CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

<table>
<tr><td>Semester-3rd</td><td colspan="5">Branch: Civil Engineering</td></tr>
<tr><td>Subject:Engineering_Mathematics-III</td><td colspan="5">Code:3000C01AT014</td></tr>
<tr><td rowspan="3">Maximum/Minimum-Passing Marks: 100/35
Teacher Assessment Marks: 20
Class Test Marks: 20</td><td colspan="5">Periods/week:</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>Ass. Hours</td><td>Teaching Hrs/Sem</td></tr>
<tr><td>02</td><td>01</td><td>-</td><td>15</td><td>45</td></tr>
<tr><td>Class Tests: 2 (Mandatory)</td><td colspan="5">Assignments: 2 (Minimum)</td></tr>
<tr><td>Duration (ESE): 3 hours</td><td colspan="5">Total Credits: 3</td></tr>
</table>

Course Objectives	Course Outcomes
The objective of this course is to familiarize the prospective engineers 1. To make the students understand that Fourier series analysis is a powerful method where the formulas are integrals and to have knowledge of expanding periodic functions that explore variety of applications of Fourier series. 2. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differential equations. 3. To have a thorough knowledge of PDE which arise in mathematical descriptions of situations in engineering. 4. To provide a sound background of complex analysis to perform a thorough investigation of major theorems of complex analysis and to apply these ideas to a wide range of problems that include the evaluation of both complex line integrals and real integrals. 5. To study about a quantity that may take any of a given range of values that can't be predicted exactly but can be described in terms of their probability	**Course Outcome: After studying the contents of the syllabus in detail the students will be able to** 1. Define Fourier series including half range series, Harmonic analysis and variety of its applications. 2. Define (mathematically) Unit step, Unit impulse, Laplace transforms, its properties, Inverse and applications to solve ordinary differential equations. 3. Form and solve by direct integration method Linear equation of first order including Homogeneous and Non-homogeneous Linear equations and also method of separation of variables. 4. Solve difficult problems using theorems of complex analysis and apply Residue theorem to evaluate real integrals. 5. Understand discrete and continuous probability distribution and be able to find mean and standard deviation and use the Uniform distribution.

UNIT–I: FOURIER SERIES

Euler's formula, Functions having point of discontinuity, Change of interval, Odd and Even function, Half range series, Harmonic analysis. **[9 Hrs]**

UNIT–II: LAPLACE TRANSFORM

Definition, Transform of elementary functions, Properties of Laplace transform, Transform of Derivatives & integrals, Multiplication by t^n Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem (Without Proof), Unit Step function, Unit impulse function, Periodic function, Application to the solution of ordinary differential equations. **[9 Hrs]**

UNIT– III: PARTIAL DIFFERENTIAL EQUATION

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables. **[9 Hrs]**

UNIT–IV: THEORY OF COMPLEX VARIABLES:

Limit, Derivative and Analytic functions; Cauchy-Riemann equations (Cartesian form) Harmonic functions, Flow problems, Complex Integration: Line and Contour integral, Cauchy integral theorem and Integral formula; Taylor series, Laurent series; singularities; Poles and their orders and residues; Evaluation of real definite integrals(Unit Circle). **[9 Hrs]**

UNIT–V: RANDOM VARIBLES

Discrete and continuous probability distributions, Expectation, Mean, Standard Deviation &Variance, probability distributions- Binomial, Poisson and Normal distributions. **[9 Hrs]**

Text Books:

S. No.	Title	Authors	Edition	Publisher
1)	Higher Engineering Mathematics	B. S. Grewal	45th Edition,2024-25	Khanna Publishers
2)	Advanced Engineering Mathematics	H.K. Dass	28th Edition, 2012	S. Chand Publication
3)	Advanced Engineering Mathematics	Erwin Kreyszig	9th Edition, 2006	John Wiley & Sons
	Applied Engineering	Madan Mohan	2nd Edition,2016	B S Publications

4)	Mathematics	Singh		
5)	Engineering Mathematics (Hindi)	S. C. Goyal	6th Edition, 2022	Khanna Publishers

Reference Books:

S. No.	Title	Authors	Edition	Publisher
1	Advanced Engg. Mathematics	R.K. Jain and S.R.K. Iyengar	3rd Edition 2008	Narosa Publishing House
2	Applied Mathematics	P.N.Wartikar & J.N. Wartikar	Vol- II	Vol- II– Pune Vidyarthi Grih Prakashan,Pune
3	Applied Mathematics for Engineers & Physicists	Louis A. Pipes, Lawrence R Harvill	3rd Edition	Tata Mc Graw-Hill
4	Applied engineering Mathematics-III	Pathak, H.K.	2nd Edition	Shiksha Sahitya Prakashan
5	Calculus and Analytic geometry	G.B. Thomas and R.L. Finney	9th Edition 2002	Pearson, Reprint
6	Higher Engineering Mathematics	B.V. Raman	11th Reprint 2010	Tata Mc Graw Hill New Delhi
7	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Reprint, 2010.	Laxmi Publications
8	Ganit aur Uske Anuprayog	V. K. Singh	5th Edition, 2021	Arihant Publication

1. **E- resources/ Web Sources:** NPTEL You Tube Channel
2. SWAYAM Portal: Online Lectures on Engineering Mathematics. (https://onlinecourses swayam2.ac.in/cec20_ma02/preview).

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BHILAI (C.G.)

<table>
<tr><td>Semester: 3rd</td><td colspan="5">Branch: Civil Engineering</td></tr>
<tr><td>Subject: Introduction to Fluid Mechanics</td><td colspan="5">Code: 3020C02BT020</td></tr>
<tr><td rowspan="2">Maximum/Minimum-Passing Marks: 100/35
Teacher Assessment Marks: 20
Class Test Marks: 20</td><td colspan="5">Periods/week:</td></tr>
<tr><td colspan="5"><table><tr><th>L</th><th>T</th><th>P</th><th>Ass. Hours</th><th>Teaching Hrs/Sem</th></tr><tr><td>02</td><td>01</td><td>-</td><td>15</td><td>45</td></tr></table></td></tr>
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<tr><td>Duration (ESE): 3 Hours</td><td colspan="3">Total Credits: 3</td><td colspan="2">Teaching Hours: 45</td></tr>
</table>

Course Objectives:

1. To provide knowledge the concept of fluid statics in different engineering problems.
2. To study about the principle of fluid kinematics.
3. To analysis the energy and momentum principle.
4. To study about the pipe flow and open channel flow.
5. To have thorough knowledge of the flow through mouthpiece, orifice, notch and weir.

UNIT-I: Introduction and Fluid Statics

Fluid and continuum, physical properties of fluids ideal and real fluid, Newtonian and Non- Newtonian Fluid. Pressure density height relationship, pressure measurement by Manometers, Pressure on plane surface, centre of pressure, buoyancy, stability of immersed and floating bodies, meta- centric height. **(9 Hrs)**

UNIT-II: Kinematics of fluid flow

Steady and unsteady flow, uniform and non-uniform flow, laminar and turbulent flow, one, two and three dimensional flow, streamlines, streak lines and path lines, velocity and acceleration, circulation and vorticity, rotational, and irrotational flow, velocity potential and stream function, continuity equation. **(9 Hrs)**

UNIT-III: Dynamics of fluid flow

Euler's equation of motion along a streamline and its integration, Bernoulli's equation and. its applications – Pitot tube, Venturimeter, Orificemeter, nozzles, momentum equation and its application to stationary and moving plates/vanes, pipe bends, problems related to combined application of energy and momentum equations. **(9 Hrs)**

UNIT-IV: Flow in Pipes and Open Channel Flow

Reynolds's experiment, experimental determination of critical velocity, transition from laminar to turbulent flow, Laminar flow through circular tubes, minor losses in pipe lines, loss due to sudden contraction, expansion, etc; Hot wire anemometer and LDA.
Flow in open Channel Comparison between open channel and pipe flow, definition of uniform and non-uniform flow, uniform flow formulae - Chezy's and Manning's Formula, Hydraulically efficient channel section of rectangular and trapezoidal shape**.**
(9 Hrs)

UNIT-V: Flow through mouthpiece and orifices & Notches and Weirs

Hydraulic coefficients of orifice, bell method orifice, mouthpieces, Borda's mouthpiece, running free and submerged. Notches and Weirs-Rectangular, triangular and trapezoidal notches and weir, Cippoletti and broad crested weir, velocity of approach. **(9 Hrs)**

Course Outcomes: On completion of the course, the learner will be able to:

1. Apply the concept of fluid statics in different engineering problems.
2. Apply the principle of fluid kinematics.
3. Apply the energy and momentum principle.
4. Analyze the pipe flow and open channel flow.
5. Analyze the flow through mouthpiece, orifice, notch and weir.

Text Books:

1. Fluid Mechanics and Machines Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics Dr. P.N. Modi (Standard Book House)
4. Fluid Mechanics and Hydraulic Machines K. Subramanya Mc Graw Hill
5. Hydraulics and Hydraulic Machines (हिंदी) by B. L. Gupta (Standard Publishers)

Reference Books:

6. Mechanics of Fluid Irving H. Shames (Mc Graw Hill)
7. Introduction to Fluid Mechanics James A. Fay (Prentice Hall India)
8. Fluid Machines Dr. Jagdish Lal (Metropolitan Book Company)
9. Hydraulics, Fluid Mechanics and Hydraulic Machines R.S. Khurmi and N. Khurmi (S. Chand)
10. Fluid Mechanics (हिंदी) by S. K. Saini, (Neelkanth Publishers Pvt. Ltd.

E-resources / Web Sources:

1. Fluid Mechanics, Prof. Subashisa Dutta | IIT Guwahati
2. Fluid Machines, Prof. Sankar Kumar Som | IIT Kharagpur
3. Virtual Lab Hydraulics and Fluid Mechanics Lab
   http://eerc03-iiith.vlabs.ac.in/ https://fmc-nitk.vlabs.ac.in/fluidmachinery/
   · Bernoulli's Experiment
   · Venturi Meter Experiment
   · Jets Experiment

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BHILAI (C.G.)

<table>
<tr><td colspan="3">Semester: 3rd</td><td colspan="4">Branch: Civil Engineering</td></tr>
<tr><td colspan="3">Subject: Surveying & Geomatics</td><td colspan="4">Code: 3020C03BT020</td></tr>
<tr><td colspan="3" rowspan="3">Maximum/Minimum-Passing Marks: 100/35
Teacher Assessment Marks: 20
Class Test Marks: 20</td><td colspan="4">Periods/week:</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>Ass. Hours</td><td>Teaching Hrs/Sem</td></tr>
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<tr><td colspan="3">Duration (ESE): 3 Hours</td><td colspan="2">Total Credits: 3</td><td colspan="2">Teaching Hours: 45</td></tr>
</table>

Course Objectives:

1. Get an overview of applications of modern surveying tools & Techniques like Electronic Distance Measurement (EDM), Total Stations, Drones, and Global Navigation Satellite Systems (GNSS) and carry out Tacheometric surveying.
2. Effectively use theodolite for measuring horizontal and vertical angles and carry out traversing.
3. Understand the methods for setting out curves.
4. Understand the fundamentals Remote sensing.
5. Understand the fundamentals Graphical Information System (GIS) and Global Positioning System (GPS).

UNIT-I: Introduction to Modern Tools & Techniques of Surveying and Tacheometry

- **Introduction to Modern Tools & Techniques of Surveying** *(Over view of Basic Principle, General Types, Usage and Application)***:** Electronic Distance Measurement (EDM) Instruments, Total Stations**.** ***(Field Procedures*** *to be covered in lab),* Drones in Surveying (**Data Collection:** Photogrammetry, LiDAR, and multispectral imaging.), Use of Global Navigation Satellite Systems (GNSS) in Leveling.
- **Tacheometry: Principles and Methods, Stadia Method:** Instruments, principles, field procedure, **Tangential Method:** Principles, computation methods, accuracy, and application. **(9 Hrs)**

UNIT-II: Theodolite Traversing

- Introduction to Theodolite Traversing: **Definition, Importance, Temporary and Permanent Adjustments,**
- Methods for Measurement of Horizontal and Vertical Angles: **Horizontal Angle Measurement,** Repetition and reiteration methods. **Vertical Angle Measurement,** Using the vertical circle, elevation and depression angles.
- Setting up, sighting, recording angles. ***(****Field Procedures to be covered in lab)*
- Methods of Traversing: **Open Traverse** (Steps, applications, and limitations) **Closed Traverse** (Steps, applications, and advantages).
- Balancing a Traverse: Computation methods, error adjustment (Bowditch's method, Transit method).
- Omitted Measurements: Techniques for computing missing data. **(9 Hrs)**

UNIT-III: Curves

- **Elements of Horizontal Curves:** Simple Curves, Compound Curves, Reverse Curves and Transition Curves**.**

- **Methods for Setting Out Horizontal Curves**:
  - **Simple Curves**: Tangent method, chord method, and deflection angle method.
  - **Compound Curves**: Calculation and layout.
  - **Reverse Curves**: Principles and setting out techniques.
  - **Transition Curves**: Characteristics and methods for layout.
- **Vertical Curves**:
  - **Types**: Crest and sag curves.
  - **Design Elements**: Length, gradient, and radius.
  - **Methods for Setting Out Vertical curve:** (Only Over view) **(9 Hrs)**

UNIT-IV: Introduction to Remote Sensing

- Introduction: **Definition, Basic Principles of Remote Sensing,** Concepts of capturing data from a distance using satellites or aircraft.
- Engineering Applications: Use in construction, transportation, and resource management.

- Electromagnetic Spectrum: ***(Only Over view)***
  - Spectrum Bands: Different bands (visible, infrared, microwave) and their applications.
  - Interaction with Earth's Surface: How materials reflect and absorb electromagnetic waves.
- Ideal Remote Sensing System: **Components**: Sensors, platforms, data acquisition, and processing. **Characteristics**: High spatial, spectral, and temporal resolution. **Data Collection Methods**: Passive and active remote sensing techniques.
- Over view of Analysis and Interpretation Techniques:
  - **Digital Image Processing**: Techniques for enhancing and analyzing satellite images.
  - **Image Pre-processing**: Radiometric and geometric corrections.
  - **Image Enhancement**: Techniques like contrast stretching and filtering.
  - **Classification and Analysis**: Supervised and unsupervised classification methods.

    (9 Hrs)

UNIT-V: Introduction to Graphical information system and Global Positioning System:

- **Introduction to GIS:** Basic spatial concepts, Coordinate systems, Components of a GIS (hardware, software, data, people, methods) Types of data (spatial, attribute data)
  - **Spatial Data Models:** Raster data structures and models, Vector data structures and models.
  - **Data Management and Output:** Data management functions (import/export, raster-to-vector conversion), Map compilation and multimedia output Distributed GIS vs. enterprise GIS
  - **Applications of GIS:** Engineering and construction, Case studies and real-world examples
- **Global Positioning System (GPS):** Definition and principles of GPS, Geodesy, geoid, and reference ellipsoid, GPS satellite orbits and clock systems.
  - GPS Data Processing: Single point positioning, Relative and differential positioning, Sources of errors (satellite geometry, atmospheric effects, multipath), Data processing models and techniques. **GPS Surveying:** Setting up GPS observation plans, Conducting GPS surveys, Data collection and post-processing
  - **Applications of GPS:** Navigation and vehicle tracking, Location-based services (LBS), Special applications (e.g., disaster management, traffic engineering) Case studies.

    (9 Hrs)

Course Outcomes: On completion of the course, the learner will be able to:

1. Understand the basic principles, general types, usage, and applications of modern surveying tools, including EDM instruments, Total Stations, Drones, and GNSS. and carry out Tacheometric surveying.
2. Apply the principles and methods for measuring horizontal and vertical angles using theodolite traversing, including temporary and permanent adjustments.
3. Analyze the elements and methods for setting out horizontal and vertical curves, including simple, compound, reverse, and transition curves.
4. Evaluate the principles and applications of remote sensing technologies, including the electromagnetic spectrum, data collection methods, and analysis techniques.
5. Create comprehensive analysis and applications of GIS and GPS data for engineering and construction projects, including data processing, error correction, and practical applications.

Text Books:

1. "Surveying Vol. 1 and II " by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain (Laxmi Publications)
2. “Surveying and Levelling Vol. I and II” by T. P. Kanetkar and S.V.Kulkarni (Pune Vidyarthi Griha Prakashan)
3. “Surveying and Levelling” by Subramanian (Oxford Publication).
4. “Surveying” by AM Chandra (New Age International Publisher)
5. “Introduction to Surveying and Geomatics” by PK Garg, (CBS Pub.)
6. Advance Surveying (हिंदी) (Unchya Surveshan) (Remote Sensing, GPS & Total station) by Amit Gupta, B. L. Gupta, (Standard Publishers)

Reference Books:

1. "Surveying Principles and Applications" by Barry F. Kavanagh and Tom B. Mastin (Pearson)
2. “GPS for Land Surveyors” by Jan Van Sickle (CRC Press)
3. “Advanced Surveying: Total Station, GIS and Remote Sensing” by Satheesh Gopi, (Pearson Education India)
4. “Surveying and Geomatics Engineering: Principles, Technologies, and Applications” by Daniel T. Gillins, Michael L. Dennis, Allan Y. Ng (Wiley)
5. "Elementary Surveying: An Introduction to Geomatics" by Charles D. Ghilani and Paul R. Wolf (Pearson)
6. “अधरभुत सर्वेक्षण” by Anurag Nagar, Manoj Kumar Suthar, (Neelkanth Publication)

E-resources / Web Sources:

1. Essentials of Surveying: Application and Techniques, By Mr. Pankaj Kumar Swarnkar, Chhattisgarh Swami Vivekanand Technical University, Bhilai.
2. Surveying, IIT Roorkee by Prof. J.K. Ghosh.
3. Modern Surveying Techniques, IIT Kanpur,
4. Basics of Remote Sensing, Geographical Information System (GIS) and Global Navigation Satellite System (GNSS) by ISRO, SWAYAM (NPTEL)
5. Virtual Lab: Surveying Lab http://sl-iitr.vlabs.ac.in/sl-iitr/
   · Observations of Vertical and Horizontal angles using Total Station
   · Study of Global Positioning System (GPS) and its Accessories
   · Observations using GPS

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<table>
<tr><td>Semester: 3rd</td><td colspan="2">Branch: Civil Engineering</td></tr>
<tr><td>Subject: Material Testing & Evaluation</td><td colspan="2">Code: 3020C04CT020</td></tr>
<tr><td>Maximum/Minimum-Passing Marks: 100/35
Teacher Assessment Marks: 20
Class Test Marks: 20</td><td colspan="2">Periods/week:
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</table>

Course Objectives:

1. To comprehend the critical role and scope of various building materials in construction and the possibilities for entrepreneurship and research.
2. To understand the ingredients of Portland cement, the roles of Bouge's compounds, the hydration process, and the different types of cement and explore types of Pozzolanas with their applications in the cement industry.
3. To learn the Standard Testing & Evaluation Procedures tests for aggregates, cement, steel and their significance in concrete production.
4. To understand the characteristics and uses of timber, wood products, paints, varnishes, and plastics for use in construction.
5. To understand the fracture mechanism, characteristics, and testing procedures for steel used in construction.

UNIT-I: Basic Building Materials

- **Introduction: (**Understanding the importance, scope, and possibilities of entrepreneurship and research in building materials.
- **Cement:** Ingredients of Portland cement, Bouges compound and their functions, Hydration of cement, Types of Cement, Standard Testing & Evaluation Procedures of Cement.
- **Pozzolanas:** Classification and applications in cement industry.
- **Aggregates**: Tests, Ennore sand. **[9 Hrs.]**

UNIT-II: Conventional Concrete

Conventional Concrete: Reasons for popularity of concrete, Properties of fresh and hardened concrete**,** water cement ratio, factors affecting strength of concrete and durability, Standard Testing & Evaluation Procedures for determining Properties of concrete in fresh and hardened state. Limitations of concrete. **[9 Hrs.]**

UNIT-III: Miscellaneous Building Materials

- **Timber** (only introduction)**:** Characteristics of good timber, cross section of timber, Seasoning of timber.
- **Wood products:** Plywood, Veneers, Hard boards, Particle board, Fibre board.
- **Paints and Varnishes:** Composition of oil paint, PVC and PVCN of paint, varnishing, enamels and distempering.
- **Plastics with/without reinforcement-** types &uses of plastics and PVC. **[9 Hrs.]**

UNIT-IV: Building Materials: Metallic and Ceramics

- **Aluminum:** Alloys, advantages, properties and uses.
- **Naming systems** for Irons, Steel and nonferrous Metals.
- **Ceramics:** Introduction, types of tiles, refractories, paver block.
- **Low-cost Materials and eco-friendly constructions:** Industrial wastes, agricultural wastes and other materials. **[9 Hrs.]**

UNIT-V: Introduction to Material Engineering

- **Standard Testing & Evaluation Procedures of Steel:** Tensile test, Impact test, Hardness tests; Fatigue of material; Creep;

- **Introduction to fracture mechanics.** Elasticity – principle and characteristics; Plastic deformation of metals. **[9 Hrs.]**

Course Outcomes: After completion of the course, the learner will be able to:

1. Identify the ingredients and their functions in Ordinary Portland cement, describe the hydration process, and recognize different types of cement and their uses.
2. Explore the reasons for the popularity of concrete by understanding their fresh and hardened properties, and appreciate the factors affecting concrete strength and durability.
3. Understand the applications of timber and various wood products such as plywood, veneers, hardboards, oil paints, varnishes, and plastics in construction.
4. Identify and describe the properties and uses of aluminum alloys, different types of iron, steel, nonferrous metals, and ceramics, along with applications of industrial waste in low-cost housing and eco-friendly constructions.
5. Understand the fracture mechanism, characteristics, elastic and plastic deformation, and explain the testing procedures for steel used in construction.

Text Books:

1. Building Materials by S.K. Duggal – New Age Publications
2. Concrete Technology by M.S. Shetty - S. Chand Publishing
3. Engineering Materials (Volume 1 & 2) by Surendra Singh - Konark Publishers Pvt. Ltd
4. Building Materials and Construction by P.C. Varghese - PHI Learning Pvt. Ltd.,
5. Building Materials by N. Subramanian - Oxford University Press
6. Civil Engineering Construction Materials by S.K. Sharma – Khanna Publishing House
7. Building Materials and Construction by Dr. Anil Kumar Misra - S. Chand Publishing.
8. Construction Engineering & Management by S. Seetharaman - Umesh Publication
9. Building Materials (हिंदी) by Gurcharan Singh (Standard Publishers)

Reference Books:

1. **"Properties of Concrete" by A.M. Neville-** Pearson Education
2. "Building Construction Illustrated" by Francis D.K. Ching - Wiley
3. "Materials for Civil and Construction Engineers" by Michael S. Mamlouk and John P. Zaniewski- Pearson
4. "Building Materials: Properties and Performance" by J.M. Illston and P.L.J. Domone CRC Press
5. "Construction Materials: Their Nature and Behaviour" by Peter Domone and John Illston- CRC Press
6. “Mechanical Testing of Engineering Materials” by Kyriakos Komvopoulos Cognella Cognella Academic Publishing

7. “Civil Engineering Materials and Construction” Saamagri Prodyogiki by Shivanand Kaamade University Book House
8. Construction Material (हिंदी) Ankit Kumawat (Neelkanth Publishers)

E-resources / Web Sources:

1. Basic construction materials, By Prof. Manu Santhanam, Prof. Radhakrishna G. Pillai | IIT Madras, SWAYAM (NPTEL)
2. Building Materials and Composites By Prof. Sumana Gupta | IIT Kharagpur, SWAYAM (NPTEL)
3. Modern Construction Materials By Prof. Ravindra Gettu | IIT Madras, SWAYAM (NPTEL)
4. Building Materials and Construction, By Dr. B. Bhattacharjee | IIT Delhi | NPTEL, https://nptel.ac.in/courses/105102088
5. Virtual Lab: Strength-of-Materials lab http://sm-nitk.vlabs.ac.in/
   · Charpy Impact Test
   · Direct Shear Test on Mild Steel Rod
   · Direct Shear Test on Timber Specimen
   · Rockwell Hardness Test
   · Torsion Test on Mild Steel

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BHILAI (C.G.)

<table>
<tr><td colspan="3">Semester: 3rd</td><td colspan="4">Branch: Civil Engineering</td></tr>
<tr><td colspan="3">Subject: Civil Engineering Drawing</td><td colspan="4">Code: 3020C05CT020</td></tr>
<tr><td colspan="3" rowspan="3">Maximum Marks: 100
Minimum Passing marks: 35</td><td colspan="4">Periods/week:</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>Ass. Hours</td><td>Teaching Hrs/Sem</td></tr>
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Course Objectives:

1. To enable students with graphic communication skills for better visualization, presentation and organization of ideas for preparing Civil Engineering Drawings.
2. To introduce students with the fundamental principles of civil engineering drawing and its role in construction, while developing their practical skills to create, read, and interpret building plans, layouts, and component drawings.
3. To familiarize with building components and their representation in drawings, such as walls, doors, windows, and structural elements.
4. To develop the ability to draw elevations and sectional elevations of residential buildings and detailed section of a Modern Kitchen.
5. To enable students to understand the elements of perspective drawings and create perspective drawings of basic structural blocks.

UNIT-I: Introduction to Civil Engineering Drawing (9 Hrs.)

- Definition and Importance: Understanding the role of civil engineering drawing in construction and design. Scales and Scaling.
- Manual Drafting Techniques: Line Types and Uses: Different types of lines (continuous, dashed, etc.) and their applications. Lettering and Numbering: Techniques for neat and legible lettering and numbering.
- Building Information Modelling: Awareness of Software (Autodesk Revit, ArchiCAD, TEKLA, SketchUp)
- Principles of Planning: Site Selection: Location, Topography, Climate
- Functionality and Space Utilization: Orientation (Aspects and Prospects), Circulation, Grouping, Roominess, Economy, Elegance, Furniture requirements, Flexibility,
- Privacy. Compliance with Regulations: Building bye-laws for residential buildings.

UNIT-II: Plan View (9 Hrs.)

- Preparing Construction Drawings: Overview of different types of drawings (Plan, Elevation and Section)
- Architectural: Overview of single-line plans for the site, landscape, floor, and roof.
- Structural Drawings: Drawing plan of single and double storey residential buildings.

UNIT-III: Sectional Elevation of wall (9 Hrs.)

- Drawing section of walls: Showing foundation, DPC, Windows/Doors, Lintels, Beam, Slab, Parapet.
- Detailing of Doors and Windows: Flush Shutters, Paneled Shutters, Fully Glazed Doors and Window, Half Glazed Doors and Windows, Half Glazed and Half Paneled Doors and Windows.

UNIT-IV: Elevation and Sectional Elevation (9 Hrs.)

- Drawing of elevation and section of single and double storey residential buildings.
- Sectional elevation of Kitchen (Detailed Section of a Modern Kitchen).

UNIT-V: Perspective Drawing for Civil Engineers (9 Hrs.)

- **Introduction to Perspective Drawing:** Understanding the basics and significance of perspective drawing in civil engineering.
- **Elements of Perspective Drawing**
- **One-Point Perspective of Simple Blocks**
    - **Basic Concepts:** Introduction to one-point perspective and its applications.

  Two-Point Perspective of Simple Blocks
    - **Basic Concepts:** Introduction to two-point perspective and its applications. CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)
- **Drawing Techniques:** Step-by-step methods to create two-point perspective drawings.
- **Practice Exercises**: Simple exercises to draw two-point perspective drawings.
- **Three-Point Perspective**
    - Overview and understanding of three-point perspective in drawings. .

Course Outcomes: The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that after completion of course the student demonstrates the following industry-oriented competency:

1. Understand and apply fundamental principles of building planning and building codes while demonstrating proficiency in manual drafting techniques and an awareness of BIM software.
2. Draw and interpret comprehensive site plans, floor plans, and roof plans for single and double-storey residential buildings.
3. Draw section elevation of wall, door & window.
4. Draw precise elevations and sectional elevations of single and double-storey residential buildings, including specialized detailing for modern kitchen units.
5. Understand one-point, two-point and three-point perspective drawings while demonstrating proficiency in drawing two point perspective diagrams of simple blocks.

Text Books:

1. “Building Planning and Drawing” By Dr. N. Kumara Swamy, A. Kameswara Rao, (Charotar Publishing House Pvt. Ltd.)
2. “Engineering Graphics”, Chandra, A. M. and Chandra, Satish, (Narosa Publishing House, New Delhi)
3. “Civil Engineering Drawing” by RS Malik; (Asia Publishing House)
4. “Civil Engineering Drawing” by V.B.Sikka; (Katson Publishing, Ludhiana)
5. “Civil Engineering Drawing” by NS Kumar; (IPH, New Delhi)
6. “Principles of Building Drawing” by MG Shah and CM Kale; (MacMillan, Delhi)
7. “Drawing and Design of Residential and Commercial Buildings” by Zaidi, SKA and Siddiqui, Suhail; (Standard Publishers and Distributors, Delhi).
8. “Building Drawing” by Mamta Kataria; (North Publication, Jalandhar.)
9. “Building Planning & Drawing” by Aparna Dwivedi, AICTE
10. Civil Engineering Drawing (हिंदी) by Gurcharan Singh, (Standard Publishers)

Reference Books:

1. "Elementary Engineering Drawing", Bhatt, N.D., (Charotar Book Stall, Anand)

2. “Principles of Building Drawing” by MG Shah and CM Kale; (MacMillan, Delhi)
3. SP: 20
4. National Building Code
5. Basic Engineering Drawing (हिंदी) by Santosh Chauhan (Neelkanth Publishers)

E-resources / Web Sources:

1. Engineering Drawing, IIT Guwahati, Prof. P.S. Robi
2. Engineering drawing and computer graphics, By Prof. Rajaram Lakkaraju | IIT Kharagpur
3. NOC: Engineering / Architectural Graphics Part I & II, Orthographic projection, IIT Roorkee, Prof. Avlokita Agrawal

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

<table>
<tr><td>Semester: 3rd</td><td colspan="5">Branch: Civil Engineering</td></tr>
<tr><td>Subject: Life Concept by Bhagwat Gita</td><td colspan="5">Code: 3000C06ET046</td></tr>
<tr><td rowspan="3">Maximum/Minimum-Passing Marks: 100/35
Teacher Assessment Marks: 20
Class Test Marks: 20</td><td colspan="5">Periods/week:</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>Ass. Hours</td><td>Teaching Hrs/Sem</td></tr>
<tr><td>02</td><td>-</td><td>-</td><td>15</td><td>30</td></tr>
<tr><td>Class Tests: 2 (Mandatory)</td><td colspan="5">Assignments: 2 (Minimum)</td></tr>
<tr><td>Duration (ESE): 3 Hours</td><td colspan="3">Total Credits: 2</td><td colspan="2">Teaching Hours: 30</td></tr>
</table>

Course Objectives:

1. To learn the scientific aspects of the Bhagavad Gita.
2. To explore how the timeless wisdom of the Gita can be integrated into modern life to foster holistic well-being.
3. To discover practical methods from the Gita to manage and reduce stress, anxiety, and overwhelm in personal and professional life.
4. To gain insights from the Gita on building meaningful and harmonious relationships, enhancing effective communication, and critical thinking.
5. To develop mindfulness and meditation practices based on Gita teachings to enhance self-awareness, inner peace, and bhakti for achieving the ultimate goal of life.

Course Outcome:

1. Student understands the basic concepts of Bhagwd-Gita and its need for students.
2. They have been introduced to some concepts of Science of SOULS
3. They have been introduced to some concepts Supreme Lord (Ishwara).
4. They have been introduced to concepts of Yoga – Dhyana, Karma, Jnana, Bhakti

UNIT-I: BASIC CONCEPTS OF BHAGWAD GITA: (8 Hours)

Introduction to Bhagavad Gita, How to learn Bhagavad-Gita, Five topics in the Bhagavad Gita: Isvara, Jiva, Kala, Karma and Prakriti.

Dilemma in the material world: Arjuna's dilemmas and doubts; perplexities of life in this world: birth, death, disease and old age, three-fold miseries; material relationships: temporary, cause misery; the only solution: spiritual, relationship.

Absolute necessity of spiritual relationship with a bonafide spiritual master/teacher; qualifications of a spiritual master; check and balance through Guru, sadhu and sastra, Qualifications of a disciple/student

UNIT-II: SCIENCE OF SOUL (JIVA): (6 Hours)

What is soul? Proof of existence of soul, its nature and individuality; the doctrine of life comes from life; activities in knowledge of science of soul. Cause of suffering in this world; constitutional position of living entity.

UNIT-III: SUPREME LORD (ISHWARA): (8 Hours)

Knowing Krishna, the Supreme personality of Godhead; Krishna as the source of both material and spiritual energies, and the supreme controller; understanding the position of God, His expansions and living entities. Lord's descent: His love, purpose and mission; Paramatma: our ever well-wishing best friend. Inconceivable nature of the Supreme Personality of Godhead, His qualities and pastimes; cultivating spiritual relationship: the only way to understand Him. Is God personal or impersonal? Three aspects of the Absolute Truth; path of personalism vs. path of impersonalism. Demigod worship: universal administration; demigods and their relationship with Krishna; right way to approach demigods

UNIT-IV: YOGA (CONNECTING WITH SUPREME LORD): (8 Hours) What is yoga? Types of yoga – Dhyana, Karma, Jnana, Bhakti; limitation of asthanga yoga in kali yuga; gradual and direct method - bhakti yoga; pure devotional service; the topmost yoga system. Different platforms of worship: fear, desire, duty,

Karm Yoga (कर्म योग) : Why bad things happen to good people? Law of karma: good karma, bad karma and akarma; how to become free from karma and reincarnation; karma yoga and its importance; contemporary relevance of karma yoga; sakama and nishkama karma yoga

Jnana Yoga (ज्ञान योग): Relation between Karma Yoga and Jñāna yoga, Distinction between Jnana and Vijñāna. Criteria of True Knowledge (Buddhi Yoga & JñānaYoga),

Bhakti Yoga भक्ति योग : Four kinds of devotees, Characteristics of Ideal Bhakti- Saraṇāgati & Prapattikrupa (grace); Relation between Bhakti Yoga & Jñāna Yoga

Text Books:

1. Srimad Bhagavad Gita: The ultimate manual of life (1st ed.) Das, M., & Das, T. K. (n.d.) CHOICE (Centre for Heritage of Indian Culture and Education).
2. Introduction to Bhagavad Gita by A.C.Bhaktivedanta Swami Prabhupada.
3. Srimad Bhagavad Gita As It Is. Mumbai: Bhaktivedanta Book Trust, 2009.
4. The Bhagavad Gita. Gorakhpur: Gita Press, 2007.
5. Krishna consciousness - The Topmost Yoga System by A.C.Bhaktivedanta Swami Prabhupada.

Reference Books:

1. Prabhupada, His Divine Grace A.C. Bhaktivedanta. Isopanishad. Mumbai: Bhaktivedanta, Book Trust, 2002.
2. Dasa, Bhurijana. Surrender Unto Me. Vrindavan: Vrindavan Institute of Higher Education, 1997.
3. Prabhupada, His Divine Grace A.C. Bhaktivedanta. The Science of Self-Realization. Mumbai: Bhaktivedanta Book Trust, 2002.

E- Recourses

1. https://youtu.be/bedsn7xIn0w?si=VW5iQdLgDu5UDhA6
2. https://anubooks.com/uploads/session_pdf/16623612876.pdf
3. https://ijcrt.org/papers/IJCRT2101218.pdf
4. https://youtu.be/HHIv6qJlRjI?si=MML5aslZRwUvE1Rl
5. https://en.wikipedia.org/wiki/Jnana-Vijnana_Yoga
6. https://en.wikipedia.org/wiki/Bhakti_yoga

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

Semester: 3rd	**Branch: Civil Engineering**			
Subject: Fluid Mechanics Lab	**Code: 3020C01BL020**			
Maximum Marks: 40 **Minimum Passing marks: 20** **Total Credits: 1**	**Periods/week:**			
	L	**T**	**P**	**Ass. Hours**
	-	**-**	**2**	**15**

Course Objectives:

1. To introduce the various equipment used to measure discharge.
2. To explain techniques for analyzing the effects of pipe flow.
3. To explore different phenomena related to pipe flow.
4. To provide hands-on experience with discharge measurement tools.
5. To emphasize the importance of proper analysis in understanding pipe flow.

List of Experiments: ***(At least ten experiments are to be performed by each student)***

1. To determine the metacentric height of a ship model.
2. Verification of Bernoulli's equation.
3. Verification of the momentum equation.
4. To calibrate a venturimeter and study the variation of the coefficient of discharge with the Reynolds number.
5. To calibrate an orificemeter and study the variation of the coefficient of discharge with the Reynolds number.
6. Experimental determination of critical velocity in a pipe.
7. Determination of the head loss coefficient due to sudden expansion in a pipe.
8. Determination of the head loss coefficient due to sudden contraction in a pipe.
9. Determination of the head loss coefficient in pipe bends.
10. To determine the hydraulic coefficients (Cc, Cd, and Cv) of an orifice.
11. To determine the coefficient of discharge of a mouthpiece.
12. To calibrate a triangular notch.
13. To calibrate a rectangular notch.

Equipment/Machines / Instruments / Tools / Software Required:

- Ship Model
- Bernoulli's Apparatus
- Apparatus for Momentum Theorem
- Venturimeter
- Orificemeter
- Pipe Flow Apparatus
- Orifice Apparatus
- Mouthpiece Apparatus
- Notch Apparatus
- Vortex Flow Apparatus

Course Outcomes: On completion of the course, the learner will be able to:

1. Discuss the stability condition under water

2. Explain the effectiveness of Bernoulli's and momentum theorem
3. Calculate the discharge of various instruments
4. Classify the different types of losses in pipe
5. Determine the practicality of notch and weir

Text Books:

1. Hydraulics Laboratory Manual – S.K. Likhi (New Age International Ltd.)
2. Fluid Mechanics – Jagdish Lal (Metropolitan Educational, New Delhi-2)
3. Hydraulics and Hydraulic Machines (हिंदी) by B. L. Gupta (Standard Publishers)
4. Fluid Mechanics Dr. P.N. Modi (Standard Book House)
5. Fluid Mechanics and Hydraulic Machines K. Subramanya Mc Graw Hill

Reference Books:

1. **Laboratory Manual of fluid Mechanics and Machines by Gupta V. P (**CBS Publishers & Distributors Pvt. Ltd**)**
2. **Fluid Mechanics and Hydraulic Machines Laboratory Manual by Dr. S.K. Panigrahi, L. Mohanty, (S.K. Kataria & Sons Publication)**
3. Fluid Mechanics (हिंदी) by S. K. Saini, (Neelkanth Publishers Pvt. Ltd.)
4. Fluid Machines Dr. Jagdish Lal (Metropolitan Book Company)
5. Hydraulics, Fluid Mechanics and Hydraulic Machines R.S. Khurmi and N. Khurmi (S. Chand)

E-resources / Web Sources:

1. Fluid Mechanics, Prof. Subashisa Dutta | IIT Guwahati
2. Fluid Machines, Prof. Sankar Kumar Som | IIT Kharagpur
3. Virtual Lab Hydraulics and Fluid Mechanics Lab
    a. http://eerc03-iiith.vlabs.ac.in/ https://fmc-nitk.vlabs.ac.in/fluidmachinery/
    b. Bernoulli's Experiment
    c. Venturi Meter Experiment
    d. Jets Experiment

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

Semester: 3rd	**Branch: Civil Engineering**
Subject: Surveying and Geomatics Lab	**Code: 3020C02BL020**
Maximum Marks: 40 **Teacher Assessment Marks: 20** **Total Credits: 1**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
-	-	2	15	30

Course Objective: Impart exposure to the learner of the practical application of surveying, field experiments so as to develop skills to:

1. Determine Tacheometric Constant
2. Master horizontal and vertical angle measurement techniques.
3. Acquire expertise in setting out curves with various techniques.
4. Use and operate Modern Surveying tools like, EDM, Total Station.
5. Apply principle of RS, GIS and GPS in minor engineering problems.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Determination of Tacheometric constants.
2. Determination of elevation and distance when line of sight inclined upward downward.
3. Determination of elevation and distance when line of sight inclined downward.
4. Study of Measurement of Horizontal Distance Using EDM.
5. Study of Total station.
6. Measuring Distance Using Total Station.
7. Study of Electronic Digital Theodolite.
8. Measurement of horizontal angle by repetition method.
9. Measurement of horizontal angle by reiteration method.
10. Setting out of curve by ordinates or offsets from the long chord.
11. Setting out of curve by Tangent method.
12. Study of Remote sensing.
13. Study of classification of Remote Sensing Data.
14. Study of GPS and GIS.
15. GPS-based Navigation System for Vehicles.
16. Mobile GPS Data Collection for Field Mapping.
17. Disaster Impact Assessment Using GPS and Remote Sensing.
18. Fuel Consumption Monitoring in Vehicles Using GPS.

Equipment / Machines / Instruments / Tools / Software Required:

1. Tape (15m, 30 m)
2. Ranging Rod (2 m, 3m)
3. Plumb bob
4. Arrows
5. Theodolite
6. Leveling Staff (Folding and Non-folding)
7. Wooden Pegs
8. Total Station
9. EDM

Course Outcomes: On completion of the course, the learner will be able to:

1. Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.
2. Apply the knowledge of Theodolite in different operations.
3. Formulate the Curve Setting and Planning.
4. Understand the Remote Sensing and Data Classification.
5. Discuss the Practical GPS and Navigation Skills.

Text Books:

1. "Surveying Vol. 1 and II " by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain (Laxmi Publications)
2. “Surveying and Levelling Vol. I and II” by T. P. Kanetkar and S.V.Kulkarni (Pune Vidyarthi Griha Prakashan)
3. “Surveying and Levelling” by Subramanian (Oxford Publication).
4. “Surveying” by AM Chandra (New Age International Publisher)
5. “Introduction to Surveying and Geomatics” by PK Garg, (CBS Pub.)
6. Advance Surveying (हिंदी) (Unchya Surveshan) (Remote Sensing, GPS & Total station) by Amit Gupta, B. L. Gupta, (Standard Publishers)

Reference Books:

1. "Surveying Principles and Applications" by Barry F. Kavanagh and Tom B. Mastin (Pearson)
2. “GPS for Land Surveyors” by Jan Van Sickle (CRC Press)
3. “Advanced Surveying: Total Station, GIS and Remote Sensing” by Satheesh Gopi, (Pearson Education India)
4. “Surveying and Geomatics Engineering: Principles, Technologies, and Applications” by Daniel T. Gillins, Michael L. Dennis, Allan Y. Ng (Wiley)
5. "Elementary Surveying: An Introduction to Geomatics" by Charles D. Ghilani and Paul R. Wolf (Pearson)
6. “अधरभुत सर्वेक्षण” by Anurag Nagar, Manoj Kumar Suthar, (Neelkanth Publication)

E-resources / Web Sources:

1. Essentials of Surveying: Application and Techniques, By Mr. Pankaj Kumar Swarnkar, Chhattisgarh Swami Vivekanand Technical University, Bhilai.
2. Surveying, IIT Roorkee by Prof. J.K. Ghosh.
3. Modern Surveying Techniques, IIT Kanpur,
4. Basics of Remote Sensing, Geographical Information System (GIS) and Global Navigation Satellite System (GNSS) by ISRO, SWAYAM (NPTEL)
5. Virtual Lab Surveying Lab http://sl-iitr.vlabs.ac.in/sl-iitr/
   · Observations of Vertical and Horizontal angles using Total Station
   · Study of Global Positioning System (GPS) and its Accessories
   · Observations using GPS

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

Semester: 3rd	**Branch: Civil Engineering**
Subject: Material Testing & Evaluation Lab	**Code: 3020C03CL020**
Maximum Marks: 40 **Teacher Assessment Marks: 20** **Total Credits: 1**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
-	-	2	15	30

Course Objectives:

1. To understand and conduct standard tests on cement, including consistency, setting times, fineness, soundness, specific gravity, compressive strength, and tensile strength.
2. To determine the specific gravity, water absorption, fineness modulus, grain size distribution, and bulking of fine and coarse aggregates through various tests.
3. To perform tests on steel to determine its uniaxial tensile strength, Izod Charpy value, and Erichsen value, using appropriate testing machines and methods.
4. To examine the compressive strength of wood both along and across the fibre through standard testing procedures.
5. To conduct abrasion, impact, and flexural strength tests on tiles to evaluate their suitability and durability for flooring applications.

List of Experiments: (At least Ten experiments are to be performed by each student)

Tests on binder material: Cement

1. Determination of Fineness of cement by Blain Apparatus.
2. Determination of Soundness of cement.
3. Determination of Specific gravity of cement.
4. Determination of Compressive strength of cement.
5. Determination of Tensile strength of cement.

Tests on filler materials: Aggregates

6. Determination of Specific gravity and water absorption of aggregate.
7. Determination of fine aggregate (by field method) and draw curve between water content and bulking.
8. Determination of fineness modulus and grain size distribution and developing grading curve in semi log sheet of given a. Coarse Aggregates b. Fine Aggregate

Tests on reinforcing material: Steel

9. To determine Uniaxial Tensile Test of mild steel.
10. To determine Izod Charpy Value of given mild steel.
11. To study the Cupping Test Machine and determine Erichsen value of mild steel sheet.

Tests on conventional structural material: Wood

12. To determine Compressive Strength of Wood: (a) Along the fibre and (b) Across the fibre.

Tests on flooring material: Tiles

13. Abrasion Test on tiles.
14. Impact test on tiles.

15. Flexural Strength of Tiles.

Note: Students should develop the habit of regularly referring to all relevant IS Codes throughout their learning process.

Equipment / Machines / Instruments / Tools / Software Required:

1. Cube mould 7.06 cm size
2. IS Sieve 80, 40, 20, 10, 4.75, 2.36, 1.18 mm and 600, 300, 150, 90 Micron
3. Sieve Shakers
4. Tensile Strength Testing Machine
5. Oven Wire Basket
6. Spring Balance and Weighing Balance
7. Air permeability blain apparatus
8. Abrasion Testing Machine
9. Flexural Strength Testing Machine for tiles
10. Universal Testing Machine
11. Hardness Testing Machine
12. Impact Testing Machine

Course Outcomes: On completion of the course, the learner will be able to:

1. Evaluate different properties of cement through various tests.
2. Evaluate different parameters of aggregates.
3. Plot stress-strain curve of mild steel under given loading.
4. Determine the compressive strength of wood.
5. Evaluate flooring construction materials like tiles, etc.

Text Books:

1. Building Materials by S.K. Duggal – New Age Publications
2. Concrete Technology by M.S. Shetty - S. Chand Publishing
3. Engineering Materials (Volume 1 & 2) by Surendra Singh - Konark Publishers Pvt. Ltd
4. Building Materials and Construction by P.C. Varghese - PHI Learning Pvt. Ltd.,
5. Building Materials by N. Subramanian - Oxford University Press
6. Civil Engineering Construction Materials by S.K. Sharma – Khanna Publishing House
7. Building Materials and Construction by Dr. Anil Kumar Misra - S. Chand Publishing.
8. Construction Engineering & Management by S. Seetharaman - Umesh Publication
9. Building Materials (हिंदी) by Gurcharan Singh (Standard Publishers)

Reference Books:

1. "Properties of Concrete" by A.M. Neville- Pearson Education
2. "Building Construction Illustrated" by Francis D.K. Ching - Wiley
3. "Materials for Civil and Construction Engineers" by Michael S. Mamlouk and John P. Zaniewski- Pearson
4. "Building Materials: Properties and Performance" by J.M. Illston and P.L.J. Domone CRC Press
5. "Construction Materials: Their Nature and Behaviour" by Peter Domone and John Illston- CRC Press
6. “Mechanical Testing of Engineering Materials” by Kyriakos Komvopoulos Cognella Cognella Academic Publishing

7. “Civil Engineering Materials and Construction” Saamagri Prodyogiki by Shivanand Kaamade University Book House
8. Construction Material (हिंदी) Ankit Kumawat (Neelkanth Publishers)

E-resources / Web Sources:

1. Basic construction materials, By Prof. Manu Santhanam, Prof. Radhakrishna G. Pillai | IIT Madras, SWAYAM (NPTEL)
2. Building Materials and Composites By Prof. Sumana Gupta | IIT Kharagpur, SWAYAM (NPTEL)
3. Modern Construction Materials By Prof. Ravindra Gettu | IIT Madras, SWAYAM (NPTEL)
4. Building Materials and Construction, By Dr. B. Bhattacharjee | IIT Delhi | NPTEL, https://nptel.ac.in/courses/105102088
5. Virtual Lab: Strength-of-Materials lab http://sm-nitk.vlabs.ac.in/
   · Charpy Impact Test
   · Direct Shear Test on Mild Steel Rod
   · Direct Shear Test on Timber Specimen
   · Rockwell Hardness Test
   Torsion Test on Mild Steel

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

Semester: 3rd	**Branch: Civil Engineering**				
Subject: Idea Innovation Lab	**Code: 3020C04FL020**				
Teacher Assessment Marks: 40 **Total Credits: 1**	**Periods/week:**				
	L	**T**	**P**	**Ass. Hours**	**Teaching Hrs/Sem**
	-	**-**	**2**	**15**	**30**

Course Objectives:

1. To facilitate the knowledge of independent thinking and creativity.
2. To train the students to handle the current technological aspects.
3. To motivate the students with the idea of solving problems and coming up with a solution.
4. To encourage students to ideate, prototype, and test solutions for real-world civil engineering challenges.
5. To enhance employability by exposing students to industry-grade tools and workflows

UNIT I: PROBLEM STATEMENT **(6 Hrs)**

Identify a real-world scenario where socioeconomic constraints pose significant challenges to civil engineering practices. Formulate a clear problem statement based on this context, and initiate a brainstorming process to uncover key variables and innovative approaches. The goal is to address these challenges creatively by enhancing construction methods, design strategies, and overall project feasibility.

UNIT II: PLANNING AND SCHEDULING **(6 Hrs)**

Following a thorough analysis of the identified problem scenario, outline the key innovative insights and strategic directions that emerged from the project. Evaluate the project's advantages and limitations in light of current engineering standards and practices. Conduct a comprehensive requirement analysis to distinguish between functional and non-functional requirements. Utilize PERT (Program Evaluation and Review Technique) charts to assess the project timeline, resource allocation, and overall feasibility.

UNIT III: PROJECT DESIGN **(6 Hrs)**

Define the implementation domain of the identified problem to establish its practical context. Select and apply appropriate design software relevant to this domain to develop and execute the project effectively

UNIT IV: TESTING **(6 Hrs)**

Deploy the civil engineering project in a real-world setting, ensuring it is fully functional and capable of addressing practical challenges. Incorporate an intuitive and visually effective interface—whether through BIM platforms, simulation dashboards, or monitoring systems—to enhance usability and stakeholder engagement. Conduct rigorous unit and integration testing to validate the design's structural integrity, workflow accuracy, and system interoperability

UNIT V: DOCUMENTATION **(6 Hrs)**

Develop comprehensive project documentation detailing the design, methodology, and implementation strategy. Include clear, step-by-step instructions for executing the project in real-world civil engineering scenarios. Conduct both system-level and usability testing to validate performance, reliability, and user interaction. Document all test cases systematically to support reproducibility and quality assurance. Prepare the finalized project for formal presentation—whether as a journal article, conference paper, or patent submission—to contribute meaningfully to the field of civil engineering innovation.

Sample domains for Project

1. Sustainable Materials
2. Automation in Civil Engineering
3. Thermal bridging
4. Application of IoT in Civil Engineering
5. BIM
6. Intelligent Transportation System
7. Smart Cities
8. Sustainable waste management

Projects are not limited to the above domains, and can include any innovative development ideas.

Course Outcomes: On completion of the course, the learner will be able to:

1. Identify and formulate a clear problem statement relating to innovative areas in the Civil Engineering domain
2. Assess the project timeline, resource allocation, and overall feasibility of construction project.
3. Develop and execute the project effectively.
4. Ensure the functionality of the innovative project.
5. Develop comprehensive project documentation that details the entire design methodology.

Text Books:

1. Jimmie W. Hinze, "Construction Planning and Scheduling", 4th Edition, Pearson, ISBN - 9780132473989 New Delhi, 2017.
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2018.
3. Civil Engineering Innovations for Sustainable Communities with Net Zero Targets, Sreevalsa Kolathayar, N. Vinod Chandra Menon, Sreekeshava K. S. (Editors), CRC Press (Taylor & Francis).
4. Structural Reliability in Civil Engineering, Wei-Liang Jin, Qian Ye, Yong Bai, Scrivener Publishing.
5. Digital Cities, O.V. Gnana Swathika, K. Karthikeyan (Editors), Scrivener Publishing.

Reference Books:

1. Hamdy A. Taha.,. "Operations Research: An Introduction", Prentice Hall, 9th edition, 2019
2. Creswell,John W. , "Research design: Qualitative, quantitative, and mixed methods, approaches". Sage publications, 2018
3. Innovation in Smart and Sustainable Infrastructure, ISSI Conference Editors, Springer Nature.
4. Emerging Trends in Civil Engineering Innovation, Conference proceedings (ICCE), Springer.
5. Innovation and Sustainability in Civil Engineering: Shaping Tomorrow's Infrastructure, Multiple authors (Transportation Engineering focus), Springer.

E-resources/Web Sources:

1. **https://bim360resources.autodesk.com/ebooks**
2. **https://www.mooclab.club/tags/computer-aided-design-cad/**
3. **https://elearn.nptel.ac.in/shop/iit-workshops/completed/concepts-in-measurement-laboratory experiment-and-modelling-of-atmospheric-pollutants/**
4. **https://www.mooclab.club/resources/autodesk-fusion-360-integrated-cad-cam-cae.2044/**
5. **https://civiconcepts.com/blog/innovation-in-civil-engineering**

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

Semester: 3rd	**Branch: Civil Engineering**			
Subject: Personality Development	**Code: 3000C07DT076**			
Teacher Assessment Marks:40 **Total Credits: -1**	**Periods/week:**			
	L	**T**	**P**	**Ass. Hours**
	1	**-**	**2**	**15**

Course Objectives: This course aims to develop self-awareness, self-management, communication, interpersonal, and professional skills in students to enhance their personality and prepare them for career and workplace readiness.

Course Contents:

Unit I: **Personality & Self-Awareness** – Concept and determinants of personality, Self-awareness and SWOT analysis, Attitude and confidence building.

Unit II: **Self-Management**– Stress management techniques, Time management and goal setting, Body language.

Unit III**: Interpersonal Skills** – Interpersonal transactions and Transactional Analysis (TA) basics; Conflict – Types and resolution, Digital communication etiquette: email writing, netiquette, and professional social media presence.

Unit IV: **Teamwork** – Group dynamics and team building, Leadership skills, Collaboration and coordination, Problem-solving in teams.

Unit V: **Professional Skills** – Public speaking and presentation skills: overcoming stage fear, structuring a talk, use of visuals; Workplace etiquette: professional appearance, meeting conduct, and workplace relationship.

Course Outcomes:

CO No.	Course Outcome	Bloom's Level
CO1	Identify personality traits and perform self-assessment analysis.	Remember (L1) / Understand (L2)
CO2	Apply self-management techniques for personal and career goals.	Apply (L3)
CO3	Demonstrate effective interpersonal skills in various contexts.	Apply (L3)
CO4	Analyze group dynamics and exhibit teamwork abilities.	Analyze (L4)

CO5	Develop professional competencies and workplace etiquettes.	Create (L6)

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Personality Development and Soft Skills	Barun K. Mitra	-	Oxford University Press
2	Communication Skills and Personality Development	J.R. Kadam et al.	-	Scientific Publishers

Reference Books:

S.No.	Title	Authors	Edition	Publisher
1	Communication Skills and Personality Development	M. Jegadeesan et al.	-	-
3	How to Win Friends and Influence People	Dale Carnegie	-	-