

**NAGARJUNA GOVERNMENT COLLEGE,**

**NALGONDA**

**Autonomous**

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

**BOARD OF STUDIES MEETING 2015-16**

**DEPARTMENT OF INDUSTRIAL CHEMISTRY**

**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.


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

  
PRINCIPAL  
Govt. Degree College  
RAMANNAPET  
Dist. Nalgonda

  
Principal  
Principaha Govt. College  
(Autonomous) NALGONDA.

  
Dr. R. ROOPA  
Asst. Professor, Dept. of Chemistry  
MAHATMA GANDHI UNIVERSITY  
NALGONDA-508254. A.P. INDIA.

# **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 Dr.K.Venkata Krishna on 30.09.2015 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,II year students (I, II, III & IV Semesters) for the academic year 2015-16.
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 2015-16.
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,II year students (I, II, III & IV Semesters) for the academic year 2015-16.
4. To consider and approve the Continuation of 80:20 pattern for External and Internal assignments for B.Sc III year (V & VI semesters) for the academic year 2015-16. 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 2015-16.
7. To consider and approve the list examinations for paper setting and evaluation for the academic year 2015-16.

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 & II year (I, II, III & IV semesters) Students for the academic year 2015-16.
2. The modules and allotted Credits is approved for B.Sc I & II year (I, II, III & IV semesters) Students for the academic year 2015-16.
3. Unitization of Syllabus in to 4 Units for each paper (module)
4. The evaluation of the students for each Semester of I, II, III & IV 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.


<b>Section – A (very short questions)</b>	<b>5 X 2 = 10</b>
Answer all the questions- 5 questions - 2 marks each	
<b>Section – B (short questions)</b>	<b>4 X 5 = 20</b>
Answer any four – six questions given – 5 marks each	
<b>Section – C (essay type questions) unit wise</b>	<b>4 X 10 =40</b>
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 III year (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.

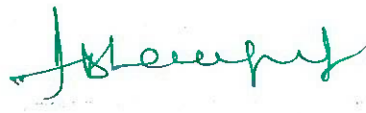
6. Approved The syllabus for I, II, III, IV, V, VI, VII & VIII papers and model Question Papers.
7. Approved to assign the project work for B.Sc Final year Students by giving grades.
8. Approved to conduct the Practical examination at the end of II, IV and VI Semesters.  
Each paper consists 50 marks. 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 2015-16.

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

  
**K. Manjula**, M.Sc., B.Ed.  
Assistant Professor  
Department of Chemistry  
Govt. Degree College for Women  
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Dr. R. KDUPA  
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**NAGARJUNA GOVT.COLLEGE, NALGONDA**  
**(AUTONOMOUS)**

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

SNO	CATEGORY	NAME & DESIGNATION	CONTACT NOS
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.	9441780972
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



**PRINCIPAL**  
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Proposals approved Principal/

Chairman academic council

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NALGONDA.

**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	CRED ITS
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	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	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				

DEPARTMENT OF INDUSTRIAL CHEMISTRY  
N.G.COLLEGE, NALGONDA

COMMISSIONERATE OF COLLEGIATE EDUCATION, T.S, HYDERABAD

BASIC CURRICULAR FORMAT UNDER MODULAR AND CBCS SYSTEM

COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc

SUBJECT: INDUSTRIAL CHEMISTRY

YEAR: 2015-16

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	

HEAD OF DEPT



**COMMISSIONERATE OF COLLEGIATE EDUCATION, T.S, HYDERABAD****BASIC CURRICULAR FORMAT UNDER MODULAR AND CBCS SYSTEM**

COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc

SUBJECT: INDUSTRIAL CHEMISTRY

YEAR: 2015-16

Semester: II

NAME OF THE MODULE: Utilities in Chemical Industry &amp; 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 tubeBoilers	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 meassuring equipments	class-room teaching	Assignment	
DEC-III&IV	4	Flow meassuring 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	



HEAD OF DEPT

COMMISSIONERATE OF COLLEGIATE EDUCATION, T.S, HYDERABAD

BASIC CURRICULAR FORMAT UNDER MODULAR AND CBCS SYSTEM

COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc

SUBJECT: INDUSTRIAL CHEMISTRY

YEAR: 2014-15

Semester: III

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	Dimensions & Units	Class-room teaching	Visit to library	
JUNE-IV	4	Dimensions & Units	Lecture method	Assignment	
JULY-I	4	Material Balance I	Demonstration	Visit to library	
JULY-II	4	Material Balance II	Demonstration	Student seminar	
JULY-III	4	Material Balance III	Lecture method	Assignment	
JULY-IV	4	Material Balance IV	Demonstration	Visit to library	
AUG-I	4	Energy Balance I	Lecture method	Assignment	
AUG-II	4	Energy Balance II	Demonstration	Student seminar	
AUG-III	4	Nitration	Class-room teaching	Assignment	
AUG-IV	4	Halogenation	Class-room teaching	Student seminar	
SEPT-I	4	Sulphonation	Demonstration	Visit to library	
SEPT-II	4	Oxidation	Lecture method	Quiz program	
SEPT-III	4	Hydrogenation	Class-room teaching	Assignment	
SEPT-IV	4	Alkylation	Demonstration	Quiz program	
OCT-I	4	Amination by Reduction	Class-room teaching	Visit to library	

HEAD OF DEPT

**COMMISSIONERATE OF COLLEGIATE EDUCATION, T.S, HYDERABAD****BASIC CURRICULAR FORMAT UNDER MODULAR AND CBCS SYSTEM****COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA****COURSE; B.Sc****SUBJECT: INDUSTRIAL CHEMISTRY****YEAR: 2014-15****Semester: IV****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	Process instrumentation	Class-room teaching	Student seminar	
NOV-III	4	Concept of Measurement	Lecture method	Assignment	
NOV-IV	4	Thermometers	PPT	Visit to Library	
DEC-I	4	Thermometers	Lecture method	Student seminar	
DEC-II	4	Pressure	Class-room teaching	Assignment	
DEC-III&IV	4	Liquid Level	Demonstration	Visit to Library	
JAN-I&II	4	Viscosity Measurement	Lecture method	Group Discussion	
JAN-III	4	Oils and Fats	PPT	Student seminar	
JANIV	4	Oils and Fats	Class-room teaching	Visit to Library	
FEB-I	4	Waxes	Lecture method	Assignment	
FEB-II	4	Soap, Manufacture	PPT	Group Discussion	
FEB-III	4	Detergents	Class-room teaching	Student seminar	
FEB-IV	4	Detergents	Lecture method	Visit to Library	
MARCH-I	4	Pigments	Demonstration	Assignment	
MARCH-II	4	Paints	Class-room teaching	Student seminar	

  
HEAD OF DEPT

# **NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of **INDUSTRIAL CHEMISTRY**

## **B.Sc I Year 1<sup>st</sup> Semester 1<sup>st</sup> Paper**

**60hrs**

### **Unit –I**

**15hrs**

**Unit Operations**

**Distillation**

**Absorption**

**Evaporation**

**Filtration**

**Drying**

**Crystallization**

**Extraction**

**Mixing**

### **Unit –II**

**15hrs**

**Material Science**

**Metals & alloys**

**Iron (Fe), Copper(Cu), Zinc(Zn), Aluminum (Al), Lead (Pb).**

### **Unit –III**

**15 hrs**

**Cement - Ceramic- Refractories-Glass**

### **Unit –IV**

**15 hrs**

**Corrosion passivity**

# COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc      SUBJECT: INDUSTRIAL CHEMISTRY      YEAR: 2015-16

## 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.

*Brief idea about Absorption, Drying, Extraction, mixing.*

### 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 cast 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

*varities*

### 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 of 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.

VII. % composition Determination by Refractometer.

*A. Sampath*  
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*K. Manjula*  
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*R. Roopa*  
Dr. R. ROOPA  
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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**

**4x10=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, Serpèck'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.

  
**K. Manjula, M.Sc., B.Ed.**  
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# **NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of **INDUSTRIAL CHEMISTRY**

## **B.Sc I Year 1<sup>st</sup> Semester 2<sup>nd</sup> Paper**

**60hrs**

### **Unit -I**

**15hrs**

**Utilities in Chemical industries**

**Boilers -Steam**

### **Unit -II**

**15hrs**

**Flow -Heat Transfer**

### **Unit -III**

**15hrs**

**Water Treatment**

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### **Unit -IV**

**15hrs**

**Fuels - Fertilizers**



# COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc      SUBJECT: INDUSTRIAL CHEMISTRY      YEAR: 2015-16

## 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 tubeboilers 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, Volex 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, permute 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.

(BOD)

COD

## 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 on 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 standardization 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: 2 $\frac{1}{2}$  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

4x10=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.

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# **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**

# COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc      SUBJECT: INDUSTRIAL CHEMISTRY      YEAR: 2014-15

## Semester: III

NAME OF THE MODULE: Material Balance and Energy Balance & Unit processes in Chemical Manufacture

NATURE OF THE MODULE: CORE

MODE OF THE LEARNING: REGULAR

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### Unit -I

#### Material Balance and Energy Balance 15hrs

**Dimension & Units:** Basic chemical calculations- Atomic weight, Molecular weight, equivalent weight, mole, composition of 1) Liquid Mixture 2) Gaseous Mixture.

**Material Balance without involving reaction:** Steps involved in material calculation without involving Chemical reaction; Flow diagram for material balance, simple material balance with or without recycle or by pass for chemical engineering operations such as distillation, absorption, crystallization etc., *drying, mixing, evaporation, extraction, etc.*

### Unit -II 15hrs

**Material Balance involving chemical reaction:** Steps involved in material calculation with involving Chemical reaction; Concept of limiting reactant conversion, yield liquid phase reaction, gas phase reaction with or without recycle or bypass.

**Energy balance:** Heat capacity of pure gases and gaseous mixture at constant pressure, Derive  $C_p - C_v = R$ , Concept of enthalpy, enthalpy changes,

### Unit-III 15hrs

#### Unit processes in Chemical Manufacture.

**1-Nitration:** Introduction, Nitrating agents, kinetics and mechanism of nitration- Nitration of paraffin hydrocarbons, Benzene to nitrobenzene, m-dinitrobenzene, chlorobenzene to ortho and para-nitrochlorobenzene.

**2- Halogenations:** Introduction reagents of halogenations, kinetics of Halogenation reactions, Halogenation of aromatic side chain nuclear halogenations, commercial manufacture of chlorobenzene, chloral, mono chloroacetic acid, dichlorodifluoromethane.

3. **Suphonation:** Introduction, suphonating agents, kinetics and mechanism of suphonation (B.S.)  
Commercial sulfonation of benzene, alkyl benzene Batch Vs continuation sulphonation

#### Unit -IV

#### Oxidation - Hydrogenation - Alkylation - Ammuniton

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, manufacture of di methyl aniline.

**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

**Hydrolasis :-** 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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**FACULTY OF SCIENCE**  
**B.Sc., II YEAR III SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-III**

**Time: 2½ hours**

**Max. Marks.70 marks**

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

**Answer all the following questions**

**5x2=10M**

1. Define Atomic weight and Molecular weight?
2. Define Heat capacity gases?
3. Write a short note on kinetics of Sulphonation?
4. Write the various types of Oxidizing agents?
5. What is Amination give example?

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

**Answer any four of the following questions**

**4x5=20M**

6. What are the various dimensions and their units by which a liquid mixture can be expressed?
7. Discuss Material balance equation in Recycle operation with flow diagram.
8. Write a note on Energy balance.
9. Write the reaction and mechanism of Nitrobenzene.
10. What is Hydrogenation? Explain the Hydrogenation process of Vegetable Oils
11. Briefly explain the manufacturing of Di methyl aniline.

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

**Answer the following questions**

**4x10=40M**

- 12.(A) Explain what are the steps involved in material balance calculations without involving chemical reactions  
(B) Write the material balance equation for distillation with block diagram  
(Or)  
(C) Write the material balance equation for Extraction with block diagram  
(D) Write a short note on Recycle and Bypass operations
13. (A) Define Heat capacity of gases at constant pressure and constant volume.  
(B) Derive the equation  $C_p - C_v = R$ .  
(Or)  
(C) Write a note on Enthalpy.  
(D) Define Recycle Ratio and Purge Ratio.
14. (A) Write the manufacturing process of O and P nitro chlorobenzenes.  
(B) Explain reaction mechanism of Chlorobenzene?  
(Or)  
(C) Explain the kinetics of halogenations and halogenating agent with examples ?  
(D) What is Sulphonation? How commercial sulphonation of benzene manufactured.
15. (A) Explain the manufacturing process of acetic acid by liquid phase Oxidation?  
(B) Write Hydrogenating agent and kinetics of hydrogenation?  
(Or)  
(C) Explain the types of alkylations with examples?  
(D) Write manufacture of Aniline from Nitrobenzene?

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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**



# COLLEGE: NAGARJUNA GOVT.COLLEGE, NALGONDA

COURSE; B.Sc      SUBJECT: INDUSTRIAL CHEMISTRY      YEAR: 2014-15

## Semester: IV

NAME OF THE MODULE: Process instrumentation, Thermometers & Oils, fats, waxes paints, pigment

NATURE OF THE MODULE: CORE  
MODE OF THE LEARNING: REGULAR

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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) Read 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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**B.Sc., II YEAR IV SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-IV**

**Time: 2½ hours**

**Max. Marks.70 marks**

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

**Answer all the following questions**

**5x2=10M**

1. What are the Elements of Instrumentation?
2. Define Pressure and their units?
3. Write differences between Oil and Fat?
4. Define the Iodine value?
5. Explain the cleaning action of Detergent?

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

**Answer any four of the following questions**

**4x5=20M**

6. What are the static and dynamic characteristics of instruments?
7. Write a note on Resistance Thermometer.
8. What is viscosity? Write a note on Orifice meter.
9. What are Waxes? Write classification of Waxes with examples.
10. What is Hydrogenation? Explain the Dry process of Vegetable Oils.
11. Write the differences in between Soaps and Detergents?

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

**Answer the following questions**

**4x10=40M**

12. (A) Explain Construction and working process of Bi-Metallic Thermometer?  
(B) Write a note on pressure spring Thermometer?

**(Or)**

- (C) Explain construction and working process of Mercury in glass Thermometer?

- (D) Write an essay about Pyrometers?

13. (A) What is Manometer? Explain about U-tube manometer.

- (B) Write an essay about Pirani gauge?

**(Or)**

- (C) Write an essay about liquid level measuring equipments?

- (D) Explain construction and working process of Rotameter?

14. (A) Explain the manufacturing process of Cotton seed oil by Expression method?

- (B) Write a short note on Saponification and Acid values ?

**(Or)**

- (C) What are the step involved in refining of crude Vegetable Oil?

- (D) Explain the manufacturing process of Soap by Kettle process?

15. (A) Write a note on Anionic, Cationic, and Non-ionic Detergents?

- (B) Write the manufacture and uses of White Lead pigment?

**(Or)**

- (C) Write the manufacturing process of Lithophone pigment?

- (D) What are the stages involved in the manufacture of paints?

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# **NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

Autonomous Re-accredited by NAAC with "A" Grade

Revised Syllabus for Department of **INDUSTRIAL CHEMISTRY**

**B.Sc II 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**

# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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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, Neopren Rubber

**Fibres** :Introduction, Rayon or artificial silk , Cupra ammonium process, Acetate Rayon, Viscose Rayon, Distinction between artificial and natural silk, polyamides, Nylon -6, Nylon66-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, Suphur 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, Phenolphalein ,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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**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.**  
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**FACULTY OF SCIENCE**  
**B.Sc., III YEAR V SEMESTER EXAMINATION**  
**INDUSTRIAL CHEMISTRY PAPER-V**

Time: 2½ hours

Max. Marks. 40 marks

4x8=32M

**SECTION-A**

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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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)**



# **NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

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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.

**Pharmacopeias:** Introduction to various Pharmacopeias 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, emulsifying agents, sweeteners (sorbitol) Lubricants glidant, flavoring agent (Vanillin), Colouring 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: (Riboflavin)** Occurrence, isolation diseases caused by its deficiency, requirement, structure.

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

#### PRACTICALS:

**Analysis of common raw material**

**I. Estimation of Aniline**

**II. Estimation of benzoic acid**

**III. Determination of iodine value**

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

*Ashwini*  
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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: 2½ hours

Max. Marks.40marks

SECTION-A

4x8=32M

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 formulation? 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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*[Signature]*  
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Dist. Nalgonda

# **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 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

# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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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 cyulture 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.

**Cardiovascular drugs:** Structure, synthesis therapeutic action of 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) 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

  
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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA.  
(AUTONOMOUS)  
FACULTY OF SCIENCE

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

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

Max. Marks.40marks

SECTION-A

4x8=32M

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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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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*K. Manjula*  
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Syllabus for Department of INDUSTRIAL CHEMISTRY

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

## 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

I.4-bromo aniline from acetanilide

II.Preparation of phenol formaldehyde resin

III.Preparation of nylon-66

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

Time: 2½ hours

Max. Marks. 40marks

**SECTION-A**

4x8=32M

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**

4x2=8M

Answer all the following questions

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 are the Methods used in Industry and Developed?

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

NO: 150/BOS/Ind chem/acad/2015-16

DATE : 29.09.2015

TO

Dr.A.BhanuPrasad,  
Principal,  
GDC, Ramanapet  
NALGONDA.


**SUB:- Nagarjuna Govt. College, Nalgonda(Autonomous)-convening the meeting of Board of studies Industrial Chemistry on 30.9.15 at 11.30am 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 30.9.2015 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.

  
In-Charge /Chairman BOS  
(Industrial Chemistry)

  
Principal  
Nagarjuna Govt. College  
(Autonomous) NALGONDA.  
Principal

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

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

**DATE :**

**TO**

**K.Manjula,  
Asst.Prof,  
GDC(W) College  
NALGONDA.**

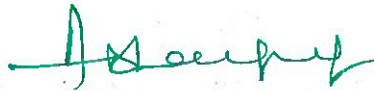
**SUB:- Nagarjuna Govt. College, Nalgonda(Autonomous)-convening the  
meeting of Board of studies Industrial Chemistry on \_\_\_\_\_ Intimation-  
Request-Reg.**

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**In-Charge /Chairman BOS**  
**PRINCIPAL**  
**Degree College**  
**RAMANNAPET**  
**Dist. Nalgonda**

**Principal**

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

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

**DATE :**

**TO**

**Dr.A.BhanuPrasad,**  
**Principal,**  
**GDC, Ramanapet**  
**NALGONDA.**

**SUB:- Nagarjuna Govt. College, Nalgonda(Autonomous)-convening the meeting of Board of studies Industrial Chemistry on \_\_\_\_\_ Intimation-Request-Reg.**

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**In-Charge /Chairman BOS**

**Principal**

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

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

**DATE :**

**TO**

**Dr.R.Roopa,**  
**Asst.Prof,**  
**MG University**  
**NALGONDA.**

**SUB:- Nagarjuna Govt. College, Nalgonda(Autonomous)-convening the meeting of Board of studies Industrial Chemistry on \_\_\_\_\_ Intimation-Request-Reg.**

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**In-Charge /Chairman BOS**

**Principal**