

SCHEME OF INSTRUCTION & EXAMINATION FOR I/IV B.TECH  
(With effect from 2019-20 admitted batches onwards)

**B. Tech I Year – I Semester**

CODE NUMBER	COURSE	HOURS PER WEEK				MAXIMUM MARKS			Credits
		L	T	P	Total	Ses.	Ext.	TOTAL	
1909101	Mathematics-I	3	--	--	3	30	70	100	3
1909102	Mathematics-II	3	--	--	3	30	70	100	3
1909103	Chemistry	3	1	--	4	30	70	100	4
1909105	Computer Programming with C and Numerical Methods	3	0	--	3	30	70	100	4
1909107	Essence of Indian Traditional Knowledge	2	0	-	2	30	70	100	0
1909109	English	3	--	--	3	30	70	100	3
1909103P	Chemistry Lab	0	0	3	3	50	50	100	1.5
1909105P	Computer Programming with C and Numerical Methods Lab	0	0	3	3	50	50	100	1.5
	<b>Total</b>	<b>17</b>	<b>1</b>	<b>6</b>	24	280	520	<b>800</b>	<b>19</b>

## 1909101 MATHEMATICS-I

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
3	3	-	-	3	30	70	100

### PREREQUISITE (s)

Knowledge of Trigonometry, Differentiation and Integration.

### COURSE OBJECTIVES

- To impart the knowledge of partial differentiation involving two or more variables, Euler's theorem, change of variables, Jacobians, Geometrical interpretation.
- To apply the concept of partial differentiation in finding the errors and approximations, maxima and minima of two variables, to introduce the Lagrange's method of undetermined constants and Leibnitz's rule.
- To solve the ordinary differential equations of first order and first degree, Bernoulli's equation, exact differential equations, and equations reducible to exact equations.
- To get knowledge about the applications of differential equations of first order like orthogonal trajectories, simple electric circuits, law of natural growth and decay.
- To solve the linear differential equations of higher order and Simultaneous Differential Equations.

### COURSE OUTCOMES

At the end of the course student will be able to

- CO 1 Analyze problems involving two or more variables and their interpretation
- CO 2 Apply the techniques of multivariable differential calculus to determine extrema and series expansions etc. of functions of several variables.
- CO 3 Understand some basic definitions and terminology associated with differential equations and their solutions.
- CO 4 Solve practical problems which give rise to differential equations of the first order.
- CO 5 Develop the ability to solve linear differential equations of higher order.

## **Unit-I**

### **Partial Differentiation:**

Functions of two or more variables - Partial derivatives - Homogeneous functions – Euler’s theorem - Total derivative. Change of variables – Jacobians.

## **Unit-II**

### **Applications of Partial Differentiation:**

Taylor’s theorem for functions of two variables - Errors and approximations, Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers - Leibnitz’s rule.

## **Unit-III**

### **Ordinary Differential Equations of First Order and First Degree:**

Formation of the ordinary differential equations(ODEs) - Solution of an ordinary differential equation - Equations of the first order and first degree - Linear differential equation - Bernoulli’s equation - Exact differential equations - Equations reducible to exact equations.

## **Unit-IV**

### **Applications of Differential Equations of First Order:**

Orthogonal Trajectories - Simple Electric (LR & CR) Circuits - Newton’s Law of Cooling - Law of Natural growth and decay.

## **Unit-V**

### **Linear Ordinary Differential Equations of Higher order:**

Solutions of Linear Ordinary Differential Equations with Constant Coefficients - Rules for finding the complimentary function - Rules for finding the particular integral - Method of variation of parameters – Cauchy’s Linear Equation – Legendre’s Linear Equations and Simultaneous linear differential equations.

### **TEXT BOOK:**

Scope and Treatment as in “Higher Engineering Mathematics”, by Dr. B.S. Grewal, Khanna Publishers, 43<sup>rd</sup> Edition.

### **REFERENCE BOOKS:**

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
5. Higher Engineering Mathematics by Dr. M.K.Venkataraman, National Publishing Co., Chennai.

## 1909102 MATHEMATICS-II

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
3	3	-	-	3	30	70	100

### PREREQUISITE (s)

Knowledge of algebra of matrices, Trigonometry, Differentiation and Integration.

### COURSE OBJECTIVES

The students are introduced with matrix algebra, Laplace transforms and Fourier series to enable them to use in their further studies.

- In matrix algebra, Consistency and inconsistency of system of equations by the use of rank of a matrix, Obtaining Eigen values and Eigen vectors of a square matrix and application of Cayley- Hamilton's theorem, Quadratic and canonical forms, Properties of complex matrices, Solution of system of equations by direct methods are thoroughly discussed.
- In Laplace transforms, Properties of Laplace transforms, Properties of Inverse Laplace transforms, Applications of Laplace transforms are presented.
- Whereas in Fourier Series, Euler's Formula, Conditions for a Fourier Expansion, Functions having points of discontinuity, Expansions of Odd or Even Functions, Half-Range Series, Parseval's Formula.

### COURSE OUTCOMES

At the end of the course, student will be able to

- CO 1 Solve the linear system of equations analytically and compute Eigen values and eigenvectors of a square matrix.
- CO 2 Reduce the Quadratic Form to Canonical Form and find the nature of a Quadratic Form
- CO 3 Evaluation of integrals by using Laplace Transforms.
- CO 4 Appraise the Laplace transform technique and use it to solve various engineering problems.
- CO 5 Find Fourier series for certain functions.

## Unit-I

### Matrices-I

Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations - Consistency of Linear System of Equations - Direct & Indirect Methods: Gauss elimination method, LU Factorization method, Eigen Values and Eigen Vectors of a Matrix - Cayley-Hamilton theorem - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem and its applications.

## Unit-II

### Matrices-II

Diagonalization of a Matrix - Quadratic Forms - Reduction of Quadratic Form to Canonical Form - Nature of a Quadratic Form - Complex Matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their Properties.

## Unit-III

### Laplace Transforms - I

Introduction - Existence Conditions - Transforms of Elementary Functions - Properties of Laplace Transforms - Laplace Transforms of Periodic Functions - Transforms of Derivatives - Transforms of Integrals - Multiplication by  $t^n$  - Division by  $t$  - Evaluation of integrals by Laplace Transforms.

## Unit-IV

### Laplace Transforms - II

Inverse Laplace Transform - Convolution Theorem - Applications of Laplace Transforms in solving Ordinary Differential Equations - Second Shifting Theorem - Laplace Transforms of Unit Step Function, Unit Impulse Function

## Unit-V

### Fourier Series

Introduction - Euler's Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even Periodic Functions, Half-Range Series - Parseval's Formula.

### TEXT BOOK:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S.Grewal, Khanna Publishers, 43<sup>rd</sup> Edition.

### REFERENCE BOOKS:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.

## 1909103 CHEMISTRY

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
4	3	1	-	4	30	70	100

### PREREQUISITE (s)

Knowledge of theoretical and experimental chemistry from +2 Level.

### COURSE OBJECTIVES

1. To apply the basic knowledge of Chemistry to the Engineering Discipline.
2. To develop knowledge about water and its treatment for industrial and potable purposes.
3. To develop understanding in the areas of solid state chemistry, polymers, mechanism of corrosion of metals and corrosion control methods, fuels, lubricants and building materials, conducting polymers, bio-degradable polymers and fiber reinforced plastics and apply the knowledge for solving existing challenges faced in various engineering and societal areas.

### COURSE OUTCOMES

CO.1: Analyze and determine the water quality and prescribe the remedial measures for domestic as well as industrial usage.

CO.2: Obtain the knowledge on design and development of materials with pre-required properties based on understanding the structure of solids.

CO.3: Student will differentiate the moulding techniques of plastic materials & classify the polymers and can apply to specific purposes.

CO.4: Students can able to design the metallic materials to prevent corrosion.

CO.5: Student will apply suitable lubrication mechanisms for various machinery parts.

CO.6: To understand the properties of engineering materials and their applications.

**Chapter – 1: Water Chemistry (8 Hrs)**

Sources of Water – Impurities and their influence of living systems – WHO Limits – Hardness and its Determination – Boiler Troubles and their removal – Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water – Reverse Osmosis Method, Electro-dialysis. (CO1)

**Chapter – 2: Solid State Chemistry (8 Hrs)**

Solids - Classification of Solids – Types of Crystals – Fundamental Laws of Crystal Structure – X-Rays and Bragg's Law – Imperfections in Crystals – Band Theory of Solids – Chemistry of Semiconductors – Intrinsic, Extrinsic, Compound and Defects – Organic Semiconductors – Super Conductivity – Purification of Solids by Zone refining – Liquid Crystals. (CO2)

**Chapter – 3: Polymers and Plastics (8 Hrs)**

**Polymers:** Definition – Types of Polymerization (Addition & Condensation) – Mechanisms of Addition Polymerization – Radical and Ionic – Thermodynamics of Polymerization Process.

**Plastics:** Thermosetting and Thermoplastics – Effect of Polymer Structure on Properties of Cellulose Derivatives – Vinyl Resins – Nylon (6,6), Reinforced Plastics – Conducting Polymers. (CO3)

**Chapter – 4: Corrosion (8 Hrs)**

**Corrosion:** Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, Inter granular, Waterline, Stress – Galvanic Series – Factors Effecting Corrosion.

**Corrosion Controlling Methods:** Protective Coatings: Metallic Coatings, Electroplating and Electroless Plating – Chemical conversion Coatings – Phosphate, Chromate, Anodized, Organic Coatings – Paints and Special Paints. (CO4)

**Chapter – 5: Fuels and Lubricants (8 Hrs)**

**Solid Fuels:** Wood and Coal, Ranking of Coal – Analysis (Proximate and Ultimate) Coke Manufacture – Otto Hoffmann's Process – Applications.

**Liquid Fuels:** Petroleum Refining – Motor Fuels – Petrol and Diesel Oil – Knocking – Octane number – Cetane Number.

**Gaseous Fuels:** Biogas, LPG and CNG – Characteristics – Applications.

**Rocket Fuels:** Propellants – Classification – Characteristics.

**Lubricants:** Classification – Mechanism – Properties of Lubricating Oils – Selection of Lubricants for Engineering Applications. (CO5)

## **Chapter 6: Building Materials(8 Hrs)**

**Portland Cement:** Manufacture of Cement - Dry and Wet Processes – Chemical Composition of Cement - Setting and hardening of cement - Cement concrete - RCC - Decay of concrete and Protective Measures - Special Cements.

**Refractories:** Classifications - Properties - Engineering Applications.

**Ceramics:** Classification - Properties - Engineering Applications. (CO6)

### **Text Books**

1. Engineering Chemistry – P.C. Jain and M. Jain, 16<sup>th</sup> Ed., Dhanpath Rai and Sons, New Delhi (2015).
2. A Text book of Engineering Chemistry, S.S. Dara, 12<sup>th</sup> Ed., S. Chand & Co. New Delhi (2010).

### **Reference Books**

3. Engineering Chemistry, B.K. Sharma, Krishna Prakashan, 6<sup>th</sup> Ed., Meerut (2005).
- Engineering Chemistry - B.L. Tembe, Kamaluddin and M.S. Krishnan (NPTEL).



## 1909105 COMPUTER PROGRAMMING WITH C AND NUMERICAL METHODS

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
3	3	-	-	3	30	70	100

### COURSE OBJECTIVES

- i. Aims to provide exposure to problem-solving through C programming.
- ii. Aims to train the student to the basic concepts of the C-programming language & Numerical Methods.

### COURSE OUTCOMES

CO1. Student will be able to write code using control structures & arrays

CO2. Student will be able to write code using strings & functions

CO3. Student will be able to write code using user defined data types

CO4. Student will be able to write code using Pointers for operations on files

CO5. Student will be able to write code for Numerical & Integral Methods

### SYLLABUS

#### Unit – I

#### **Introduction to C, Decision Making, Branching, Looping, Arrays**

Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations, Formatted Input, Formatted Output, Decision making with if statement, Simple if statement, The if...else statement, Nesting of if...else statement, the else if ladder, switch statement, the (?:) operator, the GOTO statement., The while statement, The do statement, The for statement, Jumps in Loops, One, Two-dimensional Arrays.

#### Unit – II

#### **Functions & Strings**

Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, The scope, visibility and lifetime of variables, Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings.

#### Unit – III

#### **Structure and Unions**

Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, structures and functions and unions, size of structures and bit-fields- Program applications.

## Unit – IV

### Pointers&File handling

Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointers, pointers as function arguments, functions returning pointers, pointers to functions, pointers to structures-Program Applications, File handling: Defining and opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, random access to files and Command Line Arguments-Program Applications.

## Unit – V

### Numerical Methods & Integrations

Solutions of Algebraic and Transcendental Equations: Bisection Method, Newton Raphson Method. Interpolation: Newton's forward and backward Interpolation, Lagrange's Interpolation in unequal intervals, Trapezoidalrule, Simpson's 1/3 rule. Solutions of Ordinary First Order Differential Equations: Euler's Method, Modified Euler's Method and Runge-Kutta Method.

### TEXT BOOKS

1. Programming in ANSI C, E Balagurusamy, 6th Edition. McGraw Hill Education (India) Private Limited.
2. Introduction to Numerical Methods, SS Sastry, Prentice Hall.

### REFERENCE BOOKS:

1. Let Us C, YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, 3rd Edition, Thomson, 2007.
3. The C –Programming Language' B.W. Kernighan, Dennis M. Ritchie, PHI
4. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M. Barone (Author), Enzo Marinari (Author), Giovanni Organtini, World Scientific.

## 1909107 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
0	2	-	-	2	30	70	100

### COURSE OBJECTIVES

1. To know the contributions of scientists for the development of society over a period of time.
2. To understand the Science and Technological developments that lead to human welfare.
3. To appreciate the Science and Technological contributions for the development of various sectors of the economy.
4. To identify the technological transfer versus economic progress of the countries.

### COURSE OUTCOMES

- CO1 - Demonstrate knowledge of broad concepts in the history of science, technology ranging over time, space and cultures and appreciate the science and technological contributions for the development of various sectors of the economy.
- CO2 - Recognize the values of a wide range of methodologies, conceptual approaches and policies for the development of science and technology.
- CO3 - Think independently and critically, using appropriate methodologies and technological developments in the critical areas of science and technology that lead to human welfare.
- CO4 - Proficiently use contemporary technologies.

### UNIT-I

#### Historical Perspective of Science and Technology

Nature and Definitions; Roots of Science – In Ancient Period and Modern Period (During the British Period); Science and Society; Role of Scientist in the Society.

### UNIT-II

#### Policies and Plans after Independence: Science and Technology Policy Resolutions

New Technology Fund; Technology Development (TIFAC); Programs aimed at Technological Self Reliance; Activities of Council of Scientific and Industrial Research.

### UNIT-III

#### Science and Technological Developments in Critical Areas

Space – The Indian Space Program: India’s Geostationary Satellite Services – INSAT System And INSAT Services; Defense Research and Technology – Research Coordination, Research efforts and Development of technologies and Spin-off technologies for civilian use; Nuclear Energy –Effects of a nuclear explosion and India’s safety measures.

#### **UNIT-IV**

##### **Impact of Science and Technology in Major Areas**

Ocean Development: Objectives of Ocean Development, Biological and Mineral resources, Marine Research and Capacity Building; Biotechnology: Meaning, Biotechnology techniques- Bioreactors, Cell fusion, Cell or Tissue Culture, DNA Fingerprinting, Cloning, Artificial Insemination and Embryo Transfer Technology and Stem Cell Technology; Application of Biotechnology – Medicine, Biocatalysts, Food Biotechnology, Fuel and Fodder and Development of Biosensors.

#### **UNIT-V**

##### **Technology Transfer and Development**

Transfer of Technology – Types, Methods, Mechanisms, Process, Channels and Techniques; Appropriate Technology - Criteria and Selection of an Appropriate Technology; Barriers of Technological Change

##### **Text Books:**

1. KalpanaRajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi-58. 2. Srinivasan, M., Management of Science and Technology (Problems & Prospects), East – West Press (P) Ltd., New Delhi.

## 1909109 ENGLISH

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
3	3	-	-	3	30	70	100

### **PREREQUISITE (s)**

Knowledge of literature and grammar from +2 Levels. Application of syntactical principles and phonetic techniques to the required course.

### **COURSE OBJECTIVES**

#### **CO - 1**

- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

#### **CO - 2**

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.
- Participating in discussions and influencing them and communicating ideas effectively.
- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.

#### **CO - 3**

- Analyzing a topic of discussion and relating it to time management skills.
- Participating in discussions and influencing them.  
Communicating ideas effectively.  
Presenting ideas coherently within a stipulated time.

#### **CO - 4**

- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.
- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.

- Understanding the importance of helping others: community services and enthusiasm.

CO – 5

- The student will learn to avoid redundancy will learn common abbreviations useful for competitive exams and will acquire basic proficiency in English including reading, comprehension and writing skills.
- The student will be motivated with a sense of purpose throughout the course by learning life skills.

## **DETAILED SYLLABUS**

### **UNIT-1**

Reading	:	On the conduct of life: William Hazlitt
Grammar	:	Prepositions
Vocabulary	:	Word Formation I: Introduction to Word Formation
Writing	:	Clauses and Sentences
Life skills	:	Values and Ethics -If: Rudyard Kipling

### **UNIT - 2**

Reading	:	The Brook: Alfred Tennyson
Grammar	:	Articles
Vocabulary	:	Word Formation II: Root Words from other Languages
Writing	:	Punctuation
Life skills	:	Self-Improvement
How I Became a Public Speaker: George Bernard Shaw		

### **UNIT-3**

Reading	:	The Death Trap: Saki
Grammar	:	Noun-Pronoun Agreement, Subject- Verb Agreement
Vocabulary	:	Word Formation III: Prefixes and Suffixes
Writing	:	Principals of Good Writing
Life skills	:	Time Management: On saving Time: Seneca

#### UNIT-4

Reading	:	ChinduYellama
Grammar	:	Misplaced Modifiers
Vocabulary	:	Synonyms; Antonyms
Writing	:	Essay Writing
Life skills	:	Innovation - Muhammad Yunus

#### UNIT-5

Reading	:	Politics and the English Language: George Orwell
Grammar	:	Clichés; Redundancies
Vocabulary	:	Common Abbreviations
Writing	:	Writing a Summary
Life skills	:	Motivation - The Dancer with a White Parasol: Ranjana Dave

#### **Prescribed Textbook**

Language and Life: A Skills Approach Board of Editors, Orient Black Swan Publishers, India. 2018.

#### **WRITING SKILLS:**

Paragraph, Letters (Formal, Enquiry, Complaint) E-mail Writing, Dialogue Writing, Story Writing with hints.

#### **Suggested Readings:**

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

## 1909103P CHEMISTRY LAB

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
1.5	-	-	3	3	50	50	100

### PREREQUISITE (s)

Knowledge of theoretical and experimental chemistry from +2 Level.

### COURSE OBJECTIVES

1. To develop the fine skills of quantitative determination of various chemical components through titrimetric analysis
2. To prepare and use ion exchange/zeolite columns for the removal of hardness of water
3. To develop the skill of organic synthesis through the preparation of a polymer/drug

### COURSE OUTCOMES

At the end of the course student will be able to

CO.1 Quantitatively determine the amount of various chemical species in solutions by titrations.

CO.2 Conduct the quantitative determinations with accuracy

CO.3 Develop novel materials to be used as zeolite and prepare columns for removal of hardness of water

CO.4 Synthesize a polymer or a drug

### List of Laboratory Experiments

1. Determination of sodium hydroxide with HCl (with  $\text{Na}_2\text{CO}_3$  as primary standard)
2. Determination of alkalinity (carbonate and hydroxide) of water sample
3. Determination of Fe(II)/Mohr's salt by permanganometry
4. Determination of oxalic acid by permanganometry
5. Determination of chromium(VI) by Mohr's salt solution
6. Determination of zinc by EDTA method



7. Determination of hardness of water sample by EDTA method
8. Determination of chlorine in water by iodometric titration
9. Ion exchange/zeolite column for removal of hardness of water
10. Synthesis of a polymer (bakelite)/drug (aspirin)

#### **REFERENCE BOOKS**

- Vogel's Quantitative Chemical Analysis – V Edition – Longman
- Experiments in Applied Chemistry (For Engineering Students) – Sinita Rattan – S. K. Kataria & Sons, New Delhi.

**1909105P COMPUTER PROGRAMMING WITH C AND NUMERICAL  
METHODS LAB**

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
1.5	-	-	3	3	50	50	100

**COURSE OUTCOMES**

- CO1.Ability to implement the programs using control structures & arrays
- CO 2.Ability to implement the programs using strings & functions
- CO 3.Ability to implement the programs using user defined data types
- CO 4.Ability to implement the programs using pointers and operations on files
- CO 5. Ability to implement the programs using numerical &integral methods

**LIST OF EXPERIMENTS**

1. a) Write a C program to find the roots of a quadratic equation  
 b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch statement.  
 c) Write a C program to find the sum of individual digits of that number and also print and save it in reverse order.
2. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
3. Write a program which generates 100 random real numbers in the range of 10.0 to 20.0 and sort them in descending order.
4. Write a function for transporting a square matrix in place (in place means that you are not allowed to have full temporary matrix).
5. Write a program to add two matrices with the dimension of the matrix specified by the user at the time of executing the program.
6. Write a program e.g. for getting a sub-string from a given position, copying one string to another, reversing a string and adding one string to another with and without using string manipulation functions.
7. Write a program to read the data of four students, each students has a name (string), roll number (string), age (integer), use an array of structure. Later find the average age of the students.
8. Write a program to demonstrate the difference between pointer to an array and array of pointers.
  - a) Store your name, address and phone number in a 2-D character array and display the same using pointer notations.
  - b) Use pointer to an array and array of pointers.

9. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.
10. Implement bisection method to find the square root of a given number to a given accuracy.
11. Implement Newton Raphson Method to determine a root of polynomial equation.
12. Given a table of x and corresponding f(x) values, write a program which will determine f(x) value at an intermediate x value using Lagrange Interpolation.
13. Implement Simpson's 1/3<sup>rd</sup> rule for numerical integration.
14. Implement Trapezoidal rule for numerical integration.
15. Write a program to solve a differential equation using Runge-Kutta Method.

## II-SEMESTER

CODE NUMBER	COURSE	HOURS PER WEEK				MAXIMUM MARKS			Credits
		L	T	P	Total	Ses.	Ext.	TOTAL	
1909201	Mathematics-III	3	1	--	4	30	70	100	4
1965202	Introduction to Civil Engineering	3	1	--	4	30	70	100	4
1909204	Physics	3	1	--	4	30	70	100	4
1909206	Engineering Graphics	2	-	4	6	30	70	100	4
1909208	Professional Ethics and Moral Values	2	--	--	2	30	70	100	0
1909204P	Physics Lab	--	--	3	3	50	50	100	1.5
1909210P	Workshop	--	--	3	3	50	50	100	1.5
	<b>Total</b>	<b>13</b>	<b>3</b>	<b>10</b>	<b>26</b>	<b>250</b>	<b>450</b>	<b>700</b>	<b>19</b>

### 1909201 MATHEMATICS-III

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
4	3	1	-	4	30	70	100

#### **PREREQUISITE (s)**

Knowledge of Complex numbers and it's properties, Trigonometry, Differentiation and Integration. How to sketch the graph of function.

#### **COURSE OBJECTIVES**

The main objective of Engineering Mathematics is to make the students familiar with mathematical thinking and realization of the background of their problems.

- Multiple Integral is a natural extension of a definite integral to a function of more than one real variable.
- The students should be able to evaluate Double and Triple Integrals, volumes of solids and area of curved surfaces.
- They should know the concepts of analyticity, Complex integration, and complex power series classification of singularities.
- The student should know the applications of the calculus of residues in the evaluation of real definite integrals.

#### **COURSE OUTCOMES**

At the end of the course, student will be able to

- CO 1 Calculate the double and triple integral of a function of two or three variables.
- CO 2 Apply the knowledge of multiple integral, to find areas, volumes and moment of inertia.
- CO 3 Have deal with some elementary complex functions.
- CO 4 Solve the complex integration of a function and find the singularities of a function
- CO 5 Acquire the skill of contour integration to evaluate complicated real definite integrals via residue calculus.

## Unit-I

### Multiple Integral –I

Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates.

Triple Integrals - Change of Variables.

## Unit-II

### Multiple Integral -II

Area enclosed by plane curves - Volumes of solids - Calculation of mass - Center of gravity - Moment of inertia Beta Function - Gamma Function - Relation between Beta and Gamma Functions.

## Unit-III

### Complex Analysis -I

Introduction - Limit and continuity of  $f(z)$ - Derivative of  $f(z)$ , Cauchy-Reimann Equations, Analytic Functions, Harmonic functions, Orthogonal systems. Introduction to Conformal transformation, Bilinear transformation  $w = \frac{az + b}{cz + d}$

## Unit-IV

### Complex Analysis -II

Integration of complex functions, Cauchy's theorem, Cauchy's integral formula and their applications. Complex terms -Taylor's and Laurent's series (without proofs), Zero's and Singularities of analytic functions.

## UNIT V

### Complex Analysis -II

Residues and Calculations of residues, Cauchy's Residue Theorem, Evaluation of real definite integrals: Integration around unit circle, semi-circle.

### TEXT BOOK

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, Khanna Publishers, 43<sup>rd</sup> Edition.

### REFERENCE BOOKS

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal; Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
5. Advanced Mathematics for Engineers", by Chandrika Prasad, Pothishala Pvt. Ltd., Allahabad.

## 1965202 INTRODUCTION TO CIVIL ENGINEERING

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
4	3	1	-	4	30	70	100

### Course Objectives

- i.
- ii.

### COURSE OUTCOMES

- CO1** Classify and explain the properties and uses of different building and construction materials.
- CO2** Associate with the stress strain diagrams and the relationship between the elastic constants.
- CO3** Define the types and characteristics of soil and rock formations.
- CO4** Illustrate the knowledge on hydrological aspects and water supply systems.
- CO5** Describe various modes of transport and develop an understanding of construction equipment.

### SYLLABUS

#### UNIT-1

Various disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career, Development of various materials of construction and methods of construction, Contributions of eminent Civil Engineers.

#### Bricks:

Sources and qualities of Brick Earth, Classification of Bricks, general qualities of Bricks as per IS code, tests for good bricks as per IS code, special forms of Bricks and their uses.

#### Cements:

Natural and artificial cements, types of various artificial cements and their uses. Modern renovation materials- Cement bound, polymer cement bound and pure polymer bound materials, their properties & uses.

## UNIT-2

### **Structural Engineering:**

Types of buildings, bridges and Water retaining structures.

### **Simple stresses and strains:**

Types of stresses and strains, Hooke's law, working stress, factor of safety, lateral and volumetric strain, Poisson's ratio, elastic constant and relationship between them, bars of varying cross sections, composite bars, temperature stresses.

## UNIT-3

### **Geology**

Formation of soil and rocks, types of soils, rocks and minerals.

### **Geotechnical Engineering:**

Soil structure and clay mineralogy, Basics of Soil Mechanics, rock mechanics; types of foundations. Basics of Tunneling and the methods

## UNIT-4

### **Hydraulics, Hydrology & Water Resources Engineering:**

Fundamentals of fluid flow, basics of water supply systems. Historical evolution of Irrigation in India, Importance of irrigation in agriculture. Classification of dams and Reservoirs.

### **Environmental Engineering:**

Importance and necessity of protected water supply systems, Objectives of protected water supply system, Flow chart of public water supply system, Role of an Environmental Engineer. Components of sewage treatment plants and effluent treatment systems. solid waste management

## UNIT-5

### **Transportation:**

Importance of transportation. Different modes of transportation, Historical development of road construction in India. Classification and layout of roads, Railway stations, ports, harbours and airports.

### **Equipment and Construction:**



Classification of construction works, Construction stages, Construction Equipment: Scraper, Bulldozer, Mixer, Concrete Vibrator, Safety aspects of construction, Aesthetics and quality aspects of construction.

**TEXT BOOKS:**

1. Duggal K.N, Elements of Environmental Engineering, Revised Edition, S Chand Publication, 2014.
2. Arora K.R, Soil Mechanics and Foundation Engineering, Standard publisher dist., 2009
3. Rangwala, Engineering materials, 17<sup>th</sup> edition Charotar Publication, 2017
4. K P Subramanian, Highway railways airport and harbor Engineering. SCITECH publisher, 2016.

**REFERENCE BOOKS:**

1. Timoshenko and Young, Elements of strength of materials, 5<sup>th</sup> Revised edition, Van Nostrand Reinhold Company publication, 2007.
2. Popov, Introduction to Mechanics of Solids by Popov, 1<sup>st</sup> edition, Prentice-Hall publication, 1968.
3. Smith R.C, Materials of construction, 4<sup>th</sup> edition McGraw-Hill Company, New York, 1979.
4. Surindra Singh, Engineering Materials, 5<sup>th</sup> edition, Konark Publishers Pvt. Ltd., New Delhi, 1989.
5. Anjaneyulu.Y, Introduction to Environmental Science, 1<sup>st</sup> edition B S Publications, 2004.
6. Suresh K. Dhameja, Environmental Studies, S K Kataria & Sons Publications, 2007.
7. Tchobanoglous, Integrated Solid Waste Management, McGraw-Hill publication, 1993.
8. Rangwala, Building Materials, Charotar publisher, 2012

## 1909204 PHYSICS

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week.</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
4	3	1	-	4	30	70	100

### PREREQUISITE (s)

Knowledge of theoretical and experimental Physics from +2 Level. Application of Physics theory and calculations to required course

### COURSE OBJECTIVES

The fundamentals of sciences are essential to learn as the application of science in solving problems is technology. The physics curriculum is designed in such a way that all branches of engineering will study the basic fundamentals of technology from where it is originated. The course objectives are

1. Make the student familiar with the basic concepts, principles and laws in Waves and Oscillations, Electromagnetism, Wave Optics, Lasers and Fiber Optics, Super conductivity, Quantum Mechanics and Semiconductor Physics.
2. Make the student to realize the importance of fundamental concepts and make him learn how to apply these in solving problems.
3. To impart knowledge for the student how these basic concepts are related to engineering applications.

### COURSE OUTCOMES

By the end of this course, student would have

- CO1. Learnt the fundamental laws and their applications in Waves and Oscillations.
- CO2. Gained the basic and origin of electromagnetism from electrostatics and magnetism and summarize the basic theories of electrostatics and electromagnetics to solve a variety of problems
- CO3. Learnt the basics of physical optics and its corresponding applications.
- CO4. Known how a laser light is different from ordinary light, how a laser light can be produced and its different applications in present day technology and the principles of Optical Fiber.
- CO5. Learnt the concepts of modern physics and its applications in technology.

## Unit-I

### Waves and Oscillations (CO1)

Simple Harmonic Motion, Velocity, Acceleration and Energy of a Simple Harmonic Oscillator, Damped harmonic oscillator: heavy, critical and light damping, Coupled Oscillators, Longitudinal and Transverse waves, Reflection and Transmission of Waves, Electromagnetic Waves, The Spectrum of Electromagnetic Radiation.

## Unit-II

### Electromagnetism and Magnetic Properties of Materials (CO2)

Electric Flux, Gauss's law of Electrostatics in Free Space and its applications, Biot-Savart Law, Ampere's Law- Magnetic Induction on the axis of a circular current loop, Hall effect, Faraday's Law of Induction, Lenz's Law, Induced magnetic fields, Displacement Current, Maxwell's Equations in Integral Form (no derivation), Magnetization, Permeability and Susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

## Unit-III

### Wave Optics (CO3)

**Interference:** Principles of superposition – Young's Experiment – Coherence - Interference in thin films, Wedge shaped film, Newton's Rings, Michelson Interferometer and its applications.

**Diffraction:** Diffraction, differences between interference and diffraction, two classes of diffraction, Fraunhofer diffraction due to Single slit (Qualitative and quantitative treatment).

**Polarisation:** Polarisation by double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization and detection.

## Unit-IV

### Lasers and Fibre Optics & Super conductivity (CO4)

**Lasers and Fibre Optics:** Introduction, spontaneous and stimulated emissions, population inversions, pumping, Ruby laser, Gas laser (He-Ne Laser), Semiconductor laser, Applications of lasers. Optical Fibre and Total Internal Reflection, Acceptance Angle and cone of a fibre, Numerical aperture, Fibre optics in communications, Application of optical fibers.

**Super conductivity:** Super conductivity, Meissner Effect, Types of Superconductors and Applications of Superconductors.

## Unit-V

### Quantum Mechanics & Semiconductor Physics (CO5)

**Quantum Mechanics:** Introduction, Photoelectric effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

**Semiconductor Physics:** Energy bands in solids, Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and Extrinsic semiconductors, Diode: p-n junction diode device structure, materials, characteristics, and figures of merit, LED: device structure, materials, characteristics, and figures of merit. Photo diode, Solar cell.

### BOOKS RECOMMENDED

1. Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
3. Engineering Mechanics, 2nd ed.- M K Harbola, Cengage Learning
4. I. G. Main, —Vibrations and waves in physics', 3rd Edn, Cambridge University Press

### REFERENCE BOOKS

1. Engineering Physics by M.N. Avadhanulu & P.G. Kshirsagar, S Chand & Company Ltd.
2. Modern Engineering Physics by A.S. Vasudeva, S Chand & Company Ltd.
3. University Physics by Young & Freedman, Pearson Publications.

## 1909206 ENGINEERING GRAPHICS

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
4	2	-	4	6	30	70	100

### Course Objectives

- COB 1 The course is aimed at developing Basic Graphic skills.
- COB 2 Develop Skills in Preparation of Basic Drawings
- COB 3 Skills in Reading and Interpretation of Engineering Drawings

### COURSE OUTCOMES

At the end of the course, the student will be able to:

- CO 1 Graphically construct and understand, the importance of mathematical curves in Engineering applications
- CO 2 Graphically visualize and construct orthographic projection of points and lines
- CO 3 Visualize and construct different views of planes and solids in different orientations
- CO 4 Construct and develop the sectioned surfaces of geometrical solids
- CO 5 Interpret and draw the Orthographic and Isometric views of different solids.

### SYLLABUS

#### UNIT-I

**Introduction:** Lines, Lettering and Dimensioning, Geometrical Constructions.

**Curves:** Construction of Conic sections, cycloids and involutes. Normal and tangent to the curves.

#### UNIT – II

**Projections of Points and Straight Lines:** Principal or Reference Planes, Projections of a point situated in any one of the four quadrants. Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of straight line inclined to both the reference planes. Traces.

### UNIT – III

**Projections of Planes:** Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes. Introduction to Auxiliary Planes.

**Projections of Solids:** Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

### UNIT – IV

**Sections of Solids:** Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

**Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

### UNIT – V

**Isometric Views:** Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, sphere and their combinations.

#### TEXT BOOK

Elementary Engineering Drawing by N.D. Bhatt, Charotar Publishing House.

#### REFERENCE BOOK

Engineering Graphics by K.L. Narayana and P. Kannaiah, Tata Mc-Graw Hill.

## 1909208 PROFESSIONAL ETHICS & MORAL VALUES

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week.</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
0	2	-	-	2	30	70	100

### Objectives of the Course:

- To inculcate Ethics and Moral Values into the youngminds.
- To develop moral responsibility and mould them as bestprofessionals.
- To create ethical vision and achieve harmony inlife.

### Course outcomes:

CO 1- Student will exhibit and promote Universality of values and take ethical decisions at appropriate situations.

CO 2- student will become a better professional and will also conduct oneself according to the code of Ethics in their professional life.

CO 3- student will perform better in showcasing life skills and will also have a better perspective in balancing work and life.

CO 4- student will execute and promote professional Rights.

CO 5- student will be adapting oneself to the global professional scenario and still be able to maintain harmony in life.

**Learning outcome:** By the end of the course student should be able to understand the importance of ethics and values in life and society.

### UNIT – I

**Ethics and Moral Values:** Ethics and Values, Ethical Vision, Ethical Decisions,

**Moral Values** – Classification of Values, Universalityof Values.

### UNIT – II

**Engineering Ethics:** Nature of Engineering Ethics, Profession and Professionalism, Professional Ethics, Code of Ethics, Sample Codes – IEEE, ASCE, ASME and CSI.

### UNIT – III

**Engineering as Social Experimentation:** Engineering as social experimentation, Engineering Professionals – life skills, Engineers as Managers, Consultants and Leaders, Role of engineers in promoting ethical climate, balanced outlookon law.

#### **UNIT – IV**

**Safety Social Responsibility and Rights:** Safety and Risk, moral responsibility of engineers for safety, case studies – Bhopal gas tragedy, Chernobyl disaster, Fukushima Nuclear disaster, Professional rights, Gender discrimination, Sexual harassment at workplace.

#### **UNIT – V**

**Global Issues:** Globalization and MNCs, Environmental Ethics, Computer Ethics, Cyber Crimes, Ethical living, concept of Harmony in life.

#### **TEXT BOOKS**

1. Govindharajan, M., Natarajan, S. and Senthil Kumar, V.S., Engineering Ethics, Prentice Hall of India, (PHI) Delhi, 2004.
2. Subramainam, R., Professional Ethics, Oxford University Press, New Delhi, 2013.

#### **REFERENCES**

1. Charles D, Fleddermann, “Engineering Ethics”, Pearson / PHI, New Jersey 2004 (Indian Reprint).



### 1909204P PHYSICS LAB

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week.</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
1.5	-	-	3	3	50	50	100

#### **PREREQUISITE (s)**

Knowledge of theoretical and experimental Physics from +2 Level. Application of Physics theory and calculations to required course.

#### **Course Objectives:**

To train the student in acquiring skills, techniques of using instruments to observe the physical phenomena, to measure certain physical quantities and constants.

#### **Course Outcomes:**

By the end of the course the student will be able to

- CO1. Experiment and evaluate basic principles of physics by observing and analyzing the data, plotting graphs and interpreting the results.

#### **List of Laboratory Experiments:**

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray  $\mu_o$  and Extraordinary  $\mu_e$  ray.
6. Determination of Thickness Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.

11. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Laser- Diffraction.

## 1909210P WORKSHOP

<i>Credits</i>	<i>Periods</i>			<i>Total Contact Hrs/Week.</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
	<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
1.5	-	-	3	3	50	50	100

### COURSE OUTCOMES

- CO 1 Identify and use various tools required for performing operations in Carpentry for making various components
- CO 2 Identify and use various tools required for performing operations in Fitting for making various components
- CO 3 Identify and use various tools required for performing operations in Tinsmithy for making various components.

### LIST OF EXPERIMENTS:

Minimum of three exercises have to be conducted from each trade.

<b>Trade</b>	<b>Experiment (Job)</b>
<b>1. Carpentry</b>	(a) Cross Lap Joint (b) Corner Dovetail Joint (c) Mortise and Tenon Joint (d) Bridle Joint
<b>2. Fitting</b>	(a) V-Fit (b) Square Fit (c) Half Round Fit (d) Dovetail Fit
<b>3. Tin Smithy</b>	(a) Taper Tray (b) Square Tray (c) 90° Elbow (d) Funnel

### Reference:

1. Elements of workshop technology, Vol.1 by S. K. and H. K. Choudary.
2. A course in Workshop Technology ,Vol.1 by B.S.Raghuwanshi, Danpat Rai