, petroleum, characteristics of liquid fuel, distillation of crude petroleum, octane number, knocking and anti knocking, gaseous fuels, preparation and uses of producer gas, semi gas water, blue water gas, nature gas.

**Fertilizers:** Requirements of fertilizer, classification of fertilizers based n composition and origin, nitrogenous fertilizers, manufacture and uses of Ammonium nitrate, ammonium sulphate, manufacture of urea, raw material required, action of urea as fertilizer, phosphate fertilizers, manufacture of normal super phosphate and triple super phosphate, NPK fertilizers, and manufacture of NPK fertilizers.

#### Practical:-

To prepare and standerzation of HCl and NaOH

Determination of  $H_2SO_4$  and phosphonic acid in mixer

Determination of total hardness of water

Estimation of Halides

Analysis of dolomite

Analysis of lime stone

Analysis of cupronical

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**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**  
**(AUTONOMOUS)**  
**FACULTY OF SCIENCE**  
**B.Sc., I YEAR II SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-II**

**Time: 2½ hours**

**Max. Marks.70**

**marks**

**Part-A**

**(Very Short Questions)**

**Answer all the following questions**

**5x2=10M**

1. What are the advantages of High pressure boilers?
2. Write about steam generator.
3. Define the Hardness of water and write their units?
4. Define the Calorific value of Fuels?
5. Write the requirements of Fertilizer?

**Part-B**

**(Short Questions)**

**Answer any four of the following questions**

**4x5=20M**

6. Explain construction and working process of Babcock and Wilcox boilers?
7. What are the modes of Heat transfers? Explain Shell and Tube type Heat exchanger.
8. Explain the Physical Sterilization used in municipal purposes.
9. Briefly explain about BOD and COD.
10. Explain Liquid Fuels with examples?
11. Write the classification of Fertilizers?

**Part-C**

**(Essay Type Questions)**

**Answer the following questions**

**10x4=40M**

12. (A) Explain working process of Cochran boiler.  
(B) What are the differences between Water tube and Fire tube boilers?  
(Or)  
(C) Define Boiler? Write classification of Boilers.  
(D) Write an essay on Lancashire Boiler.
13. (A) Write an essay about Fans and Blowers.  
(B) Write working process of Reciprocating Pumps.  
(Or)  
(C) Draw the neat diagram of Shell and Tube type Heat exchangers.  
(D) Give short note about Centrifugal pump.
14. (A) What is Lime-Soda process? Explain the Hot Lime-Soda process.  
(B) Write any five chemical Sterilization methods used in municipal purposes.  
(Or)  
(C) Explain about purification hard water by Ion-exchange method ?  
(D) How do use Phosphate treatment method for water used in boilers?
15. (A) Write the preparation and uses of Producer Gas.  
(B) Briefly explain about knocking Anti knocking.  
(Or)  
(C) Explain the manufacturing process and properties of Urea.  
(D) Write the manufacturing of NPK fertilizers.

# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of INDUSTRIAL CHEMISTRY

## **B.Sc II Year 3<sup>rd</sup> Semester 3<sup>rd</sup> Paper**

**60hrs**

Unit -I

15hrs

Material Balance and Energy Balance

Dimension & Units

Material Balance without involving reaction

Unit -II

15hrs

Material Balance involving chemical reaction

Energy balance

Unit-III

15hrs

Unit processes in Chemical Manufacture.

Nitration

Halogenation

Sulphonation

Unit-IV

15hrs

Unit processes in Chemical Manufacture

Hydrogenation

Alkylation

Amination

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## Unit -IV

### Oxidation –Hydrogenation- Alkylation – Ammunition

15hrs

**Oxidation:** Introduction, Types of Oxidation reaction; oxidizing agents, kinetics and mechanism of oxidation, liquid phase oxidation-Manufacture of acetic acid, vapor phase –Oxidation –Commercial manufacture of Benzoic acid from Toluene.

**Hydrogenation :** Introduction kinetics of Hydrogenation, Catalysts for Hydrogenation reaction, Hydrogenation of vegetable Oil, manufacture of methanol from carbon monoxide and hydrogen, Hydrogenation of acids and ester to alcohols.

**Alkylation:** introduction, types alkylation, Alkylating agents, Kinetics and mechanism of alkylating reaction, manufacture of alkyl benzene.

**Amination :** introduction, methods of reduction, metal and acid catalytic, sulphide, Electrolytic, Metal and Alkali Sulphites, Manufacture of aniline, m-Nitroaniline and p- Aminophenol.

#### Practical's for III semester

**Nitration:-** preparation of meta di- nitro benzene

**Hydrolysis :-** preparation of para bromo aniline

preparation of par nitro aniline

**Oxidation :-** preparation of p nitro benzoic acid

preparation of benzyl.

**Reaction of dizonim salt**

preparation of di azo benzene.

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.  
(AUTONOMOUS)  
FACULTY OF SCIENCE  
B.Sc., II YEAR III SEMESTER EXAMINATION  
INDUSTRIAL CHEMISTRY PAPER-III

Time: 2½ hours

Max. Marks.40marks  
4x8=32M

SECTION-A

Answer all the following questions

- (A) What are the various Dimensions and their Unit by which a liquid mixture can be expressed?  
(or)  
(B) Discuss the Material balance operations involved in distillation along with block diagrams?
- (A) Explain steps involved in the Material balance calculations?  
(or)  
(B) What is Heat capacity? How is it determined for gaseous mixtures at constant Pressure?
- (A) Define the Nitration? Write mechanism of Nitrobenzene.  
(or)  
(B) What is Halogenation agent? Write the manufacturing process of Chloral
- (A) What is Hydrogenation? Explain the Hydrogenation process of Vegetable oil?  
(or)  
(B) Define the Amination and write the various types of Reduction methods?

SECTION-B

4x2=8M

Answer all the following questions

- (A) Define the Atomic weight, molecular weight?  
(or)  
(B) Show Bypass operation with an example.
- (A) Explain Material balance without recycle for distillation operation.  
(or)  
(B) Write a short note on Enthalpy change.
- (A) Write the kinetics of Sulphonation.  
(or)  
(B) Write the Nitration of paraffin hydrocarbon reaction?
- (A) Define the Oxidation? Write the important Oxidizing agents.  
(or)  
(B) Write the manufacturing reaction of Alkyl benzene.

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# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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Revised Syllabus for Department of INDUSTRIAL CHEMISTRY

**B.Sc II Year 4<sup>th</sup> Semester 4<sup>th</sup> Paper**

**60hrs**

## Unit – I

**15hrs**

Process instrumentation

Thermometers

## Unit II

**15hrs**

Pressure

Liquid level

Viscosity measurements

## Unit III

**15hrs**

Oils-Fats

Waxes

Soaps


## Unit – IV

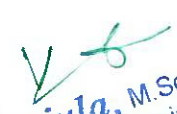
**15hrs**

Detergents

Pigments

Paints

  
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# **NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

Autonomous Re-accredited by NAAC with "A" Grade

Syllabus for Department of **INDUSTRIAL CHEMISTRY**

**B.Sc. II Year 4<sup>th</sup> Semester 4<sup>th</sup> Paper**

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## **Unit – I**

### **Process instrumentation – Thermometers**

**15hrs**

**Process instrumentation:** Static and dynamic characteristics of instruments. Concept of measurement elements of instruments principle, construction and working of the following measuring instruments.

**Thermometers (Temperature):** Bimetallic thermometers, pressure spring thermometers, liquid filled thermometers, gas filled thermometers, vapour actuated thermometer, resistance thermometers, pyrometers.

## **Unit II**

### **Pressure – Liquid level- Viscosity measurements**

**15hrs**

**Pressure:** Construction and functioning of Manometers, Bourdon Pressure gauge bellow type diaphragm type, pirani gauzes.

**Liquid Level:** Direct and indirect liquid level measurements, flat type liquid level gauzes, ultrasonic level gauzes and bubbler system.

**Viscosity Measurements:** Flow measurement, orifice meter, Rotameter

## **Unit III**

### **Oils-Fats-Waxes Soaps**

**15hrs**

**Oil-Fats:** Introduction, distinction between oils and fats properties, classification, vegetable oils, Manufacture of cotton seed oil by expression and solvent extraction method, refining of crude vegetables oil- animal fats and oils.

**Waxes :** Classification of waxes, common waxes determination of acid value saponification value, Iodine Value, Elaiden test, Hydrogenation of oils. Dry process and wet process.

**Soaps:** Introduction, Materials required for manufacture of soap , manufacture of A) Laundry Soap B) Toilet Soap C)Transparent soaps, Cleaning action soaps.

## Unit – IV

### Detergents –Pigments- Paints

15hrs

**Detergents:** Introduction, difference between Soaps and detergents principle groups of synthetic detergents reagents a) Anionic b) Cationic c) Non- Ionic detergents, Manufacture of alky hydrogen sulphate Alkyl benzene sulphonates cleaning action of detergent .

**Pigments:** Introduction, manufacture and uses of the following pigments a) White lead b) Zinc white c) Ultramarine blue d) Carbon black e) Lithophon f) Red Lead g) chrome green.

**Paints :** Introduction manufacture of paints, Varnishes –Raw materials, spirit varnishes, solvents and thinners paints and varnish industries in India.

#### PRACTICAL FOR IV SEMESTER;

##### I.Sulphonation

##### II.Preparation of sulphanic anilic acid


##### III.Reduction: preparation of met nitro aniline.

##### IV.Determination of acidity.

##### V.Determination of alkalinity.

##### VI.Analysis of brass.



  
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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.  
(AUTONOMOUS)  
FACULTY OF SCIENCE  
B.Sc., II YEAR IV SEMESTER EXAMINATION  
INDUSTRIAL CHEMISTRY PAPER-IV

Time: 2 $\frac{1}{2}$  hours

Max. Marks.40marks

SECTION-A

4x8=32M

Answer all the following questions

1. (A)What are the Static and Dynamic characteristics of instrument?  
(or)  
(B)Write a note on Pressure-Spring thermometers and its construction?
2. (A)Explain the construction and working of Manometer?  
(or)  
(B)What is Viscosity? How to measure the Viscosity by Orificemeter.
3. (A)What is Hydrogenation of oil? Explain the Dry process of hydrogenation of oil..  
(or)  
(B)Write the manufacturing of Soap by kettle process explain it.
4. (A)What is Detergent? Explain the cationic detergent.  
(or)  
(B)How White lead is manufactured and mentions its properties and uses.

SECTION-B

4x2=8M

Answer all the following questions

5. (A)Write principle of measurement Elements of instruments?  
(or)  
(B)Explain the construction and working of Resistance thermometer.
6. (A)How the construction of Pirani gauze?  
(or)  
(B)Write a note on Liquid-level measurement.
7. (A)Write the distinction between Oil and Fats?  
(or)  
(B)Write Classification and uses of Waxes?
8. (A)Write the manufacture diagram of Paint?  
(or)  
(B)Explain cleaning action of Detergent.

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# JNAGARJUNA GOVERNMENT COLLEGE, NALGONDA

Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of INDUSTRIAL CHEMISTRY

**B.Sc III Year 5<sup>th</sup> Semester 5<sup>th</sup> Paper**

**60hrs**

**Unit I**

**15hrs**

**Polymers**

**Basic polymerization**

**Unit -II**

**15hrs**

**Plastics – Manufacturing Process**

**Unit III**

**15hrs**

**Elastomers- Fibres**

**Unit IV**

**15hrs**

**Dyes – Manufacturing Methods**

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Syllabus for Department of INDUSTRIAL CHEMISTRY

***B.Sc. Final Year 5<sup>th</sup> Semester 5<sup>th</sup> Paper***

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## Unit I

### Polymers

15hrs

**Basic polymerization:** introduction, Classification of polymers, By source – Natural Polymers, synthetic polymers, By polymerization reaction- condensation polymerization or step growth polymerization, addition polymerization or chain growth polymerization, by composition – Homo polymers, co-Polymers, By skeletal structure (Linear, Cyclic, Branched, Dendrite, Network or cross linked), Types of polymerization reactions a) Addition polymerization – free radical addition polymerization, cationic addition polymerization, Anionic addition polymerization, b) condensation polymerization c) Co-Ordination Polymerization ( Ziegler – Natta Catalyst) Stereo Chemistry Polymers – Isotactic, Syndiotactic, Atactic polymers, Degree of polymerization, Determination of molecular weight of polymers by number average molecular weight, weight average molecular weight.

## Unit –II

### Plastics – Manufacturing Process

15hrs

**Plastic:** Introduction, Classification-Thermoset and thermoplastics properties and uses.

Manufacture of thermoplastic polymers-Manufacture of Poly ethylene (1.High pressure method or Low density poly ethylene 2.Low pressure method or High density poly ethylene), Properties and uses. Manufacture of Poly propylene, Manufacture of Poly Vinyl chloride.

Manufacture of thermosetting polymers- Manufacture Phenol Formaldehyde resins, Manufacture Urea formaldehyde resins.

## Unit III

### Elastomers- Fibres

15hrs

**Elastomers :** Natural and synthetic rubber, structure, Manufacture, Vulcanization of rubber, Buna Rubber, Buna S, Buna N, Neoprin Rubber

**Plastic:** Introduction, Classification-Thermoset and thermoplastics properties and uses.

**Fibres :** Introduction, Rayon or artificial silk , Cupra ammonium process, Acetate Rayon, Viscose Rayon, Distinction between artificial and natural silk, polyamides, Nylon -6, Nylon 66-Manufacture, Raw materials of Nylon -6 and Nylon -66, Teflon, Polyesters, PET & PBT.



## Unit IV

### Dyes – Manufacturing Methods

15hrs

**Dyes** : introduction, colors and constitution- Chromophores, Auxochromes, types of chromophores, types of auxochromes (Bathochromic group, Hypsochromic group) Classification of Dyes – according to their mode of application – acid dyes, Basic Dyes, Direct or substantive Dyes, Mordant or adjective Dyes, Vat dyes ingrain dyes or Developed dyes, Sulphur Dyes, Pigment Dyes, Spirit Soluble Dyes or Solvent, Food Dyes .Classification of dyes based on Chemical constitution- Nitroso dyes Nitro Dyes, Azo dyes, Structure and synthesis of methyl orange, Malachite green, Phenolphthalein ,Alizarin.

#### PRACTICALS:

#### Analysis of common raw material

##### I. Estimation of phenol

##### II. Estimation of Ketone

##### III. Determination of acid value

##### IV.Saponification of oil

##### V.Adulteration of Rhodamine B in Chili powder

##### VI. Adulteration of $PbCrO_4$ in turmeric

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B.Sc., III YEAR V SEMESTER EXAMINATION  
INDUSTRIAL CHEMISTRY PAPER-V

Time: 2 $\frac{1}{2}$  hours

Max. Marks. 40 marks

SECTION-A

4x8=32M

Answer all the following questions

1. (A) Define Polymerization? Explain types of Polymerization with examples.  
(or)  
(B) Explain the difference between the Weight average and Number average Molecular weight of Polymer.
2. (A) Write about Thermoset and Thermoplastics along with properties.  
(or)  
(B) Explain the manufacturing process of Phenol-Formaldehyde resin.
3. (A) What is difference between the Natural and Synthetic rubber along with applications?  
(or)  
(B) Explain the mechanism of Nylon-66 and briefly discuss the manufacture of Nylon-66?
4. (A) Define the Dyes? Write classification of Dyes according to their mode of application.  
(or)  
(B) Write the structure and synthesis of Methyl Orange.

SECTION-B


4x2=8M

Answer all the following questions

5. (A) Define the Isotactic, Syndiotactic and Atactic polymers.  
(or)  
(B) Briefly write the classification of Polymers.
6. (A) Write the manufacture reaction of Poly ethylene.  
(or)  
(B) Write the preparation reaction of Vinyl chloride from Acetylene, Ethylene.
7. (A) Define Vulcanization of Rubber?  
(or)  
(B) Write the synthetic reaction of Viscose rayon.
8. (A) Define the Chromophore and Auxochrome?  
(or)  
(B) Write the structure of Alizarin?



  
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Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of INDUSTRIAL CHEMISTRY

**B.Sc II) Year 5<sup>th</sup> Semester 6<sup>th</sup> Paper**

**60hrs**

## UNIT-I

**15hrs**

Historical background and development of Pharmaceutical Industry in India

Pharmaceutical industry in India

Pharmacopeias

## UNIT – II

**15hrs**

Formulation and Routes of Administration

Routes of Drug Administration

Pharmaceutical excipients

## Unit III

**15hrs**

Surgical Dressings Sutures, ligatures – Pharmaceutical packing

Wound and surgical dressings

Sutures and ligatures

## Unit-IV

**15hrs**

Vitamins

Vitamin A (A1-retinol)

Vitamin B1: (Thiamine)

Vitamin B2: (Riboflavin)

Vitamin B6: (Pyridoxine or adermine)

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Syllabus for Department of **INDUSTRIAL CHEMISTRY**

***B.Sc. Final Year 5<sup>th</sup> Semester 6<sup>th</sup> Paper***

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## **UNIT-I**

**Historical background and development of Pharmaceutical Industry in India 15hrs**

**Pharmaceutical industry in India** – Pharmaceutical Enquiry Committee, and the Hathi Committee, Specific Terms of reference of this committees, past performance, present performance – Bulk Drug production, Formulations production, Imports and Exports, Research and Developments Drug prices.

**Pharmacopoeias:** Introduction to various Pharmacopoeias History of Indian Pharmacopoeia, History of B.P. (British Pharmacopocia) and U.S.P. (United States Pharmacopoeia) History of International Pharmacopoeia, European Pharmacopoeia Role of Pharmacopoeia, Contents of Pharmacopoeia.

## **UNIT – II**

**Formulation and Routes of Administration**

**15hrs**

Introduction to various formulations, Needs for dosage Forms, Reasons for safe and convenient delivery of accurate dosage and dosage forms, some important criteria, Efficacy.

**Routes of Drug Administration:** introduction, Oral Route, Rectal Route, Parental Route – Subcutaneous injection, intramuscular injection, intravenous injections, Intra dermal injection, Epicutaneous Routes – Ocular, oral, and Nasal Routes, Other Routes.

**Pharmaceutical excipients:** Definition of excipients classification of excipients based on nature of the dosage, route of administration, possible level microbial contamination types of pharmaceutical excipients. Their non proprietary names BP, USPNF, Synonyms, Chemical name structural formula, functional category applications in pharmaceutical formulation, description, typical properties incompatibilities, methods of manufacture, safety, handling precautions, related substances, comments of binders, antioxidant, viscosity builders, coating agents, diluents, sweeteners (mannitol) preservatives, enul sifying agents, sweeteners (sorbitol) Lubricants glidant, flavorins agent (Vanillin), Colourius agents, Gelatin (Coating agent)

### Unit III

#### Surgical Dressings Sutures, ligatures – Pharmaceutical packing

15hrs

**Wound and surgical dressings:** introduction, would repair, features of an ideal dressing types of surgical dressing and their uses i) Fibres ii) Fabrics iii) Bandages, iv) Self-adhesive plasters v) compound dressings.

**Sutures and ligatures:** introduction, classification – absorbable non-absorbable pharmaceutical packaging – introduction, selection of packaging materials and characteristics of materials, packaging materials – glass, plastics thermoplastics, thermo sets, package evaluation.

### Unit-IV

#### Vitamins

15hrs

**Introduction,** nomenclature and classification, metabolic, physiological or biological function of vitamins.

**Vitamin A (A1-retinol)** occurrence, Isolation, diseases caused by its deficiency, physiological functions, structures.

**Vitamin B1: (Thiamine)** occurrence, isolation, diseases caused by its deficiency requirement, structure.

**Vitamin B2: (Ribotalavin)** Occurrence, isolation diseases caused by its deficiency, requirement, structure.

**Vitamin B6: (Pyridoxine or adermine)** occurrence, isolation, diseases caused by its deficiently, requirements, structure.

#### PRACTICALS:

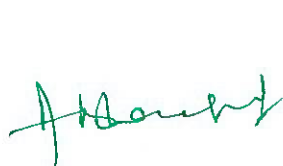
##### Analysis of common raw material


##### I. Estimation of Anilline


##### II. Estimation of benzoic acid

##### III. Determination of iodine value

##### IV. Adulteration of food stuffs. Adulteration of Vanaspathi in pure ghee



  
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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.  
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FACULTY OF SCIENCE  
B.Sc., III YEAR V SEMESTER EXAMINATION  
INDUSTRIAL CHEMISTRY PAPER-VI

Time: 2 $\frac{1}{2}$  hours

Max. Marks. 40 marks  
4x8=32M

SECTION-A

Answer all the following questions

- (A) Give a brief History of Pharmaceutical industry in India.  
(or)  
(B) What is Pharmacopoeia? What are the different Pharmacopoeias in the World?
- (A) What is a formation? What is the basis for the Formulation of a drug?  
(or)  
(B) What are the different types of Excipients in Pharmaceutical preparation and explain about any four in detail.
- (A) What are the important features of an Ideal dressing? Name the different types of Surgical dressing?  
(or)  
(B) Write the selection of Packing material and write the characteristics of materials?
- (A) Define Vitamins? Write classification of Vitamins.  
(or)  
(B) Explain the deficiency of diseases caused by vitamin B<sub>1</sub> and B<sub>2</sub>.

SECTION-B

4x2=8M

Answer all the following questions

- (A) Explain about developments of drug prices?  
(or)  
(B) Explain briefly about the role of Pharmacopoeia?
- (A) What is mean by Oral, Rectal, Parental routs?  
(or)  
(B) Write the chemical name and structural formula of Mannitol, Sorbitol?
- (A) Write a note on Fibers?  
(or)  
(B) What is Pharmaceutical packing?
- (A) What are the functions of Vitamin-A?  
(or)  
(B) Give the structure of Vitamin B<sub>6</sub> (pyridoxine)

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# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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Revised Syllabus for Department of INDUSTRIAL CHEMISTRY

## **B.Sc III Year 6<sup>th</sup> Semester 7<sup>th</sup> Paper**

**60hrs**

### Unit I

15hrs

#### Drugs & Manufacturing Process

Purification of raw material for the manufacturing of drugs

Sulpha drugs-Antipyretics and Analgesics

### Unit – II

15hrs

#### Process For the Manufacture of Drugs

Antibiotics- penicillin

Antimalarial drug- chloroquine

Antihistamine- chlorpheniramine maleate

Antimicrobes- chlorophenicol, furazolidien

Anti inflammatory drugs- Salicylic acid and its derivatives

Cardiovascular drugs- methyl dopa (L-dopa)

Barbiturates- phento barbital

### Unit III

15hrs

#### Physical Evaluation of Crude Drug

Evaluation of crude drugs

Chemical constitution of plant

### Unit-IV

15hrs

#### Pharmaceutical Quality Control –Fermentation

Pyrogenic Testing; Glass Testing; Densities of Powders

Products based on Fermentation process

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Syllabus for Department of INDUSTRIAL CHEMISTRY

## B.Sc. Final Year 6<sup>th</sup> Semester 7<sup>th</sup> Paper

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### Unit I

Drugs & Manufacturing Process

15hrs

**Introduction** – Drug diseases (definition) historical evaluation, source – plant, animal and synthetic biotechnology and human genetherapy.

**Classification** – classification based on structure and therapeutic activity with one example each.

**Purification of raw material for the manufacturing of drugs:** Effluent handling of the following bulk drugs – Sulpha drugs, sulphonamides (or) antibacterials, discovery of sulphanilamide synthesis and mechanism, important derivatives of sulphanilamide synthesis and mechanism of sulphapyridine, sulphathiazole, sulphadiazine, sulphaguanidine, mechanism of action of sulpha drugs, antipyretics and analgesics – Defination, structure, synthesis of aspirin, phenacetin (p-ethoxy acetanilide), melubrin and novalign, antimalarials – paludrine structure and synthesis.

### Unit - II

Process For the Manufacture of Drugs

15hrs

**Antibiotics** – Definition, discovery of penicillin, structure, types of penicillin, synthesis, production of penicillin i) surface culture method, ii) Bran method, iii) submerged cylture method, isolation, drug action of penicillin.

**Antimalarial drug** – Structure synthesis and therapeutic action of chloroquine.

**Antihistamine** – introduction, structure, synthesis & therapeutic action of chlorpheniramine maleate.

**Antimicrobes:** Defination, structure and synthesis therapeutic auction of chlorophenicol, furazolidien.

**Anti inflammatory drugs:** Salicylic acid and its derivatives structure, synthesis, uses of aspirin, salol, salsalate sodium salicylate, salicylamide, benorilate, choline salicy late, flufenisal.

\* **Metabolic precursor of dopamine** –  
**Cardiovascular drugs:** Structure, synthesis therapeutic action of <sup>Levo</sup> methyl dopa (L-dopa)

**Barbiturates:** Sedatives, hypnotics, drugs action of barbiturates, structure, synthesis of phento barbital.



### Unit III

#### Physical Evaluation of Crude Drug

15hrs

**Evaluation of crude drugs :** i) moisture content, ii) Extractive value iii) Volatile content iv) Foreign organic matter v) Microscopical evaluation vi) Starch vii) Leaf content (palisade ratio, stomatal number and stomatal index, vein – islet number and vein termination number viii) chromatographic techniques.

**Chemical constitution of plant:** Introduction – i) Carbohydrates (Monosaccharide, disaccharides, polysaccharide) ii) Proteins iii) Lipids iv) Waxes v) Volatile oils vi) Steroids vii) Saponin viii) Flavonoides ix) Tannins x) Glycosides xi) Alkaloids (Isolation of reserpine from vinca rosea (Catharanthus roseus)

### Unit-IV

#### Pharmaceutical Quality Control – Fermentation

15hrs

**Pyrogenic Testing :** Introduction, methods for pyrogen testing, Rabbit pyrogen test, apparatus and diluents, test animals temperature recording, test interpretation, interferences of the Rabbit pyrogen test.

**Glass Testing:** Introduction, USP & NF Glass classification powdered glass test, procedure, water attack at 121°C procedure.

**Densities of Powders:** Introduction, True density, Granule density Bulk density.

**Products based on Fermentation process:** Brief idea of micro organisms, their structure growth and usefulness of bacteria, algae, fungi, protozoa and viruses, factors affecting growth of bacteria – nutrition moisture, air, temperature, Ph, light, Osmotic pressure Enzyme systems, useful for transformation, microbial, products, general principle of fermentation processes and product processing.

**Biotransformation process – prednisolone hydroxylation in steroids enzyme catalyst transformation – Manufacture of ephedrine.**

#### PRACTICALS:

##### Synthesis of common industrial compounds

I. m-Nitro aniline from nitro benzene

II. 4-amino benzoic acid from 4-nitrotoluene

III. Preparation of soap

IV. Thin layer chromatography

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.  
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FACULTY OF SCIENCE  
B.Sc., III YEAR VI SEMESTER EXAMINATION  
INDUSTRIAL CHEMISTRY PAPER-VII

Time: 2½ hours

Max. Marks.40marks  
4x8=32M

SECTION-A

Answer all the following questions

- (A) Classify various types of drugs based on the structure & therapeutic activity with one example of each?  
(or)  
(B) Explain the mechanism & action Sulpha drug? Write the synthesis of Sulphanilamide.
- (A) What are antibiotics? Write the production of penicillin in Submerged Culture Method.  
(or)  
(B) What are Anti-malarial? Write the synthesis and therapeutic action of Chloroquin
- (A) How to evaluate Moisture content, Volatile content, Leaf content in crude drug? .  
(or)  
(B) Explain the following chemical constitution of plants? i) Carbohydrates ii) Protein iii) Fats.
- (A) Explain the Pyrogenic testing for quality control pharmaceutical industry?  
(or)  
(B) Give a brief account on structure and growth of Micro organism?

SECTION-B

4x2=8M

Answer all the following questions

- (A) Define the Antipyretics and Analgesics with example.  
(or)  
(B) Write the synthesis of Aspirin?
- (A) Write any four structure of Salicylic and derivatives?  
(or)  
(B) Write the structure of L-Dopa?
- (A) Give a note on Chromatography technique.  
(or)  
(B) Write a short note on Glucocytes?
- (A) Write short notes on powdered Glass test?  
(or)  
(B) Briefly explains biotransformation process?

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*W. S. Srinivas*  
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# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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Revised Syllabus for Department of INDUSTRIAL CHEMISTRY

**B.Sc II Year 6<sup>th</sup> Semester 8<sup>th</sup> Paper**

**60hrs**

**Unit-I**

**15hrs**

**FACTORS INVOLVED IN PROJECT COST ESTIMATION-DEPRECIATION**

**Unit-II**

**15hrs**

**ASPECTS OF MARKETING PROBABILITY CRITERIA**

**Unit-III**

**15hrs**

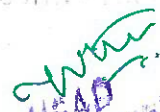
**CONCEPT OF SCIENTIFIC MANAGEMENT IN INDUSTRY – FUNCTIONS OF  
MANAGEMENT IN INDUSTRY**

**Unit – IV**

**15hrs**

**MANAGEMENT OF HUMAN RESOURCES**

  
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Syllabus for Department of INDUSTRIAL CHEMISTRY

**B.Sc. Final Year 6<sup>th</sup> Semester 8<sup>th</sup> Paper**

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## Unit-I,

### FACTORS INVOLVED IN PROJECT COST ESTIMATION-DEPRECIATION

15hrs

Factors involved in project cost estimate a methods employed for the estimate of capital investment, capital formation, elements of cost accounting, types of costs, time value of money, equivalence. Depreciation, methods employed – capital formation depreciation.

## Unit-II

### ASPECTS OF MARKETING PROBABILITY CRITERIA

15hrs

Some aspects of marketing, Pricing policy, probability criteria – Economics of selecting alternatives – Target marketing, market mix, advertising, sales promotion, customer relationship management.

## Unit-III

### CONCEPT OF SCIENTIFIC MANAGEMENT IN INDUSTRY – FUNCTIONS OF MANAGEMENT IN INDUSTRY

15hrs

Functions of Management, decision making, planning organizing, directing, controlling, Scientific Management Theory, perception, process of perception.

## Unit – IV

### MANAGEMENT OF HUMAN RESOURCES

15hrs

Selection, Recruitment, Principles of HRM, Training and Development, Techniques of Training, Motivation Theory, Material Management, location of industry, Incentives Welfare & Safety.

*Asachy*

*V e*  
**K. Manjula, M.Sc., B.Ed.**  
Lecturer in Chemistry,  
Govt. Degree College for Women,  
NALGONDA.

*Yohan*  
**HEAD**  
Dept. of Chemistry  
Mahatma Gandhi University  
NALGONDA - 508254.


**PRACTICALS:**


**Synthesis of common industrial compounds**

**I.4-bromo aniline from acetanilide**

**II.Preparation of phenol formaldehyde resin**

**III.Preparation of nylon-66**

  
**K. Manjula, M.Sc., B.Ed.**  
Lecturer in Chemistry,  
Govt. Degree College for Women,  
NALGONDA.

  
**HEAD**  
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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.  
(AUTONOMOUS)  
FACULTY OF SCIENCE  
B.Sc., III YEAR VI SEMESTER EXAMINATION  
INDUSTRIAL CHEMISTRY PAPER-VIII

Time: 2 1/2 hours

Max. Marks.40marks  
4x8=32M

SECTION-A

Answer all the following questions

1. (A) Explain the factors that are very important to prepare Project cost estimation?  
(or)  
(B) Explain methods employed for the estimation of Capital investment?
2. (A) Write a note on Merign safety?  
(or)  
(B) Define the Break-Even-Point? How to calculate Break-Even-Point by using graphical method?
3. (A) Describe the salient features of Material Management with respect to any chemical industry?  
(or)  
(B) Write a note on concepts of Scientific Management in industry?
4. (A) Write a note on Management of Human Resource?  
(or)  
(B) Explain the terms Motivation theory, Material management location of industry?

SECTION-B

Answer all the following questions

4x2=8M

5. (A) Explain about Capital formation?  
(or)  
(B) Briefly explain Depreciation?
6. (A) What are the uses of customer Relationship Management?  
(or)  
(B) Define the Probability Criteria.
7. (A) Describe the terms i) Planning ii) Organizing iii) Directing  
(or)  
(B) Briefly explain the Functions of Management?
8. (A). Explain briefly Welfare & Safety?  
(or)  
(B). What is the Methods used in Industry and Developed?

*Assent*

*K. Manjula*  
K. Manjula, M.Sc., B.Ed.  
Lecturer in Chemistry,  
Govt. Degree College for Women,  
NALGONDA.

*W. K. R.*  
HEAD  
Dept. of Chemistry  
Mahatma Gandhi University  
NALGONDA - 508254.

## NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

Autonomous Re-accredited by NAAC with "A" Grade

PANEL OF EXAMINERS FOR THE YEAR ~~2013~~-2014-15

### DEPARTMENT: INDUSTRIAL CHEMISTRY

S.NO	SEMESTER	PAPER	NAME DESIGNATION, WORKING ADDRESS/MOBIL NO /E-MAIL ID	RESIDENTIAL ADDRESS	REMARK
1	Sem-I	I	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda Mobile No:9396623040	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
			2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering. Mobile No:7306774557	M G U Nalgonda	
2	Sem-II	II	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda Mobile No:939662304	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
			2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering Mobile No:7306774557	M G U Nalgonda	
3	Sem-III	III	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda Mobile No:9396623040	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
			2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering Mobile No:7306774557	M G U Nalgonda	
4	Sem-IV	IV	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda Mobile No:9396623040	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
			2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering Mobile No:7306774557	M G U Nalgonda	

5	Sem-V	V	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda. Mobile No:9396623040	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
			2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering Mobile No:7306774557	M G U Nalgonda	
		VI	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda. Mobile No:9396623040	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
			2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering Mobile No:7306774557	M G U Nalgonda	
6	Sem-VI	VII	1. Sri.P.Venkatnarsaiah, Lect in Chemistry (Rtd) Principal at Kakatiya PG College Nalgonda. Mobile No:9396623040	6-3-558/1 Opp:Yadavasangam Gandhi nagar Nalgonda	
		VIII	2. Smt. V. Anuradha, Asst.Professor, MBA, Dept of Management, MGU, Nalgonda, B.Tech. Chemical Engineering Mobile No:7306774557	M G U Nalgonda	

### HEAD OF THE DEPARTMENT

*Handwritten signature in green ink.*

*K. M. V. Kula*, M.Sc., B.Ed.  
Lecturer in Chemistry,  
Govt. Degree College for Women,  
NALGONDA.

*Handwritten signature in green ink.*  
HEAD  
Dept. of Chemistry  
Mahatma Gandhi University  
NALGONDA-508254.



NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS) NALGONDA.  
TENTATIVE SCHEME OF EVALUATION

COURSE: B.Sc.,  
Semester: I

SUBJECT: Ind.Chemistry  
Module: Chemical Engg.Unit Operations &  
Material Science

Max. Marks: 70

Time:2:30 Hours

PART – A  
(Very Short Questions)

Answer all the questions

5 X 2 = 10

- 1.
- 2.
- 3.
- 4.
- 5.

PART – B  
(Short Questions)

Answer any four of the following  
(At least one question from each unit)

4 X 5 = 20

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

PART – C  
(Essay Type Questions)

Answer the following questions  
(Unit wise)

4 X 10 = 40

12. A)  
B)

(OR)

- C)  
D)

13. A)  
B)

(OR)

- C)  
D)

14. A)  
B)

(OR)

- C)  
D)

15. A)  
B)

(OR)

- C)  
D)

Internal Assessment - 30

Internal Periodical Tests – 20 ( Best of Two)

Co-Curricular Activities – 10

(Assignment - 5 , Seminar – 5 )

*[Handwritten Signature]*

*[Handwritten Signature]*  
HEAD  
Dept. of Chemistry  
Mahatma Gandhi University  
NALGONDA - 508 254.

*[Handwritten Signature]*  
Manjula, M.Sc., B.Ed.  
Lecturer in Chemistry,  
Govt. Degree College for Women  
NALGONDA.

**NAGARJUNA GOVT.COLLEGE, NALGONDA**  
**(AUTONOMOUS)**

**DEPARTMENT OF INDUSTRIAL CHEMISTRY**  
**CONSTITUTED OF BOARD OF STUDIES: 2015-2016**

<b>SNO</b>	<b>CATEGORY</b>	<b>NAME &amp; DESIGNATION</b>	<b>CONTACT NOS</b>
1	Chairman Board of studies	Dr.K.Venkata Krishna Asst.Prof.in Chemistry	9441993436
2	University Nominee	Dr.R.Roopa, Asst.prof. M.G.University, Nalgonda.	9849216947
3	Subject expert from outside the college	Dr.A.BhanuPrasad,Principal.GDC, Ramanapet, Nalgonda.	9848385850
4	Subject expert from outside the college	Smt.K.Manjula Asst.Prof. in Chemistry GDC(w),NLG.	8143462182
5	Members: All The Faculty members of the Dept.	1. K.Kishore Kumar, (Guest faculty). 2. V.Swamy, (Guest faculty).	9642284865 9666920711
6	One representative from Industry/Corporate sector/Allied areas	Sri.K.Ravi Shastri Manager Operational Executive RA Chem Phrama Ltd.	9985185274

Submitted by

In-Charge /Chairman BOS

Proposals approved Principal/  
Chairman academic council

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**  
**(AUTONOMOUS)**  
**FACULTY OF SCIENCE**  
**B.Sc., I YEAR I SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-I**

**Time: 2 $\frac{1}{2}$  hours**

**Max. Marks.40marks**  
**4x8=32M**

**SECTION-A**

**Answer all the following questions**

1. (A) Describe the function of any two types of evaporators.  
(or)  
(B) Write about equipment tank crystallizer and agitated crystallizer.
2. (A) Describe method on extracting cast iron from hematite.  
(or)  
(B) Write a detailed account of extraction of aluminum from bauxite ore?
3. (A) How Portland cement can be manufactured from its raw materials?  
(or)  
(B) Discuss about (i) Borosilicate glass (ii) Opal glass.
4. (A) Define the Corrosion and write the various types of Dry corrosion.  
(or)  
(B) Explain various methods of Preventing Corrosion.

**SECTION-B**

**4x2=8M**

**Answer all the following questions**

5. (A) Draw the diagram of simple Distillation.  
(or)  
(B) Describe rotator Dryer and Flash dryer.
6. (A) Define the ore write the Ores of Copper?  
(or)  
(B) Define Alloys write any three alloys of Lead?
7. (A) What are ISI specifications of Cement?  
(or)  
(B) What are Ceramics and Refractories?
8. (A) What are the differences in Dry corrosion and Wet corrosion?  
(or)  
(B) Briefly write a note on Corrosion by the other gases?

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.**  
**(AUTONOMOUS)**  
**FACULTY OF SCIENCE**  
**B.Sc., I YEAR II SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-II**

Time: 2½ hours

Max. Marks.40marks  
4x8=32M

**SECTION-A**

Answer all the following questions

1. (A) How many types of Boilers are used in industrial and write uses of Boilers?  
(or)  
(B) Define the Steam? And write the processing of Air fluid flow?
2. (A) Explain the construction working of Ejector pump?  
(or)  
(B) What are the Heat transfers? How many modes of heat transfers are there, briefly explain?
3. (A) Explain the Ion-exchange method to remove the hardness of water?  
(or)  
(B) Explain the Phosphate treatment for sterilization of water?
4. (A) Write the manufacturing process of Urea? Explain action of Urea as a fertilizer?  
(or)  
(B) Explain the classification of Fertilizer based on the Composition and Origin?

**SECTION-B**

4x2=8M

Answer all the following questions

5. (A) What are the External and Internal treatments of water?  
(or)  
(B) Mention the uses of Steam?
6. (A) What is Vacuum pump and mention its utilities?  
(or)  
(B) Write brief note on Heat exchangers?
7. (A) Define Hardness of water? Write the units of hardness?  
(or)  
(B) Define the BOD and COD?
8. (A) Write a short note on Knocking and Anti-knocking?  
(or)  
(B) What is NPK fertilizer? Explain.

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.**  
**(AUTONOMOUS)**  
**FACULTY OF SCIENCE**  
**B.Sc., II YEAR III SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-III**

**Time: 2½ hours**

**Max. Marks.40marks**  
**4x8=32M**

**SECTION-A**

**Answer all the following questions**

1. (A) What are the various Dimensions and their Unit by which a liquid mixture can be expressed?  
(or)  
(B) Discuss the Material balance operations involved in distillation along with block diagrams?
2. (A) Explain steps involved in the Material balance calculations?  
(or)  
(B) What is Heat capacity? How is it determined for gaseous mixtures at constant Pressure?
3. (A) Define the Nitration? Write mechanism of Nitrobenzene.  
(or)  
(B) What is Halogenation agent? Write the manufacturing process of Chloral
4. (A) What is Hydrogenation? Explain the Hydrogenation process of Vegetable oil?  
(or)  
(B) Define the Amination and write the various types of Reduction methods?

**SECTION-B**

**4x2=8M**

**Answer all the following questions**

5. (A) Define the Atomic weight, molecular weight?  
(or)  
(B) Show Bypass operation with an example.
6. (A) Explain Material balance without recycle for distillation operation.  
(or)  
(B) Write a short note on Enthalpy change.
7. (A) Write the kinetics of Sulphonation.  
(or)  
(B) Write the Nitration of paraffin hydrocarbon reaction?
8. (A) Define the Oxidation? Write the important Oxidizing agents.  
(or)  
(B) Write the manufacturing reaction of Alkyl benzene.

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.**  
**(AUTONOMOUS)**  
**FACULTY OF SCIENCE**  
**B.Sc., II YEAR IV SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-IV**

Time: 2½ hours

Max. Marks.40marks  
4x8=32M

**SECTION-A**

**Answer all the following questions**

1. (A)What are the Static and Dynamic characteristics of instrument?  
(or)  
(B)Write a note on Pressure-Spring thermometers and its construction?
2. (A)Explain the construction and working of Manometer?  
(or)  
(B)What is Viscosity? How to measure the Viscosity by Orificemeter.
3. (A)What is Hydrogenation of oil? Explain the Dry process of hydrogenation of oil..  
(or)  
(B)Write the manufacturing of Soap by kettle process explain it.
4. (A)What is Detergent? Explain the cationic detergent.  
(or)  
(B)How White lead is manufactured and mentions its properties and uses.

**SECTION-B**

4x2=8M

**Answer all the following questions**

5. (A)Write principle of measurement Elements of instruments?  
(or)  
(B)Explain the construction and working of Resistance thermometer.
6. (A)How the construction of Pirani gauze?  
(or)  
(B)Write a note on Liquid-level measurement.
7. (A)Write the distinction between Oil and Fats?  
(or)  
(B)Write Classification and uses of Waxes?
8. (A)Write the manufacture diagram of Paint?  
(or)  
(B)Explain cleaning action of Detergent.

### Unit III

#### Physical Evaluation of Crude Drug

15hrs

**Evaluation of crude drugs :** i) moisture content, ii) Extractive value iii) Volatile content iv) Foreign organic matter v) Micro scopical evaluation vi) Starch vii) Leaf content (palisade ratio, stomatal number and stomatal index, vein – islet number and vein termination number viii) chromatographic techniques.

**Chemical constitution of plant:** Introduction – i)Carbohydrates (Monosaccharide, disaccharides, polysaccharide) ii)Proteins iii)Lipids iv)Waxes v)Volatileoils vi)Steroids vii)Saponis viii)Flavanoides ix) Tannins x) Glycosides xi) Alkaloids (Isolation of rescripine from vinca rosea (Catharanthus roseus)

### Unit-IV

#### Pharmaceutical Quality Control –Fermentation

15hrs

**Pyrogenic Testing:** Introduction, methods for pyrogen testing, Rabbit pyrogen test, apparatus and diluents, test animal's temperature recording, test interpretation, interferences of the Rabbit pyrogen test.

**Glass Testing:** Introduction, USP & NF Glass classification powdered glass test, procedure, water attack at 121<sup>0</sup>C procedure.

**Densities of Powders:** Introduction, True density, Granule density Bulk density.

**Products based on Fermentation process:** Brief idea of micro organisms, their structure growth and usefulness of bacteria, algae, fungi, protozoa and viruses, factors affecting growth of bacteria – nutrition moisture, air, temperature, Ph, light, Osmotic pressure Enzyme systems, useful for transformation, microbial, products, general principle of fermentation processes and product processing. Biotransformation process – prednisolone hydroxylation in steroids enzyme catalyst transformation – Manufacture of ephedrine.

#### PRACTICALS:

**Synthesis of common industrial compounds**

**I.m-Nitro aniline from nitro benzene**

**II.4-amino benzoic acid from 4-nitrotoluene**

III. Preparation of soap

IV. Thin layer chromatography

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of **INDUSTRIAL CHEMISTRY**

**B.Sc II Year 6<sup>th</sup> Semester 8<sup>th</sup> Paper**

**60hrs**

**Unit-I**

**15hrs**

**FACTORS INVOLVED IN PROJECT COST ESTIMATION-DEPRECIATION**

**Unit-II**

**15hrs**

**ASPECTS OF MARKETING PROBABILITY CRITERIA**

**Unit-III**

**15hrs**

**CONCEPT OF SCIENTIFIC MANAGEMENT IN INDUSTRY – FUNCTIONS OF  
MANAGEMENT IN INDUSTRY**

**Unit – IV**

**15hrs**

**MANAGEMENT OF HUMAN RESOURCES**



# **NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

Autonomous Re-accredited by NAAC with "A" Grade

Syllabus for Department of **INDUSTRIAL CHEMISTRY**

**B.Sc. Final Year 6<sup>th</sup> Semester 8<sup>th</sup> Paper**

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## **Unit-I**

### **FACTORS INVOLVED IN PROJECT COST ESTIMATION-DEPRECIATION 15hrs**

Factors involved in project cost estimate a methods employed for the estimate of capital investment, capital formation, elements of cost accounting, types of costs, time value of money, equivalence. Depreciation, methods employed – capital formation depreciation.

## **Unit-II**

### **ASPECTS OF MARKETING PROBABILITY CRITERIA 15hrs**

Some aspects of marketing, Pricing policy, probability criteria – Economics of selecting alternatives – Target marketing, market mix, advertising, sales promotion, customer relationship management.

## **Unit-III**

### **CONCEPT OF SCIENTIFIC MANAGEMENT IN INDUSTRY – FUNCTIONS OF MANAGEMENT IN INDUSTRY 15hrs**

Functions of Management, decision making, planning organizing, directing, controlling, Scientific Management Theory, perception, process of perception.

## **Unit – IV**

### **MANAGEMENT OF HUMAN RESOURCES 15hrs**

Selection, Recruitment, Principles of HRM, Training and Development, Techniques of Training, Motivation Theory, Material Management, location of industry, Incentives Welfare & Safety.

**PRACTICALS: Synthesis of common industrial compounds**

**1.4-bromo aniline from acetanilide**

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**  
**(AUTONOMOUS)**

NO: /BOS/Ind chem/acad/2015-16

DATE : 29.09.2015

TO  
THE PRINCIPAL,  
N.G.COLLEGE,  
NALGONDA.

**SUB:- Nagarjuna Govt. college, Nalgonda(Autonomous)-convening the meeting of Board of studies Industrial chemistry on 30.09.2015 Intimation-Request-Reg.**

Sir,

I am happy to inform that you have been nominated as a Member of Board of Studies in the Department of Industrial chemistry of this college for the year 2015-16.

The meeting of the Board of studies in Industrial chemistry will be held on 30.09.2015 in the Dept of Industrial chemistry to consider the following agenda.

1. To approve the syllabus and model question papers for I, II, III, IV, V & VI semesters.
2. To approve the Introduction of internal assessment.
3. To approve the list of examinations for paper setting and evaluation.
4. Any other matter with permission of the chair.
5. You are requested to make it convenient to attend the meeting and extend your cooperation.

Principal

Copy to.

1. The chairman Board of studies  
In Ind.chemistry

Dr.K.Venkata Krishna  
In-Charge Dept.Ind.chemistry  
N.G.college, Nalgonda

2. Honorable member & university  
Chairman BOS in Ind.chemistry

Dr.Dr.R.Roopa,Asst.Prof,Nominee  
M.G.University, Nalgonda.