



Course Syllabus  
Gyanmanjari Diploma Engineering College  
Semester-3(Diploma)

**Subject:** Industrial Stoichiometry-DETCHE13205

**Type of course:** Major

**Prerequisite:** Basic knowledge of chemistry.

**Rationale:** study the basic process, ideal gas, mass, mixing takes place during the process in chemical industry.

**Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Credits | Examination Marks |              |    |                 |     | Total Marks |
|-----------------|----|----|---------|-------------------|--------------|----|-----------------|-----|-------------|
| CI              | T  | P  |         | C                 | Theory Marks |    | Practical Marks |     |             |
|                 |    |    | ESE     |                   | MSE          | V  | P               | ALA |             |
| 03              | 01 | 00 | 4       | 60                | 30           | 10 | 00              | 50  | 150         |

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*

**Course Content:**

| SR. NO | Course content   | Hrs | % Weight age |
|--------|--|-----|--------------|
| 1      | <p><b>Unit Systems :</b><br/>Explain importance of process calculation, Define different unit systems, Explain the importance of physical quantities of Units., Convert units among different systems</p> <p><b>Basic Chemical Calculations :</b><br/>Calculate important physical quantities , Calculate composition of mixtures and solutions.</p> | 15  | 40%          |
| 2      | <p><b>Material Balance In Processes Without Chemical Reactions :</b><br/>Explain law of conservation of mass, Calculate mass balance of important unit operations at steady state condition, Describe recycling and by passing operations.Explain basic concepts of material balance with chemical reaction.</p>                                     | 10  | 20%          |



|    |   |    |     |
|----|---|----|-----|
| 3  | <b>Ideal Gas Law :</b><br>Derive ideal gas law, State reference conditions, Calculate important quantities for ideal gas mixture.   | 10 | 20% |
| 4. | <b>Energy Balance :</b><br>Calculate heat capacity, specific heat, heat capacity of gas mixture and liquid mixture, Explain concepts of sensible heat and latent heat. Calculate standard heat of formation and heat of reaction. | 10 | 20% |

### Continuous Assessment:

| Sr. No       | Active Learning Activities  | Marks |
|--------------|---|-------|
| 1.           | <b>Topics on which Numerical given during Tutorial Sessions:</b><br>Systems of Units and Conversions, Numericals based on composition of mixtures and solutions.                            | 10    |
| 2.           | <b>Topics on which Numerical given during Tutorial Sessions:</b><br>Numericals based on Ideal gas law and calculation of composition of gas mixture.  | 10    |
| 3.           | <b>Topics on which Numerical given during Tutorial Sessions:</b><br>Numericals based on mass balance for important unit operations.   | 10    |
| 4.           | <b>Topics on which Numerical given during Tutorial Sessions:</b><br>(a) Numericals based on heat capacity and heat change<br>(b) Numericals based on heat of formation and heat of reaction | 10    |
| 5.           | <b>Topics on which Numerical given during Tutorial Sessions:</b><br>Numericals on calorific values of fuel, theoretical air requirement and composition of flue gases.                      | 10    |
| <b>Total</b> |   | 50    |

### Suggested Specification table with Marks (Theory): 60

| Distribution of Theory Marks<br>(Revised Bloom's Taxonomy) |                    |                      |                    |                |                 |               |
|--|--------------------|----------------------|--------------------|----------------|-----------------|---------------|
| Level  | Remembrance<br>(R) | Understanding<br>(U) | Application<br>(A) | Analyze<br>(N) | Evaluate<br>(E) | Create<br>(C) |
| Weightage  | 20%                | 20%                  | 25%                | 15%            | 20%             | 00            |

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.





### Course Outcome:

| After learning the course the students should be able to: |   |
|---|---|
| CO1   | Understand and importance of scientific unit in industry                          |
| CO2   | Apply theory in industrial calculations   |
| CO3   | Get knowledge of real gas application   |
| CO4   | Understand different types of heat energy and energy balance in chemical industry |

### Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

### Reference Books:

- [1] Stoichiometry Bhatt B. I. and Vora S. M. Tata-McGraw Hill, New Delhi, Year-2007
- [2] Process Calculation Gavhane K. A. Nirali Prakashan, Pune, Year-2012
- [3] Basic Principles and Calculations in Chemical Engineering Himmelablaui David M. PHI Learning, New Dehli, Year-2003

