

**Scheme of Teaching and Examination for
III Semester DIPLOMA in CHEMICAL ENGINEERING BRANCH**

THEORY

SL. No	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME					
			Periods per Week	Periods in one Session	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1	Professional Mathematics	00301	6	60	3	20	80	100	26	36
2	Engineering Mechanics	00302	4	50	3	20	80	100	26	36
3	Computer Programming Through 'C'	00303	4	50	3	20	80	100	26	36
4	Organic Chemistry	14304	4	50	3	20	80	100	26	36
5	Physical Chemistry	14305	4	50	3	20	80	100	26	36
Total :-			22					500		

PRACTICAL

SL. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME					
			Periods per Week	Periods in one Session	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6	Engineering Mechanics Lab.	00306	4	50	3	10	40	50	16	21
7	Computer Programming Through 'C'	00307	6	60	3	10	40	50	16	21
Total :-			10					100		

SESSIONAL

SL. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME			
			Periods per Week	Periods in One Session	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
8	Chemical Process Technology	14308	4	50	40	60	100	50
9	Physical Chemistry Lab.	14309	6	50	20	30	50	25
Total :-			10				150	

Total Periods per Week	42	Total Marks	750
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PROFESSIONAL MATHEMATICS

Subject Code 00301	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	06	00	00	Internal Exam.	:	20

Rationale:

A technical diploma holder is engaged generally as first line supervisor. He forms a bridge between workers and management. He has to understand the language of the modern management and communicate with the workers in their language. This subject will help accomplishment of the task in stipulated time, develop attitude towards cost effectiveness, selection of most effective alternative methods. This course will also help the student to tackle different numerical methods and computational techniques for problem solving in research organization as a programmer.

Objective:

The course enables students to.

- Managerial skill based on mathematical footing
- The ability to find approximate solutions and/or answers to the problems where analytical methods become more complex.
- To choose correct numerical techniques for a given problem.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	GROUP –A (Numerical Methods)	(20)
02	GROUP-B (Statistical Techniques)	(20)
03	GROUP-C (Management Techniques)	(20)
Total:		(60)

CONTENTS:

GROUP-A (NUMERICAL METHODS) (20)

- 01.01 Introduction to Numerical methods: Approximation and errors (Truncation & Round off).
- 01.02 Numerical solutions of non-linear and Transcendental equations: Iterative methods. Newton-Raphson's method. Bisection method and Regula-Falsi method.
- 01.03 Solution of Linear Simultaneous Equations: Gaussian Elimination method and Gauss-Jordan method.
- 01.04 Finite Difference: Backward and forward Differences. Finite Difference Interpolation Formula. Newton's Forward Difference formula and Newton's Backward Difference formula.
- 01.05 Numerical Differentiation & Integration: Newton's forward and backward differentiation formula. Trapezoidal Rule and Simpson's 1/3 rule for numerical integration.
- 01.06 Difference equations. simple problem Only

GROUP-B (STATISTICAL TECHNIQUES) [20]

- 02.01 Introduction to statistics: Measure of central tendencies: measures of dispersions: standard deviation and variance for discrete and grouped data: assumed mean and step deviation methods.
- 02.02 Theory of Probability: Random events and their types. Probability of Events. Definitions. Laws of Probability (Addition and Multiplication Laws)
- 02.03 Probability Distribution: Introduction to Arithmetic Mean and Standard Deviation of a probability distribution. Important probability distribution – Binomial distribution. Poisson's distribution & Their means and variance.

GROUP-C (MANAGEMENT TECHNIQUES) [20]

- 03.01 Linear Models
- 03.01.01 Introduction to Operations Research (O.R) Steps of O.R.
- 03.01.02 Linear Programming Problems: Formulation of a LPP. Mathematical Modelling and Solution by graphical method.
- 03.01.03 Solution by Simplex Method: Basic Feasible Solution (Degenerator and Non-degenerator)
- 03.01.04 Transportation problem: Introduction and Solution Procedure-
 - (i) Finding the initial basic feasible solution by N-W Corner Rule, Least cost method and Vogel's Approximation Method.
 - (ii) Test of optimality by $u-v$ method only.
- 03.01.05 Assignment Problem: Introduction and Solution Procedure–Fundamental theory underlying Hungarian Method.
- 03.02 Network Analysis. CPM & PERT: Introduction.
- 03.02.01 Basic concepts – Activities. Nodes. Edges. Networking of a project. Various times calculations. CPM to determine the optimal project schedule.

03.02.02 PERT- Definition, difference between CPM & PERT. Pessimistic times, optimistic times. Most likely times of various activities.

Books Recommended: Text Books

- | | | | |
|----|---|---|--|
| 1. | Operations Research. Sultan Chand & Sons, New Delhi, 1990 | - | Kanti Swaroop. P.K Gupta and Man Mohan |
| 2. | Operations Research. Sultan Chand & Sons, New Delhi, 1990 | - | Heera & Gupta |
| 3. | Operations Research. Macmillan Publishing Co. New York, 1982 | - | H.A.Taha |
| 4. | Computer based numerical algorithm, East West Press, 1975 | - | E.V Krishna Murthy & S.V. Sen |
| 5. | Computer oriented numerical method, Prentice Hall India, 1980 | - | V. Rajaraman |

ENGINEERING MECHANICS

Subject Code 00302	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	00	00	Internal Exam.	:	20

Rationale:

The subject forms an important part of Engineering curricula for developing the concepts required in the design of various structures. The subject deals with the basic concept of mechanic of body and the behaviour of material used in practice and in structures under varying load conditions. The first part of the subject deals with the applied mechanics science. Which describe the condition of body in rest or motion under the action of forces. In its preview come variety of general and specialized engineering disciplines concerned with analysis of structures and machines and the mechanism of their parts.

In the Second part, the principles of strength of materials is introduced in which the student will learn to distinguish between different types of stress and strain and also the qualitative assessment of stress and strains in material element under the action of internal forces.

Objective:

Knowledge Workers will be able to:

- Analyze and understand the physical behaviour of members of engineering structures.
- Acquire knowledge of various elements of structures.
- Utilise the basic principles.
- Develop skill to tackle field problem.
- Solve the problems by the application of basic principles.
- Judge the suitability of materials in design process.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
<u>PART-A</u>		
01	Introduction	(02)
02	Vector Methods	(02)
03	Introduction to system of forces and equilibrium	(06)
04	Friction	(04)
05	Kinematics and kinetics of a particle	(03)
06	Kinematics and kinetics of rigid body	(02)
07	Impulse and Momentum	(02)
08	Work, Energy and Power	(04)
Total :		(25)
<u>PART-B</u>		
01	Simple stress and strains	(07)
02	Elastic constants	(03)
03	Center of Gravity (Centroid)	(02)
04	Moment of Inertia	(05)
05	Shearing force and bending moments	(08)
Total :		(50)

CONTENTS:

PART-A

TOPIC: 01 – INTRODUCTION: [02]

Idealisation of mechanics; Concept of rigid body; External forces (Body forces & surface forces) Law of Mechanics.

TOPIC: 02 VECTOR METHODS: [02]

Equality and equivalence of vectors; Free and Bound vector; Moment of a force about a point and a line; Couple and moment of a couple.

TOPIC: 03 – INTRODUCTION TO SYSTEM OF FORCES AND EQUILIBRIUM: [06]

Statically equivalent force system; simplest equivalent of a system of forces; force analysis, free body diagram, equation of equilibrium.

TOPIC: 04 – FRICTION:	[04]
Basic Concept of different Friction (Static, Dynamic, Sliding, Rolling, Fluid).	
TOPIC: 05 – KINEMATICS AND KINETICS OF A PARTICLE:	[03]
Rectilinear and curvilinear translations; normal and tangential component of acceleration.	
TOPIC:06 – KINEMATICS AND KINETICS OF RIGID BODY:	[02]
Simple concept of Angular Velocity and angular acceleration. Effective forces on a rigid body. D’ Alembert’s principle.	
TOPIC:07 – IMPULSE AND MOMENTUM:	[02]
Linear impulse and linear momentum, angular impulse and angular momentum, definitions only;	
TOPIC: 08 – WORK, ENERGY AND POWER:	[04]
Work done by forces and couples, potential and kinetic energy, work-energy; conservation of energy; concept of power and efficiency.	

PART-B

TOPIC: 01 – SIMPLE STRESSES & STRAIN:	[07]
01.01 Definition of various terms and their units (S.I. Units)	
01.02 Stress and strain due to axial load and transverse load relation between stress and strain. Hook’s law. Studies of stress strain curve. Factor of safety & working stress. Concepts of isotropic materials.	
01.03 Stress & strain in simple section & composite bar. Stress & strain due to temperature variation.	
01.04 Shrinking on hoop’s stresses.	
TOPIC: 02 – ELASTIC STRESS & STRAIN:	[03]
02.01 Linear strain and lateral strain, poisson’s ratio, volumetric strain	
02.02 Change in volume due to axial, biaxial & triaxial loading. Bulk modulus.	
02.03 Shear stress and strain, modulus of rigidity.	
02.04 Simple shear. Complementary shear stress.	
02.05 Various Relations among modulus of elasticity, modulus of rigidity & bulk modulus.	
TOPIC: 03 – CENTER OF GRAVITY (CENTROID):	[02]
03.01 Definition of center of gravity & centroid.	
03.02 Determination of C.G of various sections symmetrical and unsymmetrical sections.	
03.03 Determination of C.G. of perforated sections.	
TOPIC: 04 – MOMENT OF INERTIA:	[05]
04.01 Definition of M.I.; radius of gyration, second moment of area.	
04.02 Parallel axis theorem & perpendicular axis theorem.	
04.03 Derivation of M.I. of regular area-rectangular, triangular circular about centroidal axis.	
04.04 M.I. of built up section, symmetrical and unsymmetrical about centroidal axis, modulus of sections.	
TOPIC: 05 – SHEARING FORCE & BENDING MOMENT:	[08]
05.01 Types of beams and types of supports, types of loading.	
05.02 Concept and definitions of shear force and bending moment, sign convention.	
05.03 Shear force and bending moment diagrams for cantilever, simply supported beam, over hanging beam for various types of loading & couples, point of contraflexure.	
05.04 Relation between B.M, S.F. and rate of loading.	

Books Recommended:

Text Books

1. Strength of Materials	- R.S. Khurmi
2. Mechanics of Structure	- S.B. Junarkar
3. Strength of Materials	- Ramamrutham
4. Theory of Structure	- Vazirini & Ratwani
5. Strength of Materials & Mechanics of Structure.	- Punamia
6. Teaching plans of Strength of Material	- T.T.T.I. Madras
7. द्रव्य सामर्थ्य	- गुरुचरण सिंह
8. Engineering Mechanics	- I.H. Shames
9. Engineering Mechanics	- Beer & Johnson
10. Strength of material	- S.K. Singh

COMPUTER PROGRAMMING THROUGH C

Subject Code 00303	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	00	00	Internal Exam.	:	20

Rationale:

Computers play a vital role in present day life, more so, in the professional life of technician engineers. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various engineering applications of computers.

Objective:

The objectives of this course are to make the students able to:

- Develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language viz. conditional, iteration and recursion.
- Implement the algorithms in “C” language.
- Use simple data structures like arrays, stacks and linked list solving problems.
- Handling File in “C”.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Introduction to Programming	(03)
02	Algorithm for Problem Solving	(08)
03	Introduction to ‘C’ Language	(08)
04	Condition and Loops	(07)
05	Arrays	(07)
06	Functions	(07)
07	Structures and Unions	(04)
08	Pointers	(06)
Total :		(50)

CONTENTS:

TOPIC: 01 – INTRODUCTION TO PROGRAMMING: **[03]**

The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation. Programming Style-Names, Documentation & Format, Refinement & Modularity.

TOPIC: 02 – ALGORITHM FOR PROBLEM SOLVING: **[08]**

Exchanging values of two variables, summation of a set of numbers. Reversing digits of an integer, GCD (Greatest Common Division) of two numbers. Test whether a number is prime. Organize numbers in ascending order. Find square root of a number, factorial computation, Fibonacci sequence. Compute sine Series. Check whether a given number is Palindrome or not. Find Square root of a quadratic equation. multiplication of two matrices,

TOPIC: 03 – INTRODUCTION TO ‘C’ LANGUAGE: **[08]**

- 03.01 Character set, Variable and Identifiers, Built-in Data Types, Variable Definition, Declaration, C Key Words-Rules & Guidelines for Naming Variables.
- 03.02 Arithmetic operators and Expressions, Constants and Literals, Precedence & Order of Evaluation.
- 03.03 Simple assignment statement. Basic input/output statement.
- 03.04 Simple ‘C’ programs of the given algorithms

TOPIC: 04 – CONDITIONAL STATEMENTS AND LOOPS: **[07]**

- 04.01 Decision making within a program
- 04.02 Conditions, Relational Operators, Logical Perator.
- 04.03 If statement, it-else statement.
- 04.04 Loop statements
- 04.05 Break, Continue, Switch

TOPIC: 05 – ARRAYS: **[07]**

What is an Array?, Declaring an Array, Initializing an Array.
One dimensional arrays: Array manipulation: Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in array; Two dimensional arrays, Addition/Multiplication of two matrices.

TOPIC: 06 – FUNCTIONS:

[07]

Top-down approach of problem solving. Modular programming and functions, Definition of Functions Recursion, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Passing arguments to a Function: call by reference; call by value.

TOPIC: 07 – STRUCTURES AND UNIONS:

[04]

Basic of Structures, Structures variables, initialization, structure assignment, Structures and arrays: arrays of structures,

TOPIC: 08 – POINTERS:

[06]

Concept of Pointers, Address operators, pointer type declaration, pointer assignment, pointer initialization pointer arithmetic.

Book Recommended:

1. Programming with C. Second Edition. Tata McGraw-Hill, - Byron Gottfried
2000
2. How to solve by Computer, Seventh Edition, 2001, Prentice - R.G. Dromey
hall of India.
3. Programming with ANSI-C, First Edition, 1996, Tata - E. Balaguruswami
McGraw hill.
4. Programming with ANSI & Turbo C. First Edition, Pearson - A. Kamthane
Education.
5. Programming with C. First Edition, 1997, Tara McGraw - Venugopla and Prasad
hill.
6. The C Programming Language, Second Edition, 2001, - B. W. Kernighan & D.M. Ritchie
Prentice Hall of India.
7. Programming in C, Vikash Publishing House Pvt. Ltd., - R. Subburaj
Jungpura, New Delhi.
8. Programming with C Language, Tara McGraw Hill, New - C. Balagurswami
Delhi.
9. Elements of C, Khanna Publishers, Delhi. - M. H. Lewin
10. Programming in C. - Stephen G. Kochan
11. Programming in C, khanna Publishers, Delhi. - B. P. Mahapatra
12. Let us C, BPB Publication, New Delhi. - Yashwant kanetkar
13. Programming in C, Galgotia Publications Pvt. Ltd. - Kris A. Jamsa
Dariyaganj, New Delhi.
14. The Art of C Programming, Narosa Publishing House, New - Jones, Robin & Stewart
Delhi.
15. Problem Solving and Programming. Prentice Hall - A.C. Kenneth
International.
16. C made easy, McGraw Hill Book Company, 1987. - H. Schildt
17. Software Engineering, McGraw Hill, 1992. - R.S. Pressman
18. Pointers in C, BPB publication, New Delhi. - Yashwant Kanetkar

Organic Chemistry

Subject Code 14304	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	00	00	Internal Exam.	:	20

Rationale & Objective:

Keeping in view the recent development in science and the present needs of industries, the curriculum of Organic Chemistry has been revised so that the engineers or technicians may have a better knowledge of organic chemistry, especially regarding the application of the subject in various fields of industries. An emphasis in this direction has been made in the curriculum.

The following topic are so chosen that through their contents the students are able to develop knowledge, skill and scientific attitude. It will enable them to distinguish, differentiate, analyse and solve engineering problems.

S.No. Topics	Periods
01 Fundamental Concept	(10)
02 Alkanes and Alkenes	(16)
03 Aromatic Compounds	(06)
04 Alcohols and Phenols	(05)
05 Aldehydes and Ketones	(08)
06 Distillation of Coal tar	(05)
	(50)

CONTENTS:

TOPIC: 01 – FUNDAMENTAL CONCEPT: [10]

- 01.01 Classification of organic compounds
- 01.02 Purification of organic compounds
- 01.03 Analysis of C, H, N, Halogens and Sulphur
- 01.04 Determination of Empirical & Molecular Formula
- 01.05 Properties of organic compounds

TOPIC: 02 – ALKANES AND ALKENES: [16]

- 02.01 Preparation, Properties of alkanes & alkenes
- 02.02 Reaction of alkanes
 - 02.02.01 Oxidation
 - 02.02.02 Halogenation
 - 02.02.03 Nitration
 - 02.02.04 Dehydrogenation
- 02.03 Reaction of alkenes
 - 02.03.01 Hydrogenation
 - 02.03.02 Action of halogen acids
 - 02.03.03 Sulphuric Acid
- 02.04 Halogen derivatives of alkanes
- 02.05 Classification, preparation, properties & reaction of alkyl halides

TOPIC: 03 – AROMATIC COMPOUNDS: [06]

- 03.01 Concept of aromaticity
- 03.02 Structure of Benzene
- 03.03 Reactions of Benzene
 - 03.04 Halogenation
 - 03.05 Hydrogenation
 - 03.06 Nitration
 - 03.07 Sulphonation

TOPIC: 04 – ALCOHOLS & PHENOLS: [05]

- 04.01 Classification
- 04.02 Properties of alcohols & phenols
- 04.03 Reaction of alcohols & phenols

TOPIC: 05 – ALDEHYDES & KETONES: [08]

- 05.01 Preparation of Carbonyl group
- 05.02 Properties of Carbonyl group
- 05.03 Reaction of Carbonyl group

TOPIC: 06 – DISTILLATION OF COAL TAR: [05]

- 06.01 Distillation of products & their separation
- 06.02 Naphthalene
- 06.03 Anthracene

Books Recommended:

- | | |
|---------------------|-------------------|
| 1 Organic Chemistry | - Bahl & Bahl |
| 2 Organic Chemistry | - P.P. Singh |
| 3 Organic Chemistry | - Morrison & Boyd |
| 4 Organic Chemistry | - Finar |

PHYSICAL CHEMISTRY

Subject Code 04305	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	00	00	Internal Exam.	:	20

Rationale & Objective:

The basic principles of physical chemistry is guide essential for a chemical engineer to handle the various industrial tasks. The students will learn the basic theories, chemical kinetic electrochemistry, catalysis etc. which will prove effective tool for them.

S.No.	Topics	
	Periods	
01	Gases & Fundamental Concepts	(27)
02	Chemical Kinematics	(10)
03	Electrochemistry	(10)
04	Catalysis	(03)
		(50)

CONTENTS:

TOPIC: 01 – GASES & FUNDAMENTAL CONCEPTS: [27]

- 01.01 Ideal & Real gases
- 01.02 Different units of Gas Constant
- 01.03 Vanderwaal Equation
- 01.04 Equation of state & corresponding states
- 01.05 Liquification of gases
- 01.06 Kinetic theory of gases
- 01.07 Vapour density & molecular weight
- 01.08 Raoult's Law
- 01.09 Lowering of vapour pressure
- 01.10 Elevation of boiling point
- 01.11 Depression of freezing point
- 01.12 Osmotic Pressure
- 01.13 Chemical Equilibrium
- 01.14 Law of mass action
- 01.15 Effect of temperature & pressure
- 01.16 Lechattelier's Principle

TOPIC: 02 – CHEMICAL KINETICS: [10]

- 02.01 Order of reaction
- 02.02 Determination of First and Second order of reaction
- 02.03 Phase rule, one & two component systems
- 02.04 Partition Coefficient
- 02.05 Azeotropes in liquid vapour, mixture

TOPIC: 03 – ELECTROCHEMISTRY: [10]

- 03.01 Electrolysis
- 03.02 Conductivity & cell constant
- 03.03 E.M.F. of cell
- 03.04 Ostwald's Laws of dilution
- 03.05 Determination of pH Value and its use
- 03.06 Hydrolysis of salts
- 03.07 Solubility and solubility products
- 03.08 Indicators
- 03.09 Buffer solution

TOPIC: 04 – CATALYSIS: [03]

- 04.01 Types of catalysis
- 04.02 Industrial application

Books Recommended:

- | | | | |
|---|--------------------|---|------------------|
| 1 | Physical Chemistry | - | Samuel Glasstone |
| 2 | Physical Chemistry | - | Bahl & Tuli |

ENGINEERING MECHANICS Lab.

Subject Code 00306	Practical			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	04	00	2 week continue	Internal Exam.	:	10

Rationale & Objectives:

The Engineering Mechanics Laboratory is a subject which will help technician to understand the application of theory that he has studied in practice by performing experiments and verifying results.

Besides the above the objective of the curriculum with effective skill will be developed in them to observe experimental data, and to analyses the results.

These topics of this curriculum will certainly build their confidence in performing the utilization of principle of mechanics in Civil Engineering works.

CONTENTS:

Eight experiments to be performed in the laboratory:

1. Determination of elongation of wire under external load.
2. Tensile Test on mild steel specimen.
3. Tensile Test on high tensile specimen.
4. Compression Test on metal.
5. Compression Test on bricks.
6. Determination of Young's Modulus of Elasticity of wire.
7. Determination of reaction at the support of beam.
8. Determination of bending moment of a simply supported beam.
9. Determination of reaction at the support of roof truss.
10. Determination of deflection of beams.
11. Determination of moment of inertia of fly wheel.
12. Determination of bending moment of a over hanging beam.
13. Verification of Polygon Law of forces.
14. Verification of Triangle Law of forces.
15. To find moment of inertia of fly wheel.
16. Compression Test on metal.
17. Tensile Test on M.S.specimen.
18. Determination of co-efficient of friction on inclined plane.

Books Recommended:

Text Books

- | | |
|--|-------------------|
| 1. अभियांत्रिक यांत्रिकी | . जे०के० कपूर |
| 2. Strength of Materials | - Bininder Singh |
| 3. Mechanics of Structure, Vol. 1 | - S.B. Junarkar |
| 4. Strength of Materials | - R.S. Khurmi |
| 5. Engineering Mechanics and Strength of Materials | - I.B. Prasad |
| 6. Teaching plans of Strength of Material | - T.T.T.I. Madras |

COMPUTER PROGRAMMING THROUGH 'C'

Subject Code 00307	Practical			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	06	00	03	Internal Exam.	:	10

CONTENTS:

List of Practicals:

1. Programming exercise on executing a C program.
2. Programming exercise on editing C program.
3. Programming exercise on defining variables and assigning values to variable.
4. Programming exercise on arithmetic and relational operations.
5. Programming exercise on arithmetic expressions and their evaluation
6. Programming on infix, postfix, transformation using stack.
7. Programs on array implementation.

Books Recommended:

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|--|--|
| 1. How to solve it by Computer, Prentice Hall of India, 1992. | - R.G. Dromey. |
| 2. The C Programming Language, Prentice Hall of India, 1989. | -B.W. Kernighan & D.M. Ritchie. |
| 3. The Spirit of C Programming, Jaico Publishing House, New Delhi, 1987. | - Cooper, Mullish |
| 4. Application Programming in C. Macmillain International editions, 1990. | - Richa'd Johnson-Baugh & Martin Kalin |
| 5. The Art of C Programming, Narosa Publishing House, New Delhi. | - Jones, Robin & Stewart |
| 6. Problem Solving and Programming. Prentice Hall International. | - A.C. Kenneth. |
| 7. C made easy, McGraw Hill Book Company, 1987. | - H. Schildt |
| 8. Software Engineering, McGraw Hill, 1992. | - R.S. Pressman |
| 9. Programming in C, Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi | - R. Subburaj |
| 10. Programming with C language, Tata McGraw Hill, New Delhi. | - C. Balaguruswami |
| 11. Elements of C, Khanna Publishers. Delhi | - M. H. Lewin |
| 12. Programming in C | - Stephan G. Kochan. |
| 13. Programming in C, Khanna Publishers. New Delhi | - B.P. Mahapatra |
| 14. Let us C, BPB Publication. New Delhi | - Yashwant Kanetkar |
| 15. Programming in C, Galgotia Publications Pvt. Ltd. Dariyaganj, New Delhi. | - Kris A. Jamsa |

CHEMICAL PROCESS TECHNOLOGY - I

Subject Code 04308	Sessional			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	60
	04	0	03	Internal Exam.	:	40

Rationale & Objective:

The chemical process technology lab. has been introduced with a view to develop scientific attitude among the students. The topics (experiments) have been chosen to develop skill among students so that they can measure differentiate and analyse test results. This will help them in solving the engineering problems in their world of work.

List of Experiments

(At least eight experiments should be performed)

- 1 Determination of the Na₂CO₃ content of washing soda.
- 2 Determination of the strength of concentrated acids.
- 3 Determination of ammonia in an ammonium salt.
- 4 Determination of the saponification value of oils and fats.
- 5 Analysis of Hydrogen Peroxide.
- 6 Determination of Copper in Crystallised Copper Sulphate.
- 7 Determination of Carbonate by the evolution of Carbon Dioxide.
- 8 Determination of Sulphur in mineral sulphides.
- 9 Determination of total hardness of water.
- 10 Determination of organic nitrogen (The Kjeldahl Procedure)

LIST OF THE EQUIPMENTS, MEASURING INSTRUMENTS FOR CHEMICAL PROCESS TECHNOLOGY - I

Sl. No.	Name	Qty.
1	Thermometers	3 No.
2	Burette 100 ml.	5
3	Pipette 50 ml., 10 ml.	10
	each	
4	Conical flash 250 ml. + 500 ml.	5
5	Beaker 50 ml. & 400 ml.	20
6	Volumetric flask 250 ml & 500 ml	20
7	Dessicator	15
8	Funnel	15
9	Silica Crucible	20
10	Analytical Balance	5
11	Analytical weight box	5
12	Analytical single pan digital balance	1
13	Measuring cylinder 25 ml., 250 ml., 500 ml.	6
14	Weighting bottle	5
15	Water bath 230 × 240 × 265 mm.	5
16	Separating Flask 100, 250, 500 ml.	10
17	Glass rod	10
18	Tripod stand	10
19	Test tube	30
20	Test tube stands	30
21	Stand	5

PHYSICAL CHEMISTRY Lab.

Subject Code 04309	Sessional			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	30
	06	0	02	Internal Exam.	:	20

Rationale & Objective:

The physical chemistry lab. practical has been introduced with a view to develop scientific attitude among the students. The topic have been chosen to develop skill among students so that they can measure, differentiate and analyse test results. This will help them in solving the engineering problems in their world of work.

List of Experiments

(At least six experiments should be performed)

- 1 To determine the flash point of the given lubricating oil.
- 2 To determine the viscosity of the given sample, by means of Redwood, Viscometer No. 1 and to establish relationship between temperature and viscosity.
- 3 Determination of smoke point of k-oil.
- 4 Determination of surface tension by capillary rise method.
- 5 Determination of composition of constant boiling mixture of water and HCl.
- 6 Find out the solubilities of Potassium Nitrate at various temperatures and draw the solubility curve.
- 7 Study the change in pH of ammonia solution on the addition of ammonium chloride solution.
- 8 To study the shift in equilibrium between ferric ions and thiocyanate ions by increasing/decreasing the concentration of either ions.
- 9 To determine the heat of neutralization of the reaction between strong acid (HCl) and strong base NaOH.

LIST OF THE EQUIPMENTS, MEASURING INSTRUMENTS FOR PHYSICAL CHEMISTRY LAB.

Sl. No.	Name	Qty.
1	Engler Viscometer with accessories	1 No.
2	Red wood viscometer with accessories	1"
3	Fenske - Martin Flash & Fire Point Apparatus with accessories	1"
4	Smoke Point Lamp	1"
5	Stalagmometer with accessories	1"
6	Beaker, 500 ml.	2"
7	Wide mouth thermos flask	1+1"
8	Glass rod	1"
9	Thermometer	1"
10	Sand bath	1"
11	Tripod stand	1"
12	Bunsen burner	1"
13	Pipette	1"
14	Water bath	1"
15	Desiccator	1"
16	Porcelain dish	1"
17	Wire gauze	1"
18	Measuring cylinder	1"
19	Test tubes	5"
20	Test tube stand	5"
21	Dropper	1"
22	Stop Watch	1"
23	Stirrer	1"