Vishwakarma Institute of Information Technology, Pune-48

Syllabus for
F.Y.B. Tech.
Civil Engineering (Pattern 2023)

Department of
Civil Engineering

Bansilal Ramnath Agarwal Charitable Trust's
Vishwakarma Institute of Information Technology, Pune-48
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

Department of Civil Engineering

Vision:

To be a Leading Centre of Education in Civil Engineering through Holistic Development

Mission:

M1: Develop competent Civil Engineers by imparting practical skills imbibed with ethical and societal values

M2: Provide holistic education empowering students to address real-world challenges in Civil Engineering

M3: Equip graduates with necessary knowledge and skills to pursue research, higher studies, entrepreneurship

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1: Graduates will have successful career in the field of Civil Engineering

PEO 2: Graduates will respond to growing demands of society through professional and ethical practices

PEO 3: Graduates will pursue lifelong learning including higher studies in the field of Civil Engineering

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Department of Civil Engineering

PROGRAM SPECIFIC OUTCOMES (PSO):

PSO1: Engineering graduates will be able to plan and execute the activities of construction projects

PSO2: Engineering graduates will be able to analyze and design components of Civil Engineering Systems.

Department of Civil Engineering

F.Y. B. TECH (CIVIL ENGINEERING), SEMESTER I (PATTERN 2023)

Course Code	Course Title	Course Type	Teaching Scheme			Examination Scheme					Total	Credits
			L	T	P	CIE	ISE	SCE	ESE	PR/OR/TW		
BS10231	Linear Algebra	TH	3	1	-	20	20	20	40	25	125	4
BS11234CV	Physics	TH	2	-	2	20	20	20	40	25	125	3
CV11235	Python for Engineers	TH	2	-	2	20	20	20	40	25	125	3
CV11236	Building Science	TH	2	-	2	20	20	20	40	25	125	3
CV11237	Basic Surveying	CE	1	-	2	-	-	-	-	50	50	2
BS11238	Indian Science and Technology	CE	1	1	-	-	-	-	-	50	50	2
BS11239	English for Technical Writing	CE	1	1	-	-	-	-	-	50	50	2
BS112310	Yoga and Sports Ethics	CE	-	-	4	-	-	-	-	50	50	2
	Total		12	3	12	80	80	80	160	300	700	21

BoS Chairman

Dean Academics

Director

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Department of Civil Engineering

F.Y. B. TECH (CIVIL ENGINEERING), SEMESTER II (PATTERN 2023)

Course Code	Course Title	Course Type	Teaching Scheme			Examination Scheme					Total	Credits
			L	T	P	CIE	ISE	SCE	ESE	PR/ OR/ TW		
BS10232	Calculus and Ordinary Differential Equations	TH	3	1	-	20	20	20	40	25	125	4
BS10233	Environmental Science	TH	2	-	2	20	20	20	40	25	125	3
CV12233	Engineering Geology	TH	2	-	2	20	20	20	40	25	125	3
CV12234	Mechanics of Solids	TH	2	-	2	20	20	20	40	25	125	3
CV12235	Introduction to Civil Engineering	TH	2	-	2	20	20	20	40	25	125	3
CV12236	Computer Aided Civil Engineering Drawing	CE	1	-	2	-	-	-	-	50	50	2
ME12237	Maker's Lab	CE	-	-	2			-	-	25	25	1
BS12238	Cocurricular Activity NSS/Club Activities/Cultural Activities/ Performing Arts	CE	-	-	4	-	-	-	-	50	50	2
	Total	-	12	1	16	100	100	100	200	250	750	21

BoS Chairman

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Semester – I

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Department of Civil Engineering

Linear Algebra (BS10231)

Teaching Scheme	Examination Scheme						
Credits: 4 Lecture (L): 3 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): 1 hr./week Practical (P): NA	20	20	20	40	-	25	125

Prerequisite Basics of derivatives, integration, plane geometry and vector algebra

Course Objective(s):

It aims to teach mathematical methodologies and models, develop mathematical skills, and enhance thinking power of students that would be essential for their disciplines.

Course Outcomes:

Upon completion of course, students will be able to:
1. Set up, solve, and interpret linear systems.
2. Acquire the knowledge of vector spaces.
3. Demonstrate linear transformations geometrically.
4. Apply knowledge of inner product spaces to compute length of a vector, angle, distance between two vectors, to compute orthogonal basis using Gram-Schmidt process.
5. Compute & apply the knowledge of eigenvalues & eigenvectors in various fields of Engineering.
6. Analyze transformations and perform contour integration of complex functions required in Image processing, Digital filters, and Computer graphics.

Contents

System of Linear Equations - Rank of matrix, Elementary Matrices, System of linear equations, Gauss Jordan Elimination, Applications of System of Linear equations.

Vector Spaces - Vector space, subspace, Linear combination, Spanning set, Linear Dependence & Independence of vectors, Basis & dimension of a vector space, Row space, Column Space & null space of a matrix.

Linear Transformations - Introduction to linear transformations, Matrix of a Linear Transformation, Rank and Nullity of Linear Transformations, Orthogonal Transformation, Geometric applications of Linear transformations.

Inner product spaces - Inner product spaces, Orthogonality, Orthogonal Complement, Gram-Schmidt process of orthogonalization, Applications to least square fitting to data.

Eigen Values and Eigen Vectors - Eigen Values and Eigen Vectors of a matrix, Algebraic and geometric multiplicity, Cayley-Hamilton Theorem, Diagonalization of a matrix, Introduction to Quadratic forms, Definiteness of quadratic form, Sylvester's Criterion, Applications of quadratic forms.

Complex Variables - Functions of Complex Variables, Analytic Functions, Miline Thompson's Method, Cauchy-Riemann Equations, Harmonic Functions, Contour Integral, Cauchy's Integral formula, Poles, Singularities and Residues Cauchy Residue theorem

Text Books
1. Linear Algebra: A Modern Introduction (4th Edition) by David Poole, Linear Cengage Learning
2. Linear Algebra: An Introduction by Ron Larson and David C. Falvo, Cengage Learning
3. Linear Algebra and its Applications by David C. Lay, Pearson.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, John Wiley & Sons.

Reference Books:

1. Schaum's outlines of Linear Algebra (6th edition) by Seymour Lipschutz, Marc Lipson, McGraw-Hill Education (India) Private Limited, New Delhi.
2. Linear Algebra and its applications (4th edition) by Gilbert Strang, Cengage Learning.
3. Elementary Linear Algebra by Howard Anton & Chris Rorres, John Wiley & sons.
4. Higher Engineering Mathematics.by B. V. Ramana., Tata McGraw Hill Publisher

List of Tutorials:

1. Problems on Rank of matrix, Elementary Matrices
2. Problems on system of linear equations, Gauss-Jordan Elimination & Applications of System of Linear equations.
3. Problems on Vector Space, Subspace.
4. Problems on Linear Dependence, Independence, Basis, and dimension of a vector space.
5. Problems on Linear transformations, Matrix of Linear Transformation, properties of a linear transformation
6. Problems on Rank -Nullity Theorem, Basis and dimensions of Kernel and Image of linear Transformation
7. Problems on Inner product Spaces, angle between two vectors & orthogonality, Gram Schmidt Process.
8. Orthogonal Transformation, Geometric properties of linear operators
9. Eigen Values and Eigen Vectors of a matrix
10. Diagonalization of a matrix, Orthogonal Diagonalization & quadratic forms
11. Assignment on Analytic Functions, Harmonic Conjugate and Miline Thomson's Method
12. Assignment on Cauchy's Integral formula and Cauchy Residue Theorem

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Department of Civil Engineering

Physics (BS11234CV)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): None

Course Objective(s):
1. To apply the principles of mechanics to practical engineering problems.
2. To develop simple mathematical model for engineering problems and carry out analysis.
3. To determine stress and strain at a point under given loading.

Course Outcomes: Upon the completion of the course, students will be able to
1. Classify force system and perform resolution and composition of coplanar force system.
2. To analyze Beams, Mechanisms, Truss and Friction using equations of static equilibrium.
3. To apply Generalized Hooke's Law to calculate stress, strain and elastic moduli.

Contents

Resolution and composition of forces– Introduction - Fundamental concepts, Laws of mechanics, system of units, force and its characteristics, system of forces, resolution and composition of forces, resultant of concurrent forces. Moment of a force, couple, Varignon's theorem, resultant of parallel and general force system.

Equilibrium – Free body diagram, equilibrium equations, Application of Lami's theorem, types of supports, types of loads – (point loads, uniformly distributed loads, uniformly varying load and moments only), Application of equilibrium equation to simply supported ,overhang and cantilever beam..

Analysis of Systems - Friction: characteristics and laws of dry friction, coefficient of friction, angle of friction, Motion, no motion and Limiting motion condition, friction on horizontal and inclined plane surfaces, wedge friction. Belt Friction
Analysis of Plane Truss: method of section and method of joint

Stress and Strain - Concept of stress and strain, elasticity, Hooke's law and modulus of Elasticity, stress-strain diagram for mild steel, Types of stresses (Shear stress, Bearing stress) and strains, Stress on an oblique plane under axial loading.
Deformations of Members Under Axial Loading (Bars of uniform and varying section), Poission's ratio, Generalized Hooke's Law, Dilatation; Bulk Modulus, Elastic moduli and the relationship between them. Temperature stresses.

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Practicals:
A) Experiments (Any Five)
1. Equilibrium of coplanar concurrent forces
2. Reactions of beams
3. Belt Friction
4. Tension test on Ductile material (Mild / tor steel/ Aluminum)
5. Shear stress on Ductile material (Mild / tor steel/ Aluminum)
6. Experiment to find Poissio's Ratio
B) Problem Solving
Four Assignments, each on one unit. Each assignment must have minimum 6 numerical
C) One individual assignment on Problem Solving using python/ code, spread sheets / software / computer program

Text books:
1. Vector Mechanics for Engineers – Ninth Edition, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication.
2. Engineering Mechanics - S. S. Bhavikatti, K. G. Rajashekharappa, New Age International (P) limited publisher
3. Mechanics of Materials – Second Edition by Andrew Pytel and Jaan Kiusalaas, Cengage Learning

Reference books:
1. Engineering Mechanics - statics and dynamics by J. L. Meriam and Craige, John Willey and Sons Publication.
2. Engineering Mechanics –Statics, Twelfth Edition by R. C. Hibbeler, McMillan Publication.

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Department of Civil Engineering

Python for Engineers (CV11235)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): None

Course Objectives:
1. Acquire the knowledge of Python, script programming language.
2. Acquaint with different tools in python.
3. Understand and implement file handling concept in Python.

Course Outcomes:
1. Understand basics of python programming.
2. Develop and implement control statements, functions with packages.
3. Apply NumPy and plotting tools in python.
4. Create and apply file handling operations.

Contents

Introduction to python: Script Model Programming, Understanding Python variables, basic Operators, Declaring and using Numeric data types: int, float, complex, using string data type and string operations, defining list and list slicing, List manipulation using in build methods, Use of Tuple data type, Dictionary manipulation.

Python Program Flow Control, functions, and packages: Conditional blocks using if, else and elif, Simple for loops in python, for loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loops block. Programming using string, list and dictionary in build functions. Organizing python codes using functions, Understanding Packages Powerful Lambda function in python Programming using functions, modules, and external packages.

NumPy and Matplotlib: What is NumPy? How to install NumPy, Arrays, Array indexing, Array Vs Listing Data types, Array math, Broadcasting. Matplotlib -Plotting, subplots and images

Python file operation: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(). Understanding write functions, write() and writelines(). Manipulating file pointer using seek. Programming using file operations.

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Practical Assignments List: (Any 6 Lab assignments)

Week1:

i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation. ii) Start the Python interpreter and type help () to start the online help utility.

2. Start a Python interpreter and use it as a Calculator.

3. Write a program to calculate compound interest when principal, rate and number of periods are given.

4. Read name, address, email and phone number of a person through keyboard and print the details

Week2:
1. Print the pascal triangle using for loop.
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in given interval (use break)

Week 3:
1. Write a program to convert a list and tuple into arrays.
2. Write a program to find common values between two arrays.
3. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
4. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise.

Week 4:
1. Write three functions that calculate the remainder of two integers by using: (a)the basic operators of +, -, * and / (why is // not required?) (b)the divmod function(c)the % operator
2. Write a Python program to Print your name 10 times using for loop.
3. Write a Python program to print Fibonacci series up to n terms.
4. Create a Python script that finds out your age in a maximum of 10 tries. The script can ask you only one type of question: guessing your age! (e.g., "Are you 67 years old?") And you can answer only one of these three options: (a)Less (b)More (c)Correct

Week 5:
1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list
3. Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they do not have to be in the same order.
4. The wordlist I provided, words.txt, does not contain single letter words. So, you might want to add "I", "a", and the empty string.

Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys

Week 6:
1. Write a python program that defines a matrix and prints
2. Write a python program to perform addition of two square matrices
3. Write a python program to perform multiplication of two square matrices
4. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
5. Use the structure of exception handling all general-purpose exceptions

Week 7:
1. Write a python program to calculate mean, median and mode of a given dataset.
2. Write a python program to calculate correlation coefficient, root mean square error and mean absolute error of observed and predicted data.

Week 8:
1. Write a Python program to plot line chat, bar chart, pi chart, for taking two different arrays as input.
2. Write a Python program to scatter chart, histogram for taking two different arrays as input

Textbooks:
1. Supercharged Python: Take your code to the next level, Overland
2. 2. Learning Python, Mark Lutz, O'reilly

Reference Books:
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. 3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition 4. Think Python, Allen Downey, Green Tea Press

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Department of Civil Engineering

Building Science (CV11236)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): None

Course Objective(s):
1. To provide the knowledge of basics of building construction to civil engineering students and prepare engineering students to apply their knowledge of building construction to tackle the problems that they will face in the civil engineering field. The objective of the course is to prepare students to work in the civil engineering field in an efficient and creative manner.

Course Outcomes:
Upon the completion of the course, students will be able to
1. Identify and differentiate various types of buildings and explain different components of the building and their functions.
2. Explain different tools used for excavation operation, process of construction of foundation, types and functions of foundations.
3. Understand and explain the different types of masonry, types of doors and windows, types of fastenings and types of staircases.
4. Explain different types of building materials, their properties and applications, types of floor finish and roofing materials.
5. Explain the process and different types of plastering, the process of painting and plastering work.

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Contents

Overview of Building Components - Introduction to building construction, Classification of buildings as per NBC: Residential buildings, Education buildings, Business buildings, Industrial buildings etc., Classification of buildings as per type of construction: Load bearing structure, Framed structure, Composite structures, Components of building: Substructure, Superstructure, Functions of various building components. Loads on buildings as per IS 875, IS 1893 and NBC. Principles of planning.

Construction of Substructure - Introduction, Job layout - Factors affecting job layout, Site clearance, Centre line method, Face line method, Precautions. Earthwork: foundation, embankment, Timbering and strutting, Materials of plinth, Tools and plants for excavation. Foundation – functions and types.

Construction of Superstructure - Introduction, types of masonry – selection criteria, types, joints and their purposes, precautions, Tools and plants for construction of brick and stone masonry, concept of hollow concrete block masonry & composite masonry. Scaffolding and formwork – purpose, types, process of erection & dismantling. Information on temporary supports to the structures. Components and types of doors, Components and types of windows, Hinges for doors and windows, Components and types of staircases. Types of Roofs and roofing materials.

Building Materials and Finishes - Building materials: Use of basic materials - cement, bricks, aggregates, natural and artificial sand and their properties, Timber: types and properties, Reinforcing Steel-Mild, Tor and High Tensile Steel. Concrete types - PCC, RCC Prestressed and Precast. Introduction to smart materials. Recycling of materials. Combinations of composite materials: laminated fiber reinforced polymers. Glass: uses, types and properties, application and ingredients, market forms, glass claddings, aluminum composite panel cladding. Ceramic products: ceramic sanitary application, water closet, urinals, washes basins, their common sizes, pipes and fittings. Eco-friendly decorating materials.
Finishes: Types of floor finish and its suitability, Process of laying and construction. Plastering – necessity, procedure and types, precautions to be taken during plastering and defects in plastering. Information on pointing and painting.

Term Work
1. Study of residential building drawing and writing a report in accordance with NBC requirements.
2. Basic sheet of building drawing - types of lines, letters etc.
3. Discussion on requirements of any four commercial buildings.
4. Prepare drawings of types of masonry and brick bonds (Quarter plate)
5. Draw sketches of any two types of - (a) Shallow foundation, (b) Deep foundation, (c) Scaffolding/formwork, (d) Door, (e) Window, (f) Staircase (2 Quarter plates)
6. Visit to a construction site for studying the various construction materials used, type of structure, type of foundation and components of superstructure – submission of detailed visit report.
7. Collection of information of modern construction materials and tools used in construction and presentation of the same through poster/power point presentation.
8. Field tests on cement, bricks, and sand.

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Textbooks:
1. Building Construction by B.C. Punmia, Laxmi Publications.
2. Building Materials by S.V. Deodhar, Khanna Publication.
3. Building Construction by Bindra and Arora, Dhanpat Rai Publications.
4. Civil Engineering Materials by Neil Jackson & Ravindra K. Dhir, Palgrave Macmillan
5. Building Construction by Rinku Kumar and Sandeep Panchal, AICTE, New Delhi

Reference Books:
1. Building Materials by S. K. Duggal, New Age International Publishers.
2. Civil Engineering Materials by TTTI Chandigrah, Tata McGraw Hill Publications.
3. Materials of construction by D.N Ghose, Tata McGraw Hill.
4. Building Construction by S.C. Rangwala, Charotdar Publications.
5. My Construction Practices by R. B. Chaphalkar, Sakal Publications.
6. National Building Code of India 2016.
7. IS:875 Part I -1987 - Code of practice for design loads (other than earthquake) for buildings and structures, Part 1- Dead loads — unit weights of building materials and stored materials.
8. IS:875 Part II-1987 - Code of practice for design loads (other than earthquake) for buildings and structures, Part 2- Imposed loads.
9. IS:875 Part III-2015 - Design loads (other than earthquake) for buildings and structures — code of practice, Part 3 - Wind loads.
10. IS 1893 Part I-2016 – Criteria for earthquake resistant design of structures.

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Department of Civil Engineering

Basic Surveying (CV11237)

Teaching Scheme	Examination Scheme						
	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Credits: 2 Lecture (L): 1 hr/week Tutorial (T): NA Practical (P): 2 hrs./week	-	-	-	-	-	50	50

Prerequisite course(s): None

Course Objective(s):
1. To impart knowledge about principles of surveying, linear/angular measurement methods, bearing and leveling.
2. To impart knowledge about different methods of surveying.
3. To impart knowledge about modern surveying techniques such as Total station

Course Outcomes:
Upon completion of the course, students will be able to
1. Plot traverse using compass and plane table in horizontal plane and Determine angle and distance by using compass and plane table.
2. Perform differential and profile levelling

Contents

Introduction – principles of survey, introduction to scale, classification, different terms used in surveying, types of maps and their uses, measuring areas from maps using digital planimeter.

Compass Surveying: Concept of bearing, meridian and their types, construction and use of prismatic compass, local attraction and correction for local attraction, dip, declination and calculation of true bearings.

Plane Table Surveying: Equipment required for plane table surveying and their uses, advantages and disadvantages, methods of plane table survey: Radiation and intersection method.

Levelling: Introduction to levelling, Types of levelling, Construction and use of auto level, laser level in construction industry, reciprocal levelling, curvature and refraction corrections, distance to the visible horizon, trigonometric leveling (Plane Survey). Profile levelling and cross-sectioning and their applications.

Contouring: direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets.

Introduction to Modern Survey Methods using Total Station

List of practicals – (Any 6):
1. Study of any 4 types of Maps and their uses
2. Exercise on Chaining, Ranging and Offsetting
3. Measurement of areas of irregular figures using digital planimeter
4. Study of prismatic compass and measurement of magnetic bearings of sides of a polygon, correction for local attraction and calculations of true bearings.
5. Plane table survey by Intersection and Radiation method.
6. Differential/Profile levelling with at least two change points using digital/auto level.
7. Demonstration of total station
8. Exercise on Box contouring

Textbooks:
1. R. Subramanian, (2007), "Surveying and Levelling", Oxford University Press
2. Dr. B.C. Punmia, Ashok K. Jain, Arun K. Jain, (2005) "Surveying Vol. I and Vol. II", Laxmi Publications Pvt Limited
3. N.N. Basak, (2014), "Surveying and Levelling", McGraw Hill Education
4. S. S. Bhavikatti, (2010), "Surveying and Levelling", I.K. International Publishing House Pvt. Limited

Reference Books:
1. J. Uren, W.F. Price, (2010), "Surveying for Engineers", Palgrave Macmillan
2. S.K. Duggal, (2013), "Surveying Vol. I and Vol. II", McGraw Hill Education
3. James McMurry Anderson, James M Anderson, Edward M Mikhail, (1998), "Surveying: Theory and Practice", McGraw-Hill Education
4. Russell C. Brinker, (2013), "The Surveying Handbook", Springer US

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Department of Civil Engineering

Indian Science and Technology (BS11238)

Teaching Scheme	Examination Scheme						
Credits: 2 Lecture (L): 1 hr./week Tutorial (T): 1 hr./week Practical (P): NA	CIE	ISE	SCE	ESE	PR/OR	TW	Total
	-	-	-	-	-	50	50

Prerequisite course(s): None

Course objectives:
Development of a holistic perspective about Indian science and technology

Course Outcomes:
Upon completion of the course, students will be able to
1. Understand the modern technological trends through Indian scientific and technological philosophy
2. Understand the development of Mathematics and water management systems in India

Contents

Fundamentals
1. An overview of Indian contributions to technology
2. Technological Innovations

Mathematics
   a. An overview of the Development of Mathematics in India
   b. Mathematics contained in the *Sulbasutra*
   c. Weaving Mathematics into Beautiful Poetry- *Bhaskaracarya*.
   d. The Evolution of Sine Function in India
   e. The Discovery of Calculus by Astronomers
   f. Concept of proof in Indian mathematics

Water Management
1. Overview
2. Harappan and Traditional Water Management System of Gujarat
3. Historical Sites- Sringeverpur, South Indian Water Management System, Western Ghats Cave- Kanheri etc.
4. Medieval Period
5. Communities Involved in Water Management

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List of Tutorial: (Any 7 tutorials can be taken)

1. Practice session to discuss-Contribution and innovation of Indian Science and Technology
2. Practice session to discuss - The Development of Mathematics in India
3. Practice session to discuss -The Evolution of Sine Function in India
4. Practice session to discuss - Harappan and Traditional Water Management System of Gujarat
5. Practice session to discuss-Historical Sites- Sringeverpur, South Indian Water Management System, WesternGhats Cave- Kanheri etc.
6. Practice session to discuss – Basic concept of Ayurveda
7. Practice session to discuss- Forest Management and Urban Planning
8. Practice session to discuss - Ancient ecological and environmental aspects of Tank, Lakes, & Stepwells
9. Practice session to discuss- Development of Trading Techniques
10. Poster presentation on any one of the above topics

Text Books:

1. R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
2. 'Indian Contribution to science', compiled by Vijnana Bharati.
3. 'Knowledge traditions and practices of India', Kapil Kapoor, Michel Danino, CBSE, India.

Reference Books:

1. Dr. Subhash Kak , Computation in Ancient India, Mount, Meru Publishing (2016)
2. Dharampal, Indian Science and Technology in the Eighteenth Century, Academy of Gandhian Studies, Hyderabad, 1971, republ. Other India Bookstore, Goa, 2000
3. Robert Kanigel, The Man Who Knew Infinity: A Life of the Genius Ramanujan, Abacus, London, 1999
4. Alok Kumar, Sciences of the Ancient Hindus: Unlocking Nature in the Pursuit of Salvation, CreateSpace Independent Publishing, 2014
5. B.V. Subbarayappa, Science in India: A Historical Perspective, Rupa, New Delhi, 2013
6. S. Balachandra Rao, Indian Mathematics and Astronomy: Some Landmarks, Jnana Deep Publications, Bangalore, 3rd edition, 2004
7. S. Balachandra Rao, Vedic Mathematics and Science In Vedas, Navakarnataka Publications, Bengaluru, 2019
8. Bibhutibhushan Datta, Ancient Hindu Geometry: The Science of the Śulba, 1932, repr. Cosmo Publications, New Delhi, 1993
9. Bibhutibhushan Datta & Avadhesh Narayan Singh, History of Hindu Mathematics, 1935, repr. Bharatiya Kala Prakashan, Delhi, 2004
10. George Gheverghese Joseph, The Crest of the Peacock, Penguin Books, London & New Delhi, 2000
11. J. McKim Malville & Lalit M. Gujral, Ancient Cities, Sacred Skies: Cosmic Geometries and City Planning in Ancient India, IGNCA & Aryan Books International, New Delhi, 2000).
12. Clemency Montelle, Chasing Shadows: Mathematics, Astronomy and the Early History of Eclipse Reckoning, Johns Hopkins University Press, 2011
13. Anisha Shekhar Mukherji, Jantar Mantar: Maharaja Sawai Jai Singh's Observatory in Delhi, AMBI Knowledge Resources, New Delhi, 2010
14. Thanu Padmanabhan, (ed.), Astronomy in India: A Historical Perspective, Indian National Science Academy, New Delhi & Springer (India), 2010

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English for Technical Writing (BS11239)

Teaching Scheme	Examination Scheme						
Credits: 2 Lecture (L): 1 hr./week Tutorial (T): 1 hr./week Practical (P): NA	CIE	ISE	SCE	ESE	PR/OR	TW	Total
	-	-	-	-	-	50	50

Prerequisite: English Language basics

Course Objective(s):
1. Improve grasp of English grammar and punctuation rules
2. Learn to write precise and concise English text
3. Learn to write reader-friendly text, using rules of organizing a document
4. Apply techniques of writing skills in technical writing, through real life examples

Course Outcomes:
Upon completion of the course, students will be able to
1. Have clarity and coherence in English
2. Produce concise and precise English text
3. Write reader-friendly well-organized text in English
4. Write effective reader-friendly technical documents in English of high-quality

Contents

English Language Basics - English grammar essentials (Parts-of-speech, tense, active, passive, article), use of punctuation, confusing words-Homophones

Precise and Concise Writing - Logically organizing your thoughts, one idea per sentence/paragraph, avoiding repetition and being specific; Using active voice, and strong verbs; Using simple plain language, reducing adjectives and adverbs, avoiding unnecessary words; Rewriting in smaller number of words/sentences; Precise writing through meticulous editing, proofreading; Writing abstracts and conclusions

Organizing the Written Document - Logical organization of text using headings, subheadings, and bullet points; Writing indexes, and table of content, chapters, paragraphs, references; Structuring of formal and informal letters, technical reports and technical presentations

Technical Writing - Introduction to technical writing, audience analysis and effectiveness, defining purpose of document; Writing emails, minutes of meeting, user manuals/guides, FAQs , statement of purpose (SOP), reports, research papers and thesis

Text/Reference Books:
1. English Grammar, Wren and Martin
2. Developing Communication Skills, Krishna Mohan, Meera Banerji, Second Edition, ISBN 10: 0230-63843-0, ISBN 13: 978-0230-63843-3
3. Technical Communication for Engineers, Shalini Verma ISBN: 978-93259-9018-0
4. Effective Technical Communication, M Ashraf Rizvi, ISBN-13: 978-0-07-059952-9, ISBN-10: 0- 07-059952-1

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Sample List of Assignments

1. Edit and proofread the provided technical document, identifying and correcting errors in grammar and punctuation.
2. Write and narrate an article of your choice (like - inventions or discoveries made by any scientist, etc). Note the mistakes you made in grammar, before the final version.
3. Rewrite the assignment in (2) with reduced number of sentences, words, but including all ideas written in the previous assignment. Note the percentage of reduction possible.
4. Write an abstract and conclusion for the given technical document.
5. Read a given unformatted document and organize it into chapters, paragraphs and sub topics. Give necessary heading where required.
6. Write an email to a faculty requesting to work under them as research interns, ensuring clarity, proper etiquette, and concise communication.
7. Prepare a User Manual for a select product. Make it easy to read and informative.
8. Write a precise and accurate technical description of an engineering component, system, or process, focusing on clarity and attention to detail.
9. Prepare a report that identifies and analyzes an engineering problem, proposes potential solutions, and recommends the best course of action

Department of Civil Engineering

Yoga and Sports (BS112310)

Teaching Scheme	Examination Scheme						
Credits: 2 Lecture (L): NA Tutorial (T): NA Practical (P): 4 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
	-	-	-	-	-	50	50

Prerequisite course(s): None

Course Objective(s):
1. To motivate the students for higher education in Yogasana & Sports
2. To motivate the students for higher education in Yogasana / Pranayam and Kriya
3. Relate the fundamental principles of Yoga & sports to applications.
4. To developed Physical & mental fitness, remove stress, frustration and take some ethical knowledge about Yoga and Sports activities.
5. To motivate the students for higher education in Yogvidya & To acquire subject knowledge of Yogvidya
6. To developed skills of game and yogasana pranayama and kriy

Course Outcomes:

Upon completion of the course, students will be able to
1. Explain the Yoga & Sports ethics as an Indian culture.
2. Explain the basic concept of Physical, Mental fitness and Social awareness or responsibilities.
3. Explain the team work, Yogic Science, the effect on our Mind & Body. And he effect of our lifestyle.
4. Explain the practical of asana like back bending. Front bending, twisting, standing, balancing etc.
5. Explain and practice of Spiritual asana & physical fineness related asana, Pranayama, kriya etc.
6. Check Performance as per practice base Sports Games and yogasana, pranayama and kriya.
7. Well understanding of sports games, yoga ethics as a physical fitness, mental fitness, recreation and refresh of mind and body, as well as healthy lifestyle in daily routine.

Content

Introduction of Sports Games Yogasana

1) The Basic Exercises, game wise different Rhythmic Exercises, various sports events Introduction & playing methods. Rule regulation of overall events. Athletics events training introduction and practice.
2) Introduction of Yogashastra, Loosening Exercises, Suryanamaskar and its practice in same reputations. Practice of basic and simple healthy asanas.

1) Practice session for Outdoor Games, event wise practice and team game organized on the spot. Game wise practice as per student's interest.
2) Standing Asana Practice & method of practice as well as time , steps and other precautions'
3 Event wise Measurement and team selection process and practice for recreation and teamwork building.

Various types of Asana, pranayama and sports practice cum Introduction

Selected simple types Sitting asana Practice ,Pro down and laydown position practice, twisting asana and pranayama practice
Selected basic indoor and outdoor sports events (team event individual events) measurement practice and game practice for physical fitness.

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Yoga and sports Practice and matches for etch other
1. All the sports games practice as per the rule as well as yoga practice as per the previous learning based revision.
2. 2) Finalize the best for revision and as per the importance of physical fitness awareness and selected yogic practice like asana pranayama and kriya for spiritual base, physical and mental wellness base as per capacity.

Textbooks:
1. Athletic Track and court marking Handbook of Games & Sports – Rajesh Agola.
2. Asana, Pranayama & Kriyas by Swami satyanand Swami.Munger.
3. Sports Game and its rule, regulation.

Reference books:
1. Yogic prakriyanche margdarshan–Dr.M.L.Gharote- (The Lonavala Yoga Research Institute,Lonavala)
2. Yogabhyas Ek Sukhi Jivan – Dr.Shripad Jarde (Chandrama Prakashan,Kolhapur)
3. Patanjal Yogsutra Ek Abhyas – Anand Rishi (Rajhans Prakashan,Pune)
4. Yog Ani Arogya – Dr.R.R.Waman (Tilak Maharashtra University,Pune)
5. Textbook of Yoga – Dr.Limbaji Pratale & Dr.Namdev Phatangare.

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Semester – II

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Calculus and Ordinary Differential Equations (BS10232)

Teaching Scheme	Examination Scheme						
Credits: 4 Lecture (L): 3 hrs./week Tutorial (T): 1 hr./week Practical (P): NA	CIE	ISE	SCE	ESE	PR/OR	TW	Total
	20	20	20	40	-	25	125

Prerequisite: Basics of derivatives, integration, plane geometry and vector algebra

Course Objective(s):

It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful.

Course Outcomes:

Upon completion of course, students will be able to

1. Deal with derivative of functions of several variables that are essential in various branches of engineering.
2. Apply the knowledge of partial derivatives to find extreme values of the function of several variables, to find gradient & directional derivative, Jacobian, approximate values and to estimate errors.
3. Learn the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
4. Learn advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions needed in evaluating multiple integrals and their applications.
5. Learn evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces.
6. Learn the effective mathematical tools for solutions of first order differential equations that model various physical processes.

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Contents

Partial Differentiation - Partial Derivatives of first and higher orders, Euler's Theorem on Homogeneous functions, Partial derivative of Composite functions, Total derivative, and Implicit differentiation

Applications of Partial Differentiation - Maxima and minima of function of two variables, Lagrange's method of undetermined multipliers, Tangent Plane and Normal to a Surface, Gradient and Directional Derivative, Errors & Approximations, Jacobian.

Fourier Series - Definition, Dirichlet's conditions, Full range Fourier series, Half range Fourier series, Harmonic analysis, Applications to problems in Engineering.

Integral Calculus & Curve Tracing - Reduction formulae, Beta & Gamma functions, Tracing of standard curves

Multiple Integrals and Applications - <u>Double Integration</u>: Double integration in Cartesian & Polar coordinates, change of order of integration, area bounded by curves. <u>Triple Integration</u>: Triple integral, volume bounded by surfaces

Differential Equations and Applications - Exact differential equation, Linear differential equation, Equations reducible to linear form, Bernoulli's differential equation, Applications of differential equations

Textbooks:
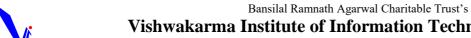1. Higher Engineering Mathematics by B.V.Ramana., Tata McGraw Hill Publisher
2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publisher.
3. Higher Engineering Mathematics by H.K.Dass, S.Chand Publication
4. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons.

Reference books:
1. Advanced Engineering Mathematics by Peter O'Neil, Global Engineering, Publisher.
2. Textbook of Applied Mathematics (Volume I & II), by P.N.Wartikar & J.N. Wartikar Pune Vidhyarthi Griha Publisher.
3. Advanced Engineering Mathematics by C.Ray Wylie & L.Barrett, McGraw Hill Publications.
4. Advanced Engineering Mathematics by M.Greenberg, Wiley Publications.

List of Tutorials
1. Evaluation of partial derivatives, Euler's theorem on homogeneous functions
2. Partial derivative of Composite Function, Total Derivative.
3. Maxima and minima of functions of two variables, Lagrange's methods of undetermined multipliers
4. Gradient & Directional Derivative, Errors & Approximations, Jacobian.
5. Full range Fourier series
6. Half range Fourier series & Harmonic analysis
7. Reduction formulae, Gamma function, Beta function
8. Tracing of cartesian and polar curves
9. Double Integration and area
10. Triple Integration and volume
11. Home Assignment on solution of differential equations
12. Home Assignment on applications of differential equations

Department of Civil Engineering
Environmental Science (BS10233)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): None

Course Objective(s):

To understand the different aspects of environmental science and management.

Course Outcomes:

Upon completion of the course, students will be able to:

1. Explain Conventional and Non-conventional Energy Resources, with respect to their advantages, disadvantages along with Principal, Construction, Working of different power plants.
2. Explain Air, Water, Land and Noise Pollution, suggest remedial measures and calculate particulates and gaseous pollutants in air.
3. Explain water and waste water management, and compute hardness, alkalinity, BOD, COD and total carbon contents.
4. Explain the Municipal and Industrial Wastes management along with its sustainability.
5. Use PBL/Seminars as a tool for reinforcing learning of concepts in Environmental Science.

Contents

Multidisciplinary Nature of Environmental Studies and Resources –
1. Environmental Studies: Definition, Scope, and Importance.
2. Conventional and Non-conventional Energy Resources: Conventional and Non-conventional Energy Resources, their Advantages, Disadvantages, and Impact on Environment.
3. Principal, Construction, Working of Thermal Power Plant, Hydroelectric Power Plant, Solar Power Plant, Wind Power Plant, Tidal Power Plant.

Environmental Pollution-
1. Air Pollution: Sources, Causes, Effects and Remedial Measures to control Air Pollution, Numerical on measurement of air pollutants for particulates and gaseous pollutants, Discussion on any one case study.
2. Water Pollution: Sources, Causes, Effects and Remedial Measures to control Water Pollution, Discussion on any one case study.
3. Land Pollution: Sources, Causes, Effects and Remedial Measures to control Land Pollution, Discussion on any one case study.
4. Noise Pollution: Sources, Causes, Effects and Remedial Measures to control Noise Pollution. Discussion on any one case study.

Water and Waste Water Management-
1. Introduction: Water Resources, Impurities in water, Disadvantages of impure water
2. Analysis of water – physical, chemical (hardness, alkalinity and their numerical) and biological (BOD, COD, total carbon contents – Numerical),
3. Softening of Water: Zeolite process, Demineralization by ion exchangers, Numerical, Desalination methods - Reverse osmosis & Electro dialysis.
4. Municipal water treatment: Specifications for drinking water (IS 10500: 2012)
5. Wastewater: Sources, Necessity of treatment, Primary, Secondary, Tertiary Treatment of waste water

Solid and Industrial Waste and Management and Sustainability –
1. Introduction: Sources, Classification, Environmental impact
2. Municipal Waste Management: collection and disposal
3. Industrial Waste Management: Biomedical waste, E- waste and Management
4. Sustainability: Introduction, Importance, Sustainability related to Environmental Parameters, Green computing and sustainable data centre, Importance of E- vehicle

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Laboratory work:

A) List of experiments (Any 6 out of the following experiments)

1. (A) Preparation of chemical solutions and chemical safety and disposal
   (B) Determination of error and error analysis
2. Proximate analysis of coal with determination of calorific value.
3. Estimation of temporary & permanent hardness of water sample by EDTA method.
4. Determination of alkalinity of water sample/To determine the acidity of the given sample of water.
5. To determine the quantity of iron present in the given sample of water by spectrophotometer / colorimeter.
6. Analysis of given soil sample with respect to pH and calcium carbonate content.
7. Field work - visit to a local area to document any one environmental issue and management system.
8. To determine physical parameters of water sample such as turbidity, pH, and conductance - virtual lab experiment
9. To determine chemical oxygen demand of water sample - virtual lab experiment
10. To determine pH and specific conductivity of soil sample - virtual lab experiment

B) PBL/Seminar:

Students will select a relevant topic for seminar/project from Environmental Science and will be evaluated based on presentation

Textbooks:

1. Domkundwar & Arora, Power Plant Engineering, Dhanpat Rai & Sons, New Delhi
2. R.K. Rajput, Power Plant Engineering, Laxmi Publications New Delhi
3. S.K. Garg, Environmental Engineering (Vol. II), Sewage Disposal and Air Pollution, Khanna Publishers
4. Peavy, Rowe and Tchobanoglous, Environmental Engineering, Tata McGraw-Hill Book Company

Reference Books:

1. E.I. Wakil, Power Plant Engineering, McGraw Hill Publications, New Delhi
2. P.K. Nag, Power Plant Engineering, McGraw Hill Publications, New Delhi
3. Metcalf Eddy, Wastewater Engineering, Treatment and Reuse, McGraw Hill Education
4. Mahua Basu, Fundamentals of Environmental studies,Cambridge publication
5. S M Khopkar, Environmental pollution analysis, New age publication
6. C S Rao, Environmental pollution control Engineering, New age publication
7. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas, Vogel's Text book of Quantitative Chemical Analysis, Pearson Education Ltd.
8. Dr. G.Vijaya Pratap, Dr. Manasi Ghamande, Dr Prashant Pangrikar, De. Balaji Rupnar A Text Book of Environmental Pollution and Management ,R .K Publication
9. Dr .Surendrakumar Yadav, Dr. T. Arunkumar, Dr. Khushal Pathade ,Dr .Manasi Vyankatesh Ghamande A Text Book of Environmental Engineering and Sustainable Development, R.K. Publications
10. Dr. Maaz Allah Khan, Dr. Droupti Yadav, Dr. Pratima V. Damre, Dr .Manasi Vyankatesh Ghamande A Text Book of Water and Waste Water Engineering, R.K. Publications

Department of Civil Engineering

Engineering Geology (CV12233)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): None

Course Objectives:
To impart the knowledge of the physical properties of minerals, various rocks types, their inherent characteristics and its applications to civil engineering.

Course Outcomes:
Upon the completion of the course, students will be able to
1. Explain various rocks and minerals with their uses in civil engineering and understand the preliminary geological exploration.
2. Identify geological structures and understand the site conditions for dams, reservoirs, and tunnels

Contents

Mineralogy, Petrology and Preliminary Geological Studies Introduction to mineralogy: physical properties of minerals, classification of minerals; Introduction to petrology: Igneous Petrology: Formation, Texture and Classification of Igneous rocks; Sedimentary Petrology: Formation, classification of sedimentary rocks, sedimentary structures; Metamorphic Petrology: Formation, types of metamorphism and Classification of Metamorphic rocks. Preliminary geological explorations: reconnaissance survey, desk study, surface and subsurface geological investigation: methods, significance and limitations, RQD, core recovery

Structural Geology and Role of Engineering Geology in Reservoirs, Dams and Tunneling Structural geology: out crop, dip and strike, conformable series, unconformity and overlap, faults and their types, folds and their types, inliers and outliers; Structures: structural features resulted due to igneous intrusions, concordant and discordant igneous intrusions, joints and their types. Geology of dams & reservoir: strength, stability and water tightness of foundation rocks, influence of geological conditions on the choice and type of dams, preliminary geological work on dams and reservoir sites; Tunneling: Preliminary geological investigations, important geological considerations while choosing alignment

Practicals
1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group:

Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.

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Text books:
1. Textbook of Engineering Geology by R. B. Gupte, P.V.G. Publications, Pune, 2001.

Reference books:
1. National Building Code (R 2016).
2. Engineering and General Geology by Parbin Singh, S.K. Kataria & Sons, 2013.

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Mechanics of Solids (CV12234)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): Physics

Course Objectives:
1. To prepare the students to analyze determinate beams for computing shear stresses, bending stresses and deflection at any point along its span.
2. To prepare the students to analyze short and long columns
3. To prepare the students to analyze short and long columns

Course Outcomes:
Upon the completion of the course, students will be able to
1. Apply equilibrium equations to calculate the internal forces namely axial shear forces and bending moments for determinate beams and draw SFD and BMD
2. Determine and plot bending stress and shear stress distribution in determinate beams
3. Determine direct and bending/buckling stresses for columns
4. Determine slope and deflection of determinate beams moments for determinate beams and draw SFD and BMD
5. Determine and plot bending stress and shear stress distribution in determinate beams
6. Determine direct and bending/buckling stresses for columns
7. Determine slope and deflection of determinate beams

Contents

Shear Force Diagram and Bending Moment Diagram - Calculation of Bending moment (BM) and shear force (SF) for statically determinate beams.BM and SF diagrams and salient features, Concept of axial force/thrust diagram

Shear and Bending Stresses in Beams - Theory of simple bending, Assumptions, Determination of bending stresses and its distribution, Section modulus of rectangular and circular sections (Solid and Hollow), I, T, L sections. Shear stress formula, Determination of shear stress and its distribution for beam sections of rectangular and circular sections (Solid and Hollow), I, T, L sections

Short and Long Columns and Introduction to Principal Stresses and Strains - Direct and Bending Stresses Combined direct and bending stresses, eccentric load on short columns, kern of a section, eccentricity of load about both axes of section. Normal and tangential stresses, stress at a point on a plane, Principal stress, Principal planes, normal and shear stresses on oblique plane. (Numerical for CIE and SCE and not for ESE)

Deflection due to Bending and Torsion of Circular Shaft - Deflection of beams: Relationship between moment, slope and deflection, Double Integration Method, Macaulay's method. Concept of Moment Area Method and Conjugate Beam Method. Torsion of circular shafts: Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, transmission of power through circular shafts.

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(Numerical for CIE and SCE and not for ESE)

List of Experiments:

List of Experiments: Any 6 experiments from the following:

1. Compression Test on Timber
2. Bending Test on Timber
3. Torsion test on mild steel and Aluminum
4. Izod and Charpy Impact test on mild steel, aluminum, brass and copper
5. Abrasion test on tile
6. Bending test on tile
7. Compression test on bricks
8. Experiment using Virtual Laboratory

Text books:

2. S.S.Rattan (2011), "Strength of Materials", Tata Mc Graw Hill Education Pvt. Ltd. New Delhi
3. S.Ramamrutham (2011), "Strength of Materials", Dhanapat Rai Publishing Company
4. Dr. Sandhu Singh (2013), "Strength of Materials", Khanna Publishers
5. S.B. Junnerkar and H.J. Shaha,(2012), "Mechanics of Structures Vol. I", Charotar Publishing House
6. Dr. R.K.Bansal (2018), "Strength of Materials",Laxmi Publications (P) Ltd.

Reference books:

3. S. Timoshenko and D.H.Young, (2003), "Elements of Strength of Materials", East-West Press Ltd
4. R.C.Hibbler, (2017), "Structural Analysis", Pearson.
5. E.P.Popov,(2017), "Mechanics of Materials", Prentice Hall Publishers
6. 4. F.L.Singer and Andrew Pytel (1987), "Strength of Materials", Harper and Row Publication

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Introduction to Civil Engineering (CV12235)

Teaching Scheme	Examination Scheme						
Credits: 3 Lecture (L): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	20	20	20	40	-	25	125

Prerequisite course(s): None

Course Objective(s):
1. To impart knowledge about major areas of Civil Engineering
2. To impart knowledge about infrastructure development, modes of transport systems and water supply and sewage treatment systems , importance of town planning

Course Outcomes:
Upon completion of the course, students will be able to
1. Relate Civil engineering areas with other Engineering branches
2. Examine components of various transportation systems and compare modes of transportation
3. Comprehend the basics of seismology and seismic effects on structure
4. Understand objective and fundamental principles of town planning

Contents

Introduction to major areas of Civil Engineering
a.) Role of civil engineer in the construction of various infrastructure projects for 21st century. Importance of interdisciplinary approach in engineering
b.) Introduction to major areas of Civil Engineering: Surveying and Planning, Structural Engineering, Hydraulics and Hydrology, Geotechnical and Foundation Engineering, Environmental Engineering, Transportation Engineering, Construction Technology and Management.

Introduction to Infrastructural Engineering
a.) Significance of Infrastructural Engineering, transportation modes: roadways, railways (metro rail, mono rail, bullet train etc.), airways and waterways (sea and river).
b.) Introduction to bridges, airports, docks and harbours. Factors affecting site selection.
c.)Introduction to intelligent transport systems- Interdisciplinary applications

Introduction to seismology and seismic effects on structure
a)Causes of earth quake ,ground shakes in earth quake ,magnitude and intensity ,seismic zones in India, seismic effects on structure , architectural features affecting structure during earthquake

Introduction to town planning
a) Objects of town planning, principles of town planning, Origin and growth of towns – development of towns, Modern town planning in India, Socio – Economic aspects of town planning.

Term work :

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1. At least two assignments on Introduction to Civil Engineering
2. At least two assignments on Introduction to Infrastructural Engineering
3. At least two assignments on Introduction to seismology and seismic effects on structure
4. At least two assignments on Introduction to town planning

Textbooks:
1. Basic Civil Engineering- G. K. Hiraskar, Dhanapat Rai Publications.
2. Introduction to Civil Engineering –S S Bhavikatti , A K Roopa , New age international publishers
3. Basic Civil Engineering –Satheesh Gopi ,Pearson Publication
4. Basic Civil Engineering, M.S. Palanichamy, McGraw Hill publication
5. Earthquke Resistant Design of Building Structures, Dr. Vinod Hosur, Wiley publication India

Reference Books:
1. Water Supply Engineering- S.K. Garg, Khanna Publishers, Delhi
2. Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publishers, Delhi
3. Irrigation Engineering- B. C. Punmia, Dhanapat Rai Publications
4. Town Planning by B C Rangwala, , Charotar Publication
5. Air port engineering by B C Rangwala, , Charotar Publication
6. Dock and Harbour Engineering by Hasmukh P Oza and Gautam Oza , Charotar Publication
7. High way engineering by Khanna and Justo ,Nem Chand and Bros ,Roorkee
8. National Information Centre of Earthquake Engineering at IIT ,Kanpur ,India Website address : https://www.nicee.org/EQTips.php

Department of Civil Engineering

Computer Aided Civil Engineering Drawing (CV12236)

Teaching Scheme	Examination Scheme						
Credits: 2 Lecture (L): 1 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
Tutorial (T): NA Practical (P): 2 hrs./week	-	-	-	-	50	-	50

Prerequisite course(s): None

Course Objective(s):
1. To know the basic drawing fundamentals in various civil engineering applications, especially in building drawing.
2. To teach students the basic commands and tools necessary for professional 2D drawing,
3. To draw line plan for residential/commercial building
4. To Design and Draw Plan, elevation and section of residential building, manually/ CAD

Course Outcomes:
Upon completion of the course, students will be able to
1. Read and interpret the existing drawings
2. Plan and design residential or public building as per the given requirements.
3. Understand CAD software and basic functions
4. Sketch line plans of residential or public buildings
5. Draw plan, elevation, and section of residential or public buildings using AUTOCAD
6. Draw plan and elevation of window, door and staircase using AUTOCAD

Content:
Basic Drawing aspects: Elements of Engineering drawing: Basic drawing, First angle method, Third angle method, orthographic projections, isometric projections, Plan, elevation, section of small objects/building elements. (Manually)

Building Planning: Principles of planning, planning regulations and building bye-laws, Functional planning of residential and public buildings, design aspects for different public buildings. Recommendations of NBC. Area calculations (built-up area, carpet area etc.). Working drawing, submission drawing

Basic building drawing: Concept of Line plan, Line plans of residential and commercial building along with requirements. Selection of scales for various drawings, dimensioning, abbreviations, and symbols as per IS 962, Developed Plan, Elevation, section.

Computer Aided Drawing: Introduction to CAD, Function keys AutoCAD basics, Cartesian coordinate system, Draw commands, modify commands, Annotate Dimension Style Manager, Text command Layers blocks, Parametric, 2D Fundamentals, Drawing Area Setup Visual reference, 2D drawings, Introduction to 3D drawings. CAD drawings of small building plans and objects.

Drawing Plan, elevation, and section of residential/commercial buildings in CAD.

Department of Civil Engineering

Lab

1. Study of existing plan
2. Plan, elevation, and section of Residential/Commercial building with building services. - on sheet (full imperial) (Manual drawing)
3. Plates of door, window, vertical circulation (Manual drawing)
4. Plan, elevation, and section of Residential/Commercial building with building services. - on sheet (ON AUTOCAD).
5. Layout/ Site plan indicating water supply and drainage line (with area statement) (ON AUTOCAD).
6. Plates of door, window, vertical circulation ((ON AUTOCAD).

Textbook:

1. Shah, M.G, Kale, C.M. and Patki, S.Y. (2017), "Building Drawings with an integrated Approach to Built-Environment", Tata McGraw Hill. (5th edition.), New Delhi
2. Deodhar, S.V., (1972), "Building science and planning", Khanna Publishers, New Delhi
3. Arora S.P. and Bindra, S.P., (2005)," Building Construction", Dhanpat Rai Publications, India
4. Malik and Mayo, (2009), "Civil Engineering Drawing", Computech Publication Ltd., New Asian Publishers, New Delhi
5. www.Autodesk.in

Reference books:

1. National Building Code (latest).
2. Frederick M. and Ricketts J. (2000), "Building Design and construction", by, Tata McGraw Hill.
3. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
4. Development plan and DCP Rules the City

Vishwakarma Institute of Information Technology, Pune-48

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

Department of Civil Engineering

Maker's Lab (ME12237)

Teaching Scheme	Examination Scheme						
Credits: 2 Lecture (L): 1 hrs./week Tutorial (T): NA Practical (P): 2 hrs./week	CIE	ISE	SCE	ESE	PR/OR	TW	Total
	-	-	-	-	-	25	25

Prerequisite course(s):

Course Objective(s):
1. Demonstrate specific use and safe operation of specific tools/machines
2. Show documentation of work products and prototypes that clearly demonstrates safety and knowledge of specific tools/machines.

Course Outcomes: Students should be able to:
1. Develop products from concept to drawing to prototype by comprehending the theory of development of surfaces.
2. Apply the BIS conventions and specifications for engineering drawing.
3. Demonstrate various tools, machines, and operations widely used in sheet metal shops.

Course Content

This course encompasses several maker's lab areas, focused on safety, basic machine usage, hand/power tool safety, and prototyping.
1.   Basic machine usage
   a. Knowledge of tool usage and work products that can be created
   b. Basic safety precautions while operating the machine
   c. Knowledge and ability to use digital tools and files to create work products
   d. Demonstration of basic machine operation in the presence of makerspace staff
   e. Maker's lab equipment, including, but not limited to: laser cutters, vinyl/paper cutters, power tools, hand tools, sewing/embroidery machines.
   f. Sample project ideas and demonstrations
2.   Prototyping
3.   Development of work products from concept to drawing/digital file
4.   Development of low/no cost prototype to develop a proof of concept
5.   Documentation of products created, demonstrating safety and proper techniques for usage

List of Practical:
1. Introduction to engineering drawing, BIS conventions
2. Development of lateral surfaces of solids (Cylinder, Cone).
3. Development of lateral surfaces of solids (Prism, and Pyramid).
4. Demonstration of tools and different manufacturing processes
5. Conceptualization of any product by sketch.
6. Practice using basic maker's lab machines and tools for different projects and purposes
7. 7.   Practice design thinking and prototyping to meet varying needs and goals

Text Book:
1. Workshop Technology Engineering drawing, N.D. Bhatt

Reference Book:
1. Workshop Practices Engineering drawing