# TEACHING SCHEME FOR B.E. (CIVIL), PU, CHD.

## FIRST YEAR

### SEMESTER-I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
<th>University External marks</th>
<th>University Internal marks</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHS101</td>
<td>Calculus</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>CIV101</td>
<td>Introduction to Civil Engineering</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>CS101</td>
<td>Programming Fundamental</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>APH 105</td>
<td>Mechanics</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>HSS101</td>
<td>Ethics and Self-Awareness</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>GS101</td>
<td>Introduction to Environmental Science</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
<td>300</td>
<td>300</td>
<td>100</td>
<td>700</td>
</tr>
</tbody>
</table>

### SEMESTER-II

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
<th>University External marks</th>
<th>University Internal marks</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH201</td>
<td>Applied Chemistry</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>HSS202</td>
<td>Communication Skills</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>MATHS201</td>
<td>Differential Equations and Transforms</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>ME203</td>
<td>Workshop Practice</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>CIV201</td>
<td>Building Materials and Construction</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>CIV202</td>
<td>Fluid Mechanics</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
<td>300</td>
<td>300</td>
<td>100</td>
<td>700</td>
</tr>
</tbody>
</table>
**SEMESTER I**

**Paper Title**: Calculus  
**Paper Code**: MATHS101  
**Course Duration**: 45 lectures of one hour each.

**Max (Univ. Exam) Marks**: 50  
**Time of examination**: 3hrs.

**Internal Assessment**: 50

**Note for the examiner**: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

**Objectives**
- To understand the behavior of infinite series and its use.
- To learn the concepts of functions of two and more than two variables and their applications.
- To learn the methods to evaluate multiple integrals and their applications to various problems.
- To understand the concepts of Vector calculus and their use in engineering problems.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Topic</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>FUNCTIONS OF ONE VARIABLE</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>DIFFERENTIAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, Euler’s theorem for homogeneous functions, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor’s theorem, Errors and increments, Maxima and minima of a function of two and three variables, Lagrange’s method of multipliers (Scope as in Chapter 12, Sections 12.1 – 12.6, 12.8 – 12.9 of Reference 1).</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>SOLID GEOMETRY</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Cylinder, Cone, Quadric surfaces, Surfaces of revolution. (Scope as in: 10.6, 10.7 of Reference 1).</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>INTEGRAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Double and triple integrals, Change of order of integration, Change of Variables,</td>
<td></td>
</tr>
</tbody>
</table>
Applications to area, volume and surface area.  
(Scope as in Chapter 13 of Reference 1).

<table>
<thead>
<tr>
<th>5.</th>
<th>VECTOR DIFFERENTIAL CALCULUS</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vector-valued functions and space curves, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative (Scope as in Chapter 11, Sections 11.1, 11.3, 11.4, Chapter 12, Section 12.7 of Reference 1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.</th>
<th>VECTOR INTEGRAL CALCULUS</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green’s theorem in the plane, Surface Areas and Surface Integrals, Stoke’s Theorem, Gauss Divergence Theorem (Statements only) (Scope as in Chapter 14 of Reference 1).</td>
<td></td>
</tr>
</tbody>
</table>

**Outcomes**

- The students are able to test the behavior of infinite series.
- Ability to analyze functions of more than two variables and their applications.
- Ability to evaluate multiple integrals and apply them to practical problems.
- Ability to apply vector calculus to engineering problems

**References:**


---

**Paper Title** : Introduction to Civil Engg.
**Paper Code** : CIV 101

**Max (Univ. Exam) Marks** : 50  
**Time of examination** : 3hrs.

**Internal Assessment** : 50

**Note for the examiner:** A total of eight questions will be asked covering the whole syllabus. Candidate will be required to attempt any five questions.

**INTRODUCTION TO CIVIL ENGINEERING**

Civil engineering and basic human needs, Role of Civil Engineer in infrastructure development Branches of civil engineering.

**SURVEYING** Objectives – Principles – Classification –Uses for Surveying, Chain Surveying, Compass Surveying,
Levelling – objectives, principles, instruments and uses. Modern Tools of Surveying and Mapping: Introduction to Theodolite, Total Station, Global Positioning System, Remote Sensing and Geographic Information System

BUILDING MATERIALS AND THEIR PROPERTIES-
Introduction to Brick, Stone, Lime, Mortar, Cement, Steel, Concrete – Composition, Properties and Uses.

BUILDING CONSTRUCTION AND PLANNING
Buildings – Classification – Requirements of buildings, Components of buildings and their functions. Foundations functions and types, Dampness, Doors and windows (Location and sizes), types of roofs, types of stairs. Elementary principles and basic requirements of a building planning.

STRUCTURAL ENGINEERING
Classification and Components of a structure, behavior, Types of loads, Bureau of Indian Standards Codes, Introduction to Reinforced Concrete Design and Steel structure Design.

TRANSPORTATION SYSTEM

GEOTECHNICAL ENGINEERING
Types of Rocks, Types of soils, Mechanism of soil formation, Important terminologies.

HYDRAULICS & WATER RESOURCES DEVELOPMENT
Introduction to Hydrology, Importance of hydrological data in water resources planning. The hydrologic cycle, Water budget equation, Introduction to diversion headworks, Dams - Purpose, Selection of site, Water logging.

WATER SUPPLY/ SEWAGE DISPOSAL - Sources and Standards of drinking water (BIS), water treatment components and functions, Testing of sewage, sewage treatment components and functions.

BOOKS:

Basic Civil Engineering : Rakesh Beohar University Press Science
Hydraulic and Fluid Mechanics : Modi and Seth, Standard Book House, Delhi
Highway Engineering : S.K. Khanna, and C.E.G Justo, Nem Chand and brothers
Irrigation & Water Power Engg : B.C. Punmia, Laxmi Publications
Paper Title : Programming Fundamentals (Theory)

Paper Code : CS101
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50    Time of examination: 3hrs.
Internal Assessment : 50

Note for the paper setter: Total of 8 questions be set with 4 from part A and four from part B. Candidate will be required to attempt any 5 questions with at least two questions from each part.

Objective: To get basic knowledge of computers, its components and Operating systems and Linux. Shell Commands.

PART A

Introduction: (5 hrs)
Introduction to Programming Languages, Flowcharts, Algorithms, System Software (Assembler, Compiler, Translator, Debugger), Program Structure.

Basic Constructs of C: (7 hrs)
Keywords, Identifiers, Variables, Symbolic Constants, Data Types and their storage, Operands, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, Type Conversions, Precedence and Order of Evaluation, External Variables and Scope of Variables. Basic Input Output, Formatted I/O.

Program Control Flow: (7 hrs)
Statements and Blocks, Conditional Statements, IF, ELSE-IF, Switch Case statements, Control Loops, For, While and Do-While, Go to and Labels.

Arrays & Functions: (7hrs)
Arrays, Multi dimensional arrays, strings, pointer arrays, Functions, Function Prototyping, Scope of functions, Arguments, Call by value and call by references, static variables, recursion.

PART B

Structures: (6 hrs)
Structures, Array of Structures, Typedef, Unions, Bit fields, passing structures as an argument to functions, C-Pre-processor and Macros, Command line arguments.

Pointers: (6hrs)
Pointer declaration, initialization, Pointer arithmetic, Pointer to array and Pointer to structure.

Input and Output (7 hrs)
Standard and Formatted Input and Output, File Access & its types, Line Input and Output, Types of Files, Binary & ASCII Files, Error handling, stderr and exit functions.

Recommended Books:

Paper Title       : Programming Fundamentals (Practical) (CS151)
Internal Assessment : 50

Instruction for Students: The candidate will be attending a laboratory session of 2 hours weekly and students have to perform the practical related to the following list.

1. Introduction to basic structure of C program, utility of header and library files.
2. Implementation of program related to the basic constructs in C
3. Program using different data types in C
4. Programs using Loops and Conditional Statements in C
5. Programs using arrays single dimension and multi dimensions in C.
6. Implementation of Matrices and their basic functions such as addition, subtraction, multiplication, inverse.
7. Programs using functions by passing values using call by value and call by reference method
8. Programs related to structures and unions
9. Program to implement array using pointers
10. Programs related to string handling in C
11. Program to manage I/O files and Pointers

Paper Title       : Mechanics

Paper Code : APH 105
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50       Time of examination: 3hrs.
Internal Assessment : 50

Note for the paper setter: Total of 8 questions be set with 4 from part A and four from part B. Candidate will be required to attempt any 5 questions with at least two questions from each part.

Objective: To get basic knowledge of kinematics, types of oscillations and theory of relativity.

Simple Harmonic Motion : Review of basic kinematics (displacement, velocity, acceleration, time period and phase of vibration) and dynamics (restoring force and energetics) of simple harmonic motion,
differential equation of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits

Damped Oscillations: Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, bandwidth. Series LCR circuit as a damped oscillator.

Forced Oscillations: States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver’s frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit

Coupled Oscillations: Basic idea of coupled oscillators, Stiffness coupled oscillators and inertia coupled oscillators, normal coordinates, degrees of freedom and normal modes of vibrations

Motion under inverse square force

Special Theory of Relativity
Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation, four vectors, space-time continuum.

Books:
2. Mechanics by Hans and Puri

PRACTICALS (APH 155)
1. To find the moment of inertia of a flywheel.
2. To determine the value of acceleration due to gravity at a place with kater’s pendulum.
3. To determine the velocity of ultrasonics waves in a given liquid.
4. To determine the requeency of A.C. mains using a sonometer and an electro-magnet.
5. To find the capacitance of a capacitor using flashing and quenching of a neon lamp.
6. To plot graph between current and frequency in a series LCR circuit and to find the resonant frequency.
<table>
<thead>
<tr>
<th>Internal Assessment: 50</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>No. of Lectures</strong></th>
<th><strong>Introduction to Ethics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(06)</strong></td>
<td>Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Values, Norms, Standards and Morality</strong></th>
<th><strong>(04)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ethics and Business</strong></th>
<th><strong>(05)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C’s of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Self-Awareness</strong></th>
<th><strong>(04)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Self-Development</strong></th>
<th><strong>(02)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window, Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises</td>
<td></td>
</tr>
</tbody>
</table>

**BOOKS**
8. Twain, Allan, “Self-Awareness”

**Paper Title**: Introduction to Environment Science

**Paper Code**: GS101

**Max (Univ. Exam) Marks**: 50

**Time of examination**: 3hrs.

**Internal Assessment**: 50

**General**
Introduction, components of the environment, environmental degradation.

Ecology
Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

Air pollution and control
Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

Water pollution and control
Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.

Land Pollution
Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Noise Pollution
Sources, effects, standards and control.

Books & References

**Objective:** To teach fundamentals of basic chemical sciences essential for the development of new technologies to all branches of engineering.

**Details of the Course:**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Contents</th>
<th>Contact hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>POLYMER CHEMISTRY: Classification of polymers, Mechanism and methods of polymerisation, idea of number average and weight average molecular masses of polymers, preparation, properties and uses of polystyrene, polyester, polyamide, phenol-formaldehyde, silicones and epoxy resins,</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>CATALYSIS: Catalysis and general characteristics of a catalytic reactions, homogenepus catalysis, kinetics of acid, base and enzyme catalysis – Michealis Menten equations. Heterogenous catalysis. Application of catalysis for industrially important processes– hydrogenation (Wilkinson’s catalyst), hydroformylation, acetic acid process and Wacker process.</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>ELECTROCHEMISTRY: Introduction to electrochemistry, types of electrodes, Ion selective electrodes, Reference electrodes, Fuel cells (hydrogen-oxygen, propane-oxygen, methanol-oxygen fuel cells), Corrosion: Types of corrosion, dry and wet corrosion and their mechanisms, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, microbiological, inter-granular, stress corrosion), Factors influencing corrosion, Prevention of corrosion.</td>
<td>8</td>
</tr>
<tr>
<td>molecules (effect of masses of atoms, bond strength, nature of substituent, hydrogen bonding on IR frequency), sample preparation for IR.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. COORDINATION CHEMISTRY: Introduction, Crystal Field Theory, Splitting of octahedral, tetrahedral and square planner complexes, crystal field stabilization energies of octahedral and tetrahedral complexes and its applications.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Books suggested:**


**Practicals (CIV-251)**

Instruction for Students: The candidate will be attending a laboratory session of two hours weekly and has to perform any eight experiments.

- Volumetric analysis: iodometric titrations, complexometric titrations, Acid-base titrations
- Analysis of lubricants: Viscosity/surface tension/saponification value/acid value
- Instrumental techniques for chemical analysis: conductometry, potentiometry, UV-visible/IR spectrophotometer.
- Preparation of few organic compounds/inorganic complexes/polymer

**Books Recommended:**


**Paper Title** : Communication Skills  
**Paper Code** : HSS202  
Max (Univ. Exam) Marks: 50  
Time of examination: 3hrs.  
Internal Assessment : 50  
Part –A
Fundamentals of Communication Skills (02)
Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing

Writing Skills (04)
Basics of Grammar – Word Order, Sentence Construction, Placing of Subject and Verbs, Parts of Speech, Use of Tenses, Articles, Prepositions, Phrasal Verbs, Active-Passive, Narration

Vocabulary Building and Writing (03)
Word Formations, Synonyms, Antonyms, Homonyms, One-Word Substitutes, Idioms and Phrases, Abbreviations of Scientific and Technical Words

Speaking Skills (03)
Introduction to Phonetic Sounds, English Phonemes, Stress, Rhythm and Intonation, Countering Stage Fright and Barriers of Communication

Reading and Comprehension (02)

Part –B

Advanced Communication Skills (02)
Scope, Significance, Process of Communication in an organization, Types and Levels, Communication Networks, Technical Communication, Tools of Effective Communication

Speaking Skills and Personality Development (05)
Interpersonal Communication, Presentation Skills, Body Language and Voice Modulation, Persuasion, Negotiation and Linguistic Programming, Public Speaking, Group Discussions, Interviews and Case Studies, Power Point Presentations, Relevant to the context and locale, Technical Presentations, Conducting, Meeting and Conferences

Communication and Media (01)
Social and Political Context of Communication, Recent Developments in Media

Advanced Techniques in Speaking Skills (02)
Importance of Listening/Responding to native and global accents, Telephonic Interviews and Video Conferencing

Advanced Techniques in Technical Writing (04)
Job Application, CV Writing, Business Letters, Memos, Minutes, Reports and Report Writing Strategies, E-mail Etiquette, Blog Writing, Instruction Manuals and Technical Proposals

Practical Sessions (HSS 252)

1. Individual presentations with stress on delivery and content
2. Overcoming Stage Fright - Debates, extempore
3. How to discuss in a group - Group Discussion
4. Discussion on recent developments and current debates in the media
5. How to prepare for an Interview and face it with confidence
6. Conducting meeting and conferences
7. Exercises on Composition & Comprehension, Reading Improvement

**TEXT BOOKS**
Quirk, Randolph. and Sidney, Greenbaum., “A University Grammar of English”, Pearson Education
Bovee, Courtland L. and John, V. Thill., “Business Communication Today”, Pearson Education

**BOOKS**
- Guffrey, Mary E., “Essentials of Business Communication”, South-Western College Publishing
- Scott, Bill., “Communication for Professional Engineers”, Thomas Teleford Ltd.
- Lock, R., “Student Activities for taking charge of your Career Direction and Job Search”, Cole Publishing

**Paper Title** : Differential Equations and Transforms
**Paper Code** : MATHS201
**Pre Requisite** : Calculus (MATHS101)
**Course Duration**: 45 lectures of one hour each.

**Max (Univ. Exam) Marks** : 50  **Time of examination**: 3hrs.
**Internal Assessment** : 50

**Note for the examiner**: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

**Objectives**
- To learn the methods to formulate and solve linear differential equations and their applications to engineering problems
- To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform
- To apply Laplace transforms to solve ordinary differential equations
- To learn the concept of Fourier series, integrals and transforms.
- To learn how to solve heat, wave and Laplace equations.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Topic</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>ORDINARY DIFFERENTIAL EQUATIONS</strong></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Review of geometrical meaning of the differential equation ( y' = f(x, y) ), directional fields, Exact differential equations (Scope as in Chapter 8, Section 8.7 of Reference 5), Integrating factors (Scope as in Chapter 8, Section 8.8 of Reference 5), Solution of differential equations with constant coefficients: method of differential operators. Non-homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters (Scope as in Chapter 9, Section 9.7 of Reference 5). Power series method of solution (Scope as in Chapter 10, Section 10.2 of Reference 2)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><strong>Laplace Transforms</strong></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac’s Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions (Scope as in Chapter 5, Sections 5.1 – 5.5 of Reference 1).</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td><strong>Fourier Series and Transforms:</strong> Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 10, Sections 10.1 – 10.5, 10.7 – 10.10 of Reference 1).</td>
<td>8</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Partial Differential Equations:</strong> Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve (Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 4).</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Boundary Value Problems:</strong> D’Alembert’s solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation, Laplace equation in Cartesian and Polar coordinates (Scope as in Chapter 11, Sections 11.1, 11.3 – 11.5, 11.8 – 11.9 of Reference 1).</td>
<td>8</td>
</tr>
</tbody>
</table>

**Outcomes**

1. The student will learn to solve Ordinary Differential equations.
2. The students will be able to apply the tools of Laplace Transforms to model engineering problems and solve the resulting differential equations.
3. Students will understand the nature and behavior of trigonometric (Fourier) series and apply it to solve boundary value problems.

**References:**

**Paper Title**: Workshop Practice  
**Paper Code**: ME203  
**Max (Univ. Exam) Marks**: 50  
**Time of examination**: 3hrs.  
**Internal Assessment**: 50  
**End semester Assessment (University Exam)**: 0 marks  
**Continuous Assessment (Sessional)**: 25 Marks  
**Course Prerequisites**: Basic Workshop Practices  

<table>
<thead>
<tr>
<th>Course Objectives (CO)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Student will be able to:</td>
<td></td>
</tr>
<tr>
<td>1. Know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals.</td>
<td></td>
</tr>
<tr>
<td>2. Understand different Mechanisms, Use of Machines, Tools and Equipment.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Outcome</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>This course is designed to help students achieve the following outcomes.</td>
<td></td>
</tr>
<tr>
<td>1) Familiarity with common machines, Tools and Equipment in basic Workshop Practices.</td>
<td></td>
</tr>
<tr>
<td>2) On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal, Smithy, Foundry and Carpentry Workshops in Engineering professions.</td>
<td></td>
</tr>
<tr>
<td>3) Applications of Basic Workshop Practices.</td>
<td></td>
</tr>
</tbody>
</table>

**SYLLABUS**

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly.

Practice of basic exercises related with different shops. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal, Smithy, Foundry and Carpentry Workshops in Engineering professions.


Jobs: Butt Joint in Flat Position using SMAW.

Lap Joint using Spot Welding

Edge Joint in Horizontal Position using SMAW

Tee Joint in Flat position using SMAW

Corner Joint in vertical position using SMAW.
<table>
<thead>
<tr>
<th>Workshop</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defect Identification and marking.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Edge preparation and Fillet making, Tacking, Distortion identification</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Electronics Workshop</strong></td>
<td>To know about Soldering mechanism and techniques</td>
</tr>
<tr>
<td></td>
<td>Familiarity with Electronic Components / symbols</td>
</tr>
<tr>
<td></td>
<td>Testing of electronic components</td>
</tr>
<tr>
<td></td>
<td>Application of Soldering: Circuit Assembly</td>
</tr>
<tr>
<td></td>
<td><strong>List of Jobs:</strong></td>
</tr>
<tr>
<td></td>
<td>Practice of Soldering and de-soldering</td>
</tr>
<tr>
<td></td>
<td>Identification and testing of a) passive electronic components b) Active electronic components</td>
</tr>
<tr>
<td></td>
<td>Assembly of Regulated Power supply circuit</td>
</tr>
<tr>
<td><strong>Electrical Workshop:</strong></td>
<td>Introduction of Various Electric wirings, Wiring Systems, Electrical wiring material and fitting, different type of cables, Conduit pipe and its fitting, inspection points, switches of all types, Distribution boards, M.C.B’s etc.</td>
</tr>
<tr>
<td></td>
<td>Electric Shock and its management.</td>
</tr>
<tr>
<td></td>
<td>Electric Tools: Conversance with various tools and to carry out the following:</td>
</tr>
<tr>
<td></td>
<td>a) Measurement of wire sizes using SWG and micrometer</td>
</tr>
<tr>
<td></td>
<td>b) Identification of Phase and neutral in single phase supply</td>
</tr>
<tr>
<td></td>
<td><strong>Jobs:</strong></td>
</tr>
<tr>
<td></td>
<td>To control a lamp with a single way switch</td>
</tr>
<tr>
<td></td>
<td>To control a lamp from two different places</td>
</tr>
<tr>
<td></td>
<td>To assemble a fluorescent lamp with its accessories</td>
</tr>
<tr>
<td></td>
<td>To control a lamp, fan and a three pin socket in parallel connection with single way switches</td>
</tr>
<tr>
<td><strong>Fitting Shop:</strong></td>
<td>Introduction of Fitting, different type of operations, Tools, materials, precision instruments like Vernier caliper and Micrometer etc.</td>
</tr>
<tr>
<td></td>
<td>Safety precautions and Practical demonstration of tools and equipments</td>
</tr>
<tr>
<td></td>
<td><strong>Jobs:</strong></td>
</tr>
<tr>
<td></td>
<td>To make a square from MS Flat, Punching, Cutting, Filling techniques and practice, Tapping, Counter Drilling</td>
</tr>
<tr>
<td><strong>Smithy Workshop:</strong></td>
<td>Introduction of Smithy and Forging process, Tools and Equipment’s, Operations, Heat Treatment processes, Advantages, Dis-advantages, Defects and Safety precautions.</td>
</tr>
<tr>
<td></td>
<td><strong>Jobs:</strong> Drawing and Upsetting Practice using Open Hearth Furnace.</td>
</tr>
<tr>
<td></td>
<td>Cold working process practice</td>
</tr>
<tr>
<td></td>
<td>Heat Treatment ¦ Annealing and hardening process</td>
</tr>
<tr>
<td><strong>Machine Shop :</strong></td>
<td>Application, Function and different parts, Operations of Lathe, Type of Cutting Tools and their materials, Drill machine Types, applications and Functions. Hacksaw machines and functions, Work Holding devices and tools, chucks, Vices, machine Vices, V Block, Measuring Instruments uses, Shaper and Milling machine Applications.</td>
</tr>
</tbody>
</table>
Jobs: To perform Marking, Facing, Turning, Taper Turning, Grooving, Knurling, parting, Drilling, Reaming operations on lathe machine, Hacksawing practice on Power hacksaw, Shaping operation practice on Shaper

**Carpentry Shop:** Classification of Tree, Timber. Advantages and uses of timber, Seasoning of Wood, Tools Used, Defects and Prevention of Wood,

Jobs:
Tee Joint
Cross Joint
Tenon Joint,
L Shape Joint
Practice of Wood Working Lathe
Practice on multi-purpose Planer

**Foundry Shop:** Introduction to Foundry, Advantages and Disadvantages of castings process, Introduction to pattern and various hand tools, Ingredients of Green sands, Various Hand Molding processes, Introduction to Casting Defects,

Jobs: Identification and uses of hand tools, Preparation of Green sand in Muller, Preparation of Sand Mould of Single piece solid pattern, Split pattern, Preparation of Green sand Core, casting of a Mould and study its defects.

### RECOMMENDED BOOKS

<table>
<thead>
<tr>
<th>NAME</th>
<th>AUTHOR(S)</th>
<th>PUBLISHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Basic Manufacturing Processes and Workshop Technology</td>
<td>Rajender Singh</td>
<td>New Age International Publication</td>
</tr>
<tr>
<td>Manufacturing Processes</td>
<td>Chapman</td>
<td>Viva Books Private Limited</td>
</tr>
</tbody>
</table>

**Paper Title:** Building Materials and Construction
**Paper Code:** CIV 201

Course Duration: 45 lectures of one hour each.
Max (Univ. Exam) Marks : 50
Internal Assessment : 50

Time of examination: 3hrs.

Note: The examiner shall set 8 questions i.e. 4 from each part and students shall be required to attempt a total of 5 questions with at least 2 questions from each part.

Objectives: To learn the various building materials and standardized laboratory techniques used to evaluate construction materials performance. To understand the various types of masonry works, causes and affects of dampness, various damp proofing methods, understand and utilize basic principles used in Building Construction.

SECTION – A

BUILDING STONES

General, Qualities of a good building stone, Deterioration of stones, Preservation of stones, Common building stones of India & their Uses, Artificial stones.

BRICKS

General, Constituents of bricks, desirable and harmful ingredients in brick earth, qualities of good bricks, testing of bricks, strength, Absorption, weathering of bricks. Varieties of fire bricks, sand lime bricks, building tiles- roofing; flooring and wall tiles.

LIME

Cementing material, Characteristics of good quality lime, classification & testing of Lime, Hydraulic test, acid test, setting & slaking of lime, uses of different varieties of lime

TIMBER

Advantages of timber construction, timber trees- exogenous and endogenous trees; soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics of good timber, uses and testing of timber

CEMENT AND CONCRETE

Constituents of concrete, different types of cements used and their strengths, Ingredients and manufacture of cements. Hydration and compounds of hydration. Properties and various tests of cement

SECTION - B

BRICK & STONE MASONRY

Terms used; types of bonds; their merits and demerits; Rubble and ashlar joints in stone masonry, introduction to cement concrete hollow blocks

WALLS AND FOUNDATION

Load bearing and non-load bearing walls, estimation of load on walls and footings, Thickness considerations, partition and cavity walls.

DAMP PROOFING
Sources, Causes of dampness in buildings, bad effects of dampness, methods of damp proofing.

ARCHES AND LINTELS
Introduction to terms used in Arches; different types of arches; brick and stone arches, types and functions of lintels.

DOORS AND WINDOWS
Introduction terms used location of doors and windows, types of doors and windows, Ventilators

PLASTERING, POINTING AND PAINTING
Introduction, objects and types, special materials for plastered surfaces, distempering, white washing and color washing of plastered surfaces.

FLOORS
Introduction, various types of floors commonly used and their suitability for different buildings, anti-termite treatment.

BOOKS:
3. Building Construction : S.K. Sharma, S. Chand

Paper Title : Fluid Mechanics
Paper Code : CIV202
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50 Time of examination: 3hrs.
Internal Assessment : 50

Note: The examiner shall set 8 questions i.e 4 from each part and students shall be required to attempt a total of 5 questions with at least 2 questions from each part.

Objective: The objective of this course is to introduce the students with various types of Fluids and their properties, concept of Fluid Statics, Fluid Dynamics, and Various types of Flows.

SECTION - A

FLUID AND THEIR PROPERTIES

Concept of fluid, difference between solids, liquids and gases; ideal and real fluids; Continuum concept of fluid: density, specific weight and relative density; viscosity and its dependence on temperature; surface tension and capillarity, vapor pressure and cavitation: compressibility and bulk modulus; Newtonian and non-Newtonian fluids.
**FLUID STATICS**

Concept of pressure, Pascal’s law and its engineering hydrostatic paradox. Action of fluid pressure on plane (horizontal, vertical and inclined) submerged surface, resultant force and center of pressure, force on a curved surface due to hydrostatic pressure. Buoyancy and floatation, stability of floating and submerged bodies, Metacentric height and its determination.

**FUNDAMENTALS OF FLUID FLOW**


**FLUID DYNAMICS**

Forces acting on Fluid in motion, Euler’s equation of motion, Bernoulli’s equation, Impulse momentum equation, kinetic energy and momentum correction factors, flow along a curved streamline, free and forced vortex motions.

**SECTION –B**

**LAMINAR FLOWS**

Flow regimes and Reynolds number, critical velocity and critical Reynolds number, laminar flow in circular cross section pipes. Navier-stokes equations in Cartesian coordinates (no derivation), meaning of terms, flow between parallel plates, stokes law.

**TURBULENT FLOWS**

Turbulent flows, scale and intensity, Effects of turbulent flow in pipes and flow losses in pipes, Darcy equation, Minor head losses in pipe fittings. Equation for velocity distribution in smooth and rough pipes (no derivation).

**BOUNDARY LAYER ANALYSIS**

Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

**DIMENSIONAL ANALYSIS AND SIMILITUDE**

Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh’s and Buckingham’s Pi method for dimensional analysis, dimension less number and their significance, geometric, kinematic and dynamic similarity, model studies.

**BOOKS:**

1. Fluid Mechanics : Dr. Baljeet S. Kapoor , New Age Publishers
2. Fluid Mechanics & Hydraulic Power Engineering: D.S Kumar, Kataria & Sons
6. Fluid Mechanics & Hydraulic Machines : S.C. Gupta, Pearson Education