Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

(An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune)

Curriculum Structure and Syllabus
of
First Year B. Tech. Civil Engineering
(Regulations 2023)

Effective from Academic Year 2024-25

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an ability to think and act independently in demanding situations.

EOMS Policy

"We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

We shall strive for technical development of students by creating globally competent and sensible engineers, researchers and entrepreneurs through Quality Education.

We are committed for Institute's social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS)."

CURRICULUM FRAMEWORK
(2023 Regulations)

LIST OF ABBREVIATIONS

Sr. No.	Abbreviation	Type of Course
1	BSC	Basic Science Course
2	ESC	Engineering Science Course
3	PCC	Program Core Course
4	PEC	Program Elective Course
5	MDM	Multidisciplinary Minor
6	OEC	Open Elective
7	VSEC	Vocational and Skill Enhancement Course
8	AEC	Ability Enhancement Course
9	EEM	Entrepreneurship/Economics/Management Course
10	IKS	Indian Knowledge System
11	VEC	Value Education Course
12	ELC	Experiential Learning Courses
13	CC/LLC	Co-curricular courses /Liberal Learning Courses

COURSE WISE CREDIT DISTRIBUTION

Sr. No.	Type of Course	No. of Courses	Total Credits	
			NO.	%
1	Basic Science Course	8	14	35
2	Engineering Science Course	6	12	30
3	Program Core Course	1	2	5
4	Vocational and Skill Enhancement Course	2	4	10
5	Ability Enhancement Course	1	2	5
6	Indian Knowledge System	1	2	5
7	Co-Curricular Courses	2	4	10
	Total	**21**	**40**	**100**

Curriculum Structure

First Year B. Tech.

Civil Engineering

CURRICULUM STRUCTURE

First Year B. Tech. (Civil Engineering) Semester – I

First Year B. Tech Civil Engineering (2023 Regulations) (With effect from Academic Year 2024-25) Semester I															
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
		L	P	T	Total	L	P	T	FA		SA	TW	PR	OR	Total
									FA1	FA2					
BSH21BS01	Linear Algebra & Univariate Calculus	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BSH21BS02	Linear Algebra & Univariate Calculus Laboratory	-	1	-	1	-	2	-	-	-	-	25	25	-	50
BSH21BS05	Engineering Chemistry	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BSH21BS06	Engineering Chemistry Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BCI21ES01	Engineering Mechanics	3	-	-	3	3	-	-	20	20	60	-	-	-	100
BCI21ES02	Elements of Civil Engineering	3	-	-	3	3	-	-	20	20	60	-	-	-	100
BCI21ES03	Engineering Mechanics Laboratory	-	1	-	1	-	2	-	-	-	-	50	-	-	50
BCI21VS01	Building Drawing and Professional Practices in Civil Engineering Laboratory	-	2		2		4					50	50		100
BSH21IK01	Indian Knowledge System	2	-	-	2	2	-	-	25	25	-	-	-	-	50
BSH21CC01	Life Skill I	-	2	-	2	-	4	-	-	-	-	100	-	-	100
Total		12	8	-	20	12	16	-	85	85	180	275	125	-	750

L-Lecture, P-Practical, T-Tutorial, FA–Formative Assessment, SA-Summative Assessment, TW-Term Work, OR-Oral, PR-Practical

***Exit Policy: Available as a separate document**

CURRICULUM STRUCTURE

First Year B. Tech. (Civil Engineering) Semester – II

First Year B. Tech Civil Engineering (2023 Regulations) (With effect from Academic Year 2024-25) Semester II															
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
		L	P	T	Total	L	P	T	FA		SA	TW	PR	OR	Total
									FA1	FA2					
BSH22BS07	Multivariate Calculus	2	-	-	2	2	-	-	10	10	30				50
BSH22BS08	Multivariate Calculus Laboratory	-	1	-	1	-	2	-	-	-	-	25	25	-	50
BSH22BS03	Engineering Physics	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BSH22BS04	Engineering Physics Laboratory	-	2	-	2	-	4	-				50	50	-	100
BCI22ES04	Engineering geology and Materials in Construction	3	-	-	3	3	-	-	20	20	60	-	-	-	100
BCI22ES05	Engineering geology and Materials in Construction Laboratory	-	1	-	1	-	2	-	-	-	-	50	-	-	50
BCI22ES06	Computer programming for problem solving Laboratory	-	1	-	1	-	2	-	-	-	-	50	-	-	50
BCI22PC01	Surveying	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BCI22VS02	Professional practices in Surveying	-	2	-	2	-	4	-				50	50	-	100
BSH22AE 01/02/03/04	AEC (Eng/Ger/Jap /Business story telling)	1	1	-	2	1	2	-	10	10	30	-	-	-	50
BSH22CC02	Life Skill II	-	2	-	2	-	4	-	-	-	-	100	-	-	100
Total		10	10	-	20	10	20	-	60	60	180	325	125	-	750

L-Lecture, P-Practical, T-Tutorial, FA–Formative Assessment, SA-Summative Assessment, TW-Term Work, OR-Oral, PR-Practical

***Exit Policy: Available as a separate document**

Course Syllabus
Semester I

Program:	B. Tech. (Civil)					Semester: I	
Course:	Linear Algebra & Univariate Calculus					Code:	BSH21BS01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	10	10	30	50

Prior knowledge of:
1. Elementary Mathematics.
2. Elementary Calculus.

is essential

Course Objectives:

This course aims at enabling students,
1. To strengthen the concept of univariate calculus and mathematical modeling of physical systems using ordinary differential equations
2. To get acquainted with advanced techniques for solving problems related to calculus and ordinary differential equation

Course Outcomes:

After learning the course, the students should be able to:
1. Apply the concept of rank for the solution of the system of equations, linear dependence/independence of vectors and finding Eigen values and Eigen vectors.
2. Evaluate the limits of indeterminate forms and representation of a function in an infinite series using successive differentiation, Taylor's and Maclaurin's theorems.
3. Formulate the mathematical models related to orthogonal trajectories, electrical circuits and one-dimensional heat flow and solve using ordinary differential equations.
4. Solve higher order linear differential equations and Apply it to evaluate the current for electrical circuits.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**Matrices:** Rank, System of linear equations with applications in electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.	8
II	**Differential Calculus:** Indeterminate Forms, Taylor's series, Maclaurin's series, Successive differentiation and Leibnitz theorem.	7
III	**Ordinary Differential Equations:** Exact differential equations, Differential equations reducible to Exact form. **Applications:** Orthogonal trajectories, Kirchoff's law of electrical circuits (L-R and R-C circuits), One-dimensional conduction of heat (steady state).	8
IV	**Linear Differential Equations:** Linear differential equation of nth order with constant coefficients, General method, Shortcut methods, Method of variation of parameters, Application of linear differential equations in engineering viz. mass spring system, electrical circuits etc.	7
	Total	30

Text Books: Include international Author

1. Higher Engineering Mathematics by B.V. Ramana, 34e, Tata McGraw-Hill.
2. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.
3. Linear Algebra & Univariate Calculus by Team Mathematics, PCCoE, Pune, 1e, Techknowledge Publication

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd.
2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.
3. Advanced Engineering Mathematics by M. D. Greenberg, , 2e, Pearson Education.
4. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi

e-sources:

1.NPTEL Course lectures

links:https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

Program:	B. Tech. (Civil)						Semester: I
Course:	Linear Algebra & Univariate Calculus Laboratory						Code: BSH21BS02
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	25	-	25	50

Prior knowledge of:
1. Elementary Mathematics.
2. Elementary Calculus

is essential

Course Objectives:

This course aims at enabling students,

1. Understanding MATLAB for mathematical computations, visualization, and data analysis.
2. Ability to apply MATLAB to solve engineering problems related to matrices, ordinary differential equations & differential calculus.

Course Outcomes:

After learning the course, the students will be able to:

1. Solve problems related to matrics, differential calculus, and ordinary differential equations.
2. Develop simple MATLAB program for limits, Taylor and Maclaurin Series, Successive differentiation, and solution of ordinary and Linear differential equations.

Detailed Syllabus

Expt. No.	Suggested List of Experiments
1	Introduction to MATLAB & Matrix operation using MATLAB
2	Properties of Matrices-Rank, Determinant & Solving Linear Systems of Equations
3	Rank & Solution of Linear Systems of Equations using MATLAB
4	Eigen Values and Eigen Vectors
5	Eigen Values & Eigen Vectors using MATLAB
6	Solving ordinary differential equations.
7	Programming Assignment I.
8	Indeterminate Forms
9	Evaluation of limits using MATLAB
10	Taylor's series, Maclaurin's series, and successive derivatives of the function.
11	Expansion of function using MATLAB
12	Solution of linear differential equations.
13	Circuit analysis using linear differential equations.
14	Plotting the solution of linear differential equations using MATLAB
15	Programming Assignment II.

References:

1. Introduction to MATLAB for Engineers and Scientists by Sandeep Nagar, Springer.
2. INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS by David Houcque, version 1.2, Northwestern University.
3. An Introduction to Differential Equations using MATLAB by Rizwan Butt, Alpha Science International Ltd.

Program:	B. Tech. (Civil)					Semester: I	
Course :	Engineering Chemistry					Code: BSH21BS05	
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	10	10	30	50

Prior knowledge of:

1. Structure of water.
2. Volumetric analysis.
3. Fossil and derived fuels.
4. Corrosion and its effects.
5. Electrochemical series.
6. Classification and properties of polymers

is essential

Course Objectives:

This course aims at enabling students,

1. To familiarize students with instrumental methods for qualitative and quantitative analysis and explore the importance of green chemistry.
2. To build consciousness about the recent development in alternative energy sources and batteries
3. To make student acquainted with chemical and electrochemical mechanism of corrosion and corrosion control
4. To lead students to investigate the advancement in engineering materials.

Course Outcomes:

After learning the course, the students should be able to:

1. Analyse the water quality, interpret techniques of water purification and compare green over traditional synthesis of polycarbonate.
2. Recognize the fuel quality and understand the scope of derived alternate fuels
3. Apply the preventive methods of corrosion to real-life problems.
4. Understand the chemical structure and properties of various polymers, nanomaterials and their uses.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**Water Technology and Green Chemistry**: a) Hardness of water, its types, units of hardness and hardness calculation. Chemical analysis of water by determination of hardness by EDTA method. Alkalinity of water and its determination. Numerical on EDTA method and alkalinity. Disadvantages of hard water in boilers. Water softening techniques: Permutit and Ion exchange method. Dissolved oxygen (DO), biological oxygen demand (BOD) and Chemical oxygen demand (COD). b) Introduction of Green Chemistry: Definition, goals, principles and green synthesis of Polycarbonate.	8

II	**Fuels and combustion** a) Fuels: definition, calorific value and its units. Calorific value (CV), gross calorific value (GCV), net calorific value (NCV). Determination of calorific value - Bomb calorimeter, Boy's colorimeter and numerical. i) Solid fuels: coal, proximate and ultimate analysis of coal, numerical based on analysis of coal. ii) Liquid fuels: composition of petroleum, refining of petroleum. Synthesis, properties, advantages and disadvantages of Power alcohol and Biodiesel. iii) Gaseous fuels: Hydrogen gas as a future fuel, production by steam reforming of methane and by electrolysis of water. Challenges in storage and transportation of H_2 gas. b) Combustion: chemical reactions, calculations on air requirement for combustion.	7
III	**Corrosion and Corrosion control** a) Corrosion: introduction, types of corrosion, mechanism of atmospheric corrosion and wet corrosion. Galvanic series. Factors affecting corrosion: nature of metal and nature of environment. Different types of corrosion: Pitting corrosion, concentration cell corrosion, stress corrosion and soil corrosion. b) Corrosion control: methods of prevention of corrosion - cathodic and anodic protection, metallic coatings and its types - anodic and cathodic coatings. Method to apply metallic coatings - hot dipping, cladding, electroplating and cementation.	7
IV	**Chemistry of Polymers and Novel Carbon Compounds** a) Polymers: definition, classification of polymers on the basis of thermal behaviour, properties of polymers: degree of polymerization, crystallinity, Tg & Tm and factors affecting Tg. Polymerization and its types. Advanced polymeric materials: Structure, properties and applications of liquid crystal polymer – Kevlar, conducting polymers - Polyacetylene, electroluminescent polymer – PPV and biodegradable polymers – PHBV. b) Nanomaterials: definition, types of nanomaterials and properties of nanomaterials. Quantum dots: Types, properties and applications of QDs. Structure properties and applications of Graphene and Carbon Nano Tubes (CNTs).	8
	Total	**30 Hrs**

Text Books:

1. Engineering Chemistry by S.S. Dara, S.Chand Publications (2010).
2. Engineering Chemistry by B.S. Chauhan, UnivScPress.(2015).
3. A TextBookOf Engineering Chemistry by Shashi Chawla, DhanpatRai& Co. (2015).
4. Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014).
5. Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Co.(2016).
6. Engineering Chemistry by Wiley India (2012).
7. Engineering Chemistry by O.G. Palanna, McGraw-Hill Education.
8. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).

Reference Books:

1. Hydrogen as a fuel by Ram D. Gupta, C.R.C.Publication (2009).
2. Polymer Science by V.R.Gowariker,, New Age International Publication (2015).
3. Nanotechnology by T. Gregory, Springer Verlog New York (1999).
4. Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003)
5. Engineering Chemistry by Wiley India Pvt.Ltd,First edition 2011.

ram:	B. Tech. (Civil)						Semester: I
Course:	Engineering Chemistry Laboratory						Code: BSH21BS06
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

1. Theory of acids and bases
2. Molarity, normality and molality
3. Titration method

Course Objectives:

1. To help students to procure conceptual clarity of Engineering Chemistry through laboratory experiments.
2. To develop experimental skills to acquire insight into societal and environmental issues.

Course Outcomes:

After completion of this course, the students will be able to,

1. Volumetric analysis for determination of quality of water.
2. Apply various instrumental methods for quantitative and qualitative chemical analysis.
3. Demonstrate the skill for synthesis of engineering materials.
4. Learn the chromatographic separation technique and impact of corrosion.
5. Explore mini projects which are relevant to societal and environmental issues, to develop research attitudes.

Guidelines:

1] Under Group A category, students have to perform all experiments from the list given below.
2] Under Group B category, students have to perform five experiments from the list given below and one mini project .

Detailed Syllabus

Expt. No.	Group A: Suggested List of Experiments
1	Determination of total hardness (by EDTA method) and alkalinity of given water sample
2	To determine the dissociation constant of a weak acid (acetic acid) using a pH meter.
3	Titration of mixture of strong acid with strong base using Conductivity meter and determine strength of acid.
4	To determine the maximum wavelength of absorption of $KMnO_4$, verify Beer's law and find concentration of the unknown sample.
5	Structural elucidation of unknown compounds by applying principles of UV and IR spectroscopy
6	Proximate analysis of Coal.
7	To determine the electrochemical equivalent (ECE) of Cu.
8	To prepare the Phenol formaldehyde resin.
9	Chromatographic separation of ortho- and para nitro-phenol.
10	Study of corrosion of metal in various mediums

Expt. No.	Group B: Suggested List of Experiments
1	Safety in the Chemistry Laboratory
2	To determine the chloride ion (Cl^-) present in a given water sample by argentometric method/ Determination of residual chlorine in water.
3	To estimate the amount of Fe (II) present in the given solution potentiometrically.
4	To synthesize p-bromoacetanilide from acetanilide as per Green Chemistry.
5	Determination of acid value of oil.
Topics for Mini project: (Student has to choose one of the topics from list given below but not limiting to)	
1	Adsorption studies of Methylene blue on bio adsorbents prepared from agricultural waste.
2	Synthesis of nano-materials
3	Determination of active ingredients from medicines / concentration of dyes in commercial beverages using UV
4	Water audit of water samples
5	One-pot synthesis of biologically active compounds
6	Microwave assisted chemical reactions.
7	Soil analysis of agricultural soil samples
8	Adulterants in food materials.
9	Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles.
10	Detection of presence of carbohydrates, fats and proteins in given foodstuffs.
11	Preparation of biodiesel.

References:

1. Vogels Text book of Qualitative Chemical Analysis by J.Mendham, R,C,Denny, J.D.Barnes, M.J.K.Thomas, 6 e, Pearson Education ltd.
2. Applied Chemistry Theory and Practice by O.P.Virmani and A.K.Narula, 2e, New age International (P) Ltd.

Program:	B. Tech. (Civil)			Semester: I			
Course:	Engineering Mechanics			Code: BCI21ES01			
Credits	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
3	3	-	-	20	20	60	100

Prior Knowledge:

1) Basic principles of trigonometry
2) Geometry
3) Algebra
4) Linear differentiation and integration
5) Principles of Physics (equations of motions)

is essential

Course Objectives: This course aims at enabling students,

1. To provide adequate knowledge of mechanics to formulate and analyze problems based on real life situations.
2. To make aware about basic concepts of statics and dynamics for rigid bodies.
3. To impart fundamental knowledge of analysis of structures, equilibrium of force system and friction.
4. To build conceptual understanding of principles of kinetics and kinematics to solve various engineering problems.

Course Outcomes: After learning the course, the students should be able to:

1. Determine the resultant of different types of coplanar force systems.
2. Apply equations of motion for rectilinear and curvilinear paths.
3. Apply Newton's second law in different forms like work energy principle and impulse momentum equation.
4. Apply the concept of equilibrium to different types of coplanar & space force systems.
5. Calculate friction and forces in the members of trusses and cables using the static equilibrium concept.
6. Determine centroid of plane lamina, moment of inertia for standard & composite figures and construct Shear Force, Bending Moment Diagram for beams.

Detailed Syllabus

Unit	Description	Duration (H)
1	**Resultant of Coplanar Force System** Introduction and Principle of statics, force systems, resolution and composition of forces, resultant of concurrent forces, moment of a force, Varignon's theorem, couple, resultant of general force system	8
2	**Kinematics of particle(Rectilinear & Curvilinear motion)** Kinematics of particle : Constant acceleration, motion under gravity, motion curves, relative motion, equations of motions in Cartesian and path coordinates for Curvilinear motion, projectile motion.	7
3	**Kinetics of Particle** Kinetics of particle: Newton's second Law and its applications to rectilinear motion, curvilinear motion, introduction to work energy principle and impulse momentum equation, direct and central impact, coefficient of restitution.	8
4	**Equilibrium of General Force System** Free body diagram, equilibrium of three forces in a plane, equilibrium of concurrent forces, types of beams: simple and compound beams, types of loads, types of supports, equilibrium of general force system, equilibrium of concurrent and parallel space forces.	8
5	**Analysis of Structure sand Friction** Two force members: analysis of plane trusses by method of joint, analysis of plane trusses by method of section, cables with supports at same level subjected to point loads, Friction: law's of friction, ladders friction and application to flat belt.	**7**

6	**Centroid of Plane Lamina, Moment of Inertia and Introduction to Shear Force & Bending Moment Diagram** Centroid of plane lamina, applications of centroid, moment of inertia(MI), perpendicular axis theorem, parallel axis theorem, MI of standard shapes, MI of composite figures. Introduction to Shear Force Diagram & Bending Moment Diagram for beams.	7
	Total	**45**

Text Books:

1) Engineering Mechanics¬Bhavikatti,NewagePublications,8thEdition,(2017)
2) Engineering Mechanics, S. Ramamurtham, Dhanpat Rai Publication(2016)
3) Strength of Materials by S.Ramamurtham and R.Narayanan,Dhanpat Rai Publication(2008)

Reference Books:

1) Engineering Mechanics¬ Singer Harper &Row,HillPublishers,3rdEdition,(1975)
2) Engineering Mechanics¬Meriamand Crage,WileyPublications,9thEdition,(2020)
3) Engineering Mechanics¬TimoshenkoandYoung,McGrawHillPublications,5thEdition,(2013)
4) Introduction of Engineering Mechanics¬ S. Rajasekaran and G Sankarasubramanian, Vikas Publications, 1st Edition, (2011)
5) Engineering Mechanics¬R.S.Khurmi,S.ChandPublications,3rdEdition,(2019)
6) Elements of Strength of Materials by TimoshenkoandYoung, East-WestPressLtd.,5thEdition,(2003)
7) Mechanics of Materials by R.C.Hibbeler,PearsonEducationpublication,10thEdition
8) Vector Mechanics for Engineers STATICS ¬ Beer & Johnston, Tata McGrawHill Publications, 12th Edition, (2018)
9) Vector Mechanics for Engineers DYNAMICS ¬ Beer & Johnston, Tata McGrawHill Publications, 12thEdition, (2018)
10) EngineeringMechanics:StaticsandDynamics¬A.K.Tayal,UnmeshPublications,11thEdition,(2000)

e-Resources

1) http://nptel.ac.in/courses/112103108
2) https://www.coursera.org/learn/engineering-mechanics-statics

Program:	B. Tech. (Civil)			Semester :		I	
Course:	Elements of Civil Engineering			Code:		BCI21ES02	
Teaching Scheme (Hrs/Week)				Evaluation Scheme and Marks			
Credits	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
3	3	-	-	20	20	60	100

Prior Knowledge:

Knowledge of fundamentals of Basic Mathematics, Geography, and Environmental Studies

Course Objectives:

1. To provide knowledge of basic areas in Civil Engineering and their applications along with role of civil engineer.
2. To build conceptual knowledge of building components.
3. To build conceptual knowledge of planning principles of building, green building and smart city/ village.
4. To provide knowledge of field measurements and leveling instruments for field survey.

Course Outcomes:

After learning the course, the students will be able to:

1. Explain the basic areas of civil engineering and the importance of the interdisciplinary approach
2. Explain the role of civil engineering in infrastructure development and the need for automation in construction.
3. Classify the building components based on their function purpose.
4. Use the building planning principles and building bye-laws
5. Explain the concepts in field surveys and field measurements.
6. Apply the knowledge of levelling to solve the problems in surveying and explain the characteristics of contour.

Detailed Syllabus

Unit	Description	Duration (H)
1	**Introduction to Civil Engineering** Introduction to basic areas of civil engineering: surveying, construction technology and management, structural engineering, geotechnical and foundation engineering, hydraulics and water resources engineering, fluid mechanics, environmental engineering, transportation engineering, and Modes of transportation. **Roads:** Types, cross-section, and components of road. **Railway**: Cross section and components of permanent way and functions. Importance of interdisciplinary approach in civil engineering with respect to other engineering disciplines. Scope of civil engineer in government and private sector.	7
2	**Infrastructure development and automation in Civil Engineering** Introduction to infrastructure development in India, sustainable development goals, smart city concept, Role and responsibilities of civil engineer in the construction of buildings, dams, expressways and infrastructure projects like metro train, mass transport system. Need for automation in civil engineering projects. Concept of Precast and prefab construction. Introduction to Building Information Modeling	7
3	**Components of Buildings** Basic construction materials: brick, stone, sand, cement, concrete, structural steel **Substructure:** Concept of bearing capacity of soil and settlement, foundation, functions of foundation, types of shallow foundation, and introduction to deep foundation (only pile foundation**)** **Superstructure:** Types of load- DL, LL, wind load, earthquake load. Types of	8

	construction- load bearing, framed (RCC Structures), and composite structure. Fundamental requirement of masonry.	
4	**Principles of Building Planning and bye-laws** Principles of building planning: aspect, prospect, roominess, grouping, privacy, circulation, sanitation, orientation, elegance, economy, furniture requirement. Concept of Green building Introduction to building bye-laws and role of bye-laws in regulating the environment, concepts of built-up area, carpet area and floor space index. Numerical on Built-up area.	7
5	**Field Surveys** Principles of surveying, classification of surveys, types of maps, scale, and their use. Introduction and use of Prismatic compass (Bearing; types, measurement; corrections for bearings), Plane Table surveying and its types; advantages and disadvantages of each method. Introduction to Digital Planimeter and Electronic Distance Measurement (EDM).	8
6	**Leveling** Terms used in leveling, Types of levels, benchmark, temporary adjustments; use of dumpy level/auto level, Methods of levelling, Recording, and computing reduced levels by HI and rise & fall method; contours: definitions, characteristics of contours, use of contour maps. Introduction to Electronics Total Station (ETS)	8
	Total	45

Text Books:

1. G K Hiraskar, Basic Civil Engineering, Danpat Rai Publication, Edition 2004.
2. Basic Civil Engineering by S.S.Bhavikatti, New Age publications, 2020.
3. Basic Civil Engineering by Satheesh Gopi, Pearson, 2019.

Reference Books:

1. Surveying- N.N. Basak, Edition 2014 Tata Mc-Graw Hill
2. Building Construction and Drawing- Bindra and Arora, Edition 2012, DhanapatRai Publications.
3. Building Construction and Drawing- Sushil Kumar, Edition 2010, Standard Publications, Delhi.
4. Surveying and Levelling- Kanetkar and Kulkarni, Edition 2014, PVG Publications.
5. Water Supply Engineering- S.K. Garg, 33rd edition 2019, Khanna Publishers, Delhi
6. Highway Engineering -Khanna, C.E. G Justo, A.Veersrsgavan, Edition 2018, NemChandand Bros Publication.
7. Railway Engineering -S.C.Saxena, S.P.Arora, Edition 2015, DhanpatRai Publication.
8. National Building Code –Bureau of Indian Standards 2016.

Program:	B. Tech. (Civil)			Semester :			I
Course:	Engineering Mechanics Laboratory			Code:			BCI21ES03
	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
Credits	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior Knowledge:

1. Basic principles of trigonometry 2)Geometry 3)Algebra 4)Principles of Physics (equations of motions) **is essential**

Course Objectives :

1. To reintroduce students to Newton's three laws by performing experiments and verifying results.
2. To develop the capacity of predicting the effects of force and motion for analysis of various problems in engineering.

Course Outcomes:

After learning the course, the students should be able to:

1. Apply knowledge of determination of resultant of force systems, equilibrium conditions and friction for result interpretation.
2. Apply Newton's second law and its application in various forms to understand the kinetics of particles.

Detailed Syllabus

Term work consists of the following 6 experiments & 6 assignments.

Part A :

1. Verification of law of polygon of forces.
2. Study of Curvilinear motion
3. Determination of coefficient to frestitution.
4. Determination of Support reactions of simple beams.(Analytical/Graphical)
5. Determination of coefficient to friction for flat belt.
6. Determination of forces in a concurrent space force system.

Part B :

7. Assignment on Each Unit (6Units) (considering application based problems)

Text Books:

1) Engineering Mechanics¬Bhavikatti,NewagePublications,8thEdition,(2017)
2) Engineering Mechanics, S. Ramamurtham, Dhanpat Rai Publication(2016)
3) Strength of Materials by S. Ramamurtham and R. Narayanan, Dhanpat Rai Publication(2008)

Reference Books:

1) EngineeringMechanics¬SingerHarper&Row,HillPublishers,3rdEdition,(1975)
2) EngineeringMechanics¬MeriamandCrage,WileyPublications,9thEdition,(2020)
3) EngineeringMechanics¬TimoshenkoandYoung,McGrawHillPublications,5thEdition,(2013)
4) Introduction of Engineering Mechanics¬ S. Rajasekaran and G Sankarasubramanian, Vikas Publications, 1st Edition, (2011)
5) Engineering Mechanics R. S.Khurmi, S. Chand Publications,3rdEdition,(2019)
6) Elements of Strength of Materials by TimoshenkoandYoung,East-WestPressLtd.,5thEdition,(2003)
7) Mechanics of MaterialsbyR.C.Hibbeler,PearsonEducationpublication,10thEdition
8) Vector Mechanics for Engineers STATICS ¬ Beer & Johnston, Tata McGrawHill Publications, 12th Edition,2018
9) Vector Mechanics for Engineers DYNAMICS ¬ Beer & Johnston, Tata McGrawHill Publications, 12th Edition, (2018)
10)Engineering Mechanics: Statics and Dynamics A.K.Tayal,UnmeshPublications,11thEdition,(2000)

E-Resources

1) http://nptel.ac.in/courses/112103108
2) https://www.coursera.org/learn/engineering-mechanics-statics

Program:	B. Tech. (Civil)				Semester:	I	
Course:	Building Drawing and Professional Practices in Civil Engineering				Code:	BCI21VS01	
Teaching Scheme				Evaluation Scheme			
Credit	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Course Objectives :

1. Develop imagination of physical objects to be represented on paper for engineering communication.
2. Get basic hands-on training on computer aided drafting (CAD) tools.

Course Outcomes: After learning the course, the students should be able to:

1. Understand basics about building drawing.
2. Draw orthographic and isometric views of objects related to building structure.
3. Draft the plan, section and elevation of buildings using AUTOCAD.

Detailed Syllabus

Lab assignments:

Practices using graph /drawing sheet (Total 11 Turns)

1. Free hand sketching of Roads, slopping roof, small Buildings, Furniture, Lavatory fixtures, Engineering tools, Historical Monuments etc.(Any 3) A (1)
2. Ethical code of practice related to Architectural drawings(1)
3. Types of Lines and Dimensioning style in Engineering Drawing. A (1)
4. Various sizes of drawing sheets, Types of scales and symbols used for various materials. A (1)
5. Draw orthographic projections of – Cuboid, cylinder. P (1)
6. Draw isometric views of simple objects. P (1)
7. Draw plan, section, elevation of engineering components /simple objects.P (1)
8. Draw basic building components like-Entrance steps, Flower bed, chajja, door, window, type of foundation, roof trusses. Any three. S (1)
9. Measurement of dimensions of single room by Electronic Distance Measurement (EDM) and drawing plan, elevation section of single room. Using 1:50 Scale. S (2)
10. Drawing simple line plan for a residential building, single storied framed/load bearing structure [On graph paper sheet] G (1)

Practices using CAD software-(Total 12 Turns)

1. Settings, Limits and CAD software basic commands. A (2)
2. Exercise on simple 2D engineering components for practice using CAD. A (2)
3. Draw plan, section, elevation of engineering components /simple objects. P (1)
4. Exercise on simple line plan for a residential building (Same as mentioned above assignment No 9) P (1)
5. Exercise on single rooms develops plan, elevation, and section using CAD. S (1)
6. Exercise on develop plan, elevation & section for a residential building, single storied framed/load bearing structure. Preparing schedule of openings, Construction notes and other details using CAD. S (3)
7. Draw Electric Wiring and lighting diagram and components. Prepare Furniture Layout/ Electrical Layout for any room (Kitchen/ Living room/Bed room/ Study room/ Dining room/ Office/) S (2)

Textbooks:

1. Gill, P.S., "A Text Book of Engineering Drawing", Katson Publishing House (Kataria and Sons) 18th Edition (2013).
2. Venugopal, K., " Engineering Drawing & Graphics+ AUTO CAD", New Age International 4th Edition (2001)
3. Venkata Reddy K., " Text Book of Engineering Drawing (2 nd Edition)", BS Publication. 2nd Edition (2008)
4. "Civil Engineering Drawing and House Planning" by Verma B. P Khanna Publishres. 12th Edition 2016.
5. Course In Civil Engineering Drawing by V. R. Sikka Publisher. S K Kataria and Sons · Publication date. 1 January 2013
6. Building Drawings with an integrated Approach to Built-Environment by M. G. Shah, C. M. Kale and S. Y. Patki, New Delhi, Tata McGraw Hill.5th Edition (2017)

Reference Book:

1. The construction of buildings; seventh edition, Vol.1 & Vol.2 by R. Barry, Oxford: Blackwell Science.5th Edition (1999) ISBN-13
2. Building Design and construction by Frederick Merrit, Tata McGraw Hill.5th Edition (1994) Hand Book.

IS Code:

1. IS 962 (1989): Code of practice for architectural and building drawings
2. NBC 2016

e-References:

1. **https://nptel.ac.in/courses/112103019**
2. **https://archive.nptel.ac.in/courses/124/107/124107157/**
3. **https://nptel.ac.in/courses/112104031**
4. **https://www.firstinarchitecture.co.uk/technical-drawing-labelling-and-annotation/**

Program	B. Tech. (Civil)					Semester: I	
Course:	Indian Knowledge System (IKS)					Code: BSH21IK01	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	25	25		50

Prior Knowledge: Nil

Course Objectives:
This course aims at enabling students,
1. To familiarize with the concepts of Indian Knowledge System
2. To get acquainted with the applications of Indian Knowledge System

Course Outcomes: After learning the course, the students will be able to;
1. Demonstrate elementary knowledge of various ancient Indian Knowledge Streams
2. Identify/Select Indian Knowledge Stream of Interest
3. Evaluate the chosen aspect Indian Knowledge Stream which in turn may be of assistance in the career of the learner

Detailed Syllabus:

Units	Description	Duration (Hrs)
I	**Indian Knowledge System – Philosophy and Culture** **A.Philosophy** Introduction to Sāṃkhya, Vaiśeṣika, Nyaya, Pūrva-Mīmāṃsā, Vedānta, Ashtanga Yoga–Yamas, Niyamas, Āsana, Prāṇāyāma, Pratyāhāra, Dhāraṇā, Dhyāna, Samādhi **B. Culture** Foundational aspects of Sangeeta, Natya Shastra, Shilpashastra	**15**
II	**Indian Knowledge System – Economics, Science and Technology** Ayurveda, Architecture and Planning, Metallurgy and Material Science, Astronomy, Kautalya Arthashatra	**15**
	Total	**30**

Text Books:

1. Mahadevan,B., Bhat Vinayak Rajat, Nagendra Pavanan R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications",PHI Learning Private Ltd. Delhi.
2. Dharampal (2021), "Indian Science and Technology in the Eighteenth Century",ISBN10:8175310936.

Reference Books:

Kapil Kapoor, Avadhesh Kumar Singh. (2005), "Indian Knowledge Systems", (Vol.1 and Vol.2), ISBN-10:9788124603369.

Program:	B. Tech. (Civil)					Semester: I	
Course:	Life Skills I					Code:	BSH21CC01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of: Nil

Course Objectives:

1. To equip them with essential competencies that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals.
2. To develop students' vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.

Course Outcomes:

After learning the course, the students will be able to:

1. Demonstrate self-awareness and inner harmony conducive to understanding the essence of happiness.
2. Exhibit proficient interpersonal skills in fostering and sustaining healthy relationship with others.
3. Employ diverse strategies for rational decision-making and problem solving.
4. Display enhanced emotional intelligence through the recognition and management of emotions in various contexts.

Course Guidelines:

1. The students are instructed to perform all the activities suggested by the course faculty.
2. The assessment of life skills activities will be done on the basis of students' performance, attitude, behavior and understanding of subject.
3. The students are suggested to attend all the sessions of the life skills course.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**Happy You, Happy Life!** Healthy Mind - Music Therapy, Yoga, Meditation, Happiness and Success, Self-Awareness - Know your personality, Develop your Self-Esteem, *Johari* Window, SWOT, Setting goals for yourself (SMART), Healthy Lifestyle - Nutrition, Significance of Physical Activity in Daily routine. • Activity/Worksheet 1: Music Therapy • Activity/Worksheet 2: Johari Window • Activity/Worksheet 3: Physical & Mental Health	**15**
II	**Building Relationships** People Skills - Networking, Developing Healthy Relationships, Collaboration, Reliability, Respectfulness, Open- Mindedness, Effective Communication in Relationships-My Relationship Web, Relationship Recipe, Active Listening and Conflict Resolution, Embracing Diversity: Respect for Different Perspectives and	**15**

	Cultures. • Activity/Worksheet 4: Building Relationships • Activity/Worksheet 5: Building String Relationships- The Key to Success in Business & Life	
III	**The Reflective Engineer** Critical Thinking - Fact or Fiction, Convergent & Divergent Thinking, Creative Thinking - Imagination, Formulate and Articulate Ideas, Perspective Thinking – Understanding others view Points, Respecting Others Opinions, Decision Making – Rational, Analytical & Ethical Solutions. • Activity/Worksheet 6: Creative & Critical Thinking • Activity/Worksheet 7: Decision Making • Activity/Worksheet 8: Perspective Thinking	**15**
IV	**You CAN DO IT…** Managing Stress - Good Stress , Bad Stress, Anxiety, Managing time - Planning, Prioritization, Delegation, Productivity and Positivity, Managing Emotions – Self-Regulation, Self-Motivation, Empathy, Assertiveness, Anger Management, Dealing with addictions, Handling Peer Pressure- Types of Peer Pressure: Spoken Peer Pressure, Unspoken Peer Pressure, Direct Peer Pressure, Indirect Peer Pressure, Positive Peer Pressure, Negative Peer Pressure. • Activity/Worksheet 9: Managing Emotions • Activity/Worksheet 10: Stress Management & Peer Pressure	**15**
	Total	**60**

Reference Books:

1. The 7 Habits of Highly Effective Teens" by Sean Covey Publisher: Simon & Schuster, 2017
2. How to Win Friends and Influence People" by Dale Carnegie Publisher: Simon & Schuster. 2020
3. Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman Publisher: Bantam Books, 2021.
4. Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books, 2019.
5. The Power of Habit: Why We Do What We Do in Life and Business" by Charles Duhigg Publisher: Random House, 2016

E Sources -

1. Psychology Today (www.psychologytoday.com): Psychology Today publishes articles and insights from psychologists and mental health experts that can be useful for improving life skills and emotional intelligence.
2. Lifehack (www.lifehack.org): Lifehack shares practical tips, techniques, and advice on personal development, productivity, and life skills improvement.
3. Coursera (www.coursera.org): Coursera offers online courses on various life skills topics, often provided by universities and experts, to help individuals develop essential skills

Course Syllabus
Semester II

Program:	B. Tech. (Civil)					Semester: II	
Course:	Multivariate Calculus					Code:	BSH22BS07
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	10	10	30	50

Prior knowledge of

1. Elementary Mathematics
2. Elementary Calculus

is essential.

Course Objectives:

This course aims at enabling students,

1. To strengthen the concepts of multivariable calculus and its application in maxima & minima, error & approximation, area and volume
2. To make students acquainted with advanced Mathematical techniques to represent Fourier series and to evaluate integrals

Course Outcomes: After learning the course, the students should be able to:

1. Evaluate Partial Differentiation and apply the concept of partial differentiation to find Maxima & Minima and Error & Approximation
2. Represent Fourier series for the periodic time domain continuous and discrete function into signal form
3. Compute definite improper integrals like Gamma, Beta function, DUIS
4. Apply multiple integration techniques to find Area and Volume

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**Partial Differentiation:** Partial derivatives, Composite function, Chain Rule, variable to be treated as constant, total derivatives. Euler's theorem for homogeneous functions. **Application of Partial derivatives:** Jacobian for explicit function, Errors and Approximations, Maxima and Minima of two variable functions.	**8**
II	**Fourier Series:** Definition, Dirichlet's conditions, full range Fourier series, Harmonic analysis, and engineering application.	**7**
III	**Integral Calculus:** Beta and Gamma functions, differentiation under integral sign (DUIS).	**7**
IV	**Multiple Integral:** Double integration, conversion into polar form, application of double integration to the area, Triple integration, Dirichlet's theorem, application of triple integration to Volume.	**8**
	Total	**30**

Text Books:

1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill)
2. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning)

Reference Books:

1. Higher Engineering Mathematics, 22e,by H. K. Das (S. Chand Publication, Delhi).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.
3. Advanced Engineering Mathematics, 4e, by S.R.K. Iyengar, Rajendra K. Jain (Alpha Science International, Ltd)
4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education)
5. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi)

e-sources:

1. NPTEL Multivariable Calculus courseshttps://nptel.ac.in/courses/111107108
2. NPTEL Video for Fourier series http://nptel.iitm.ac.in

Program:	B. Tech. (Civil)					Semester: II	
Course:	Multivariate Calculus Laboratory					Code:	BSH22BS08
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	25	-	25	50

Prior knowledge of

1. Elementary Mathematics
2. Elementary Calculus
3. Basics of MATLAB/Open Source

is essential.

Course Objectives: This course aims at enabling students to solve problems based on concepts

1. Multivariate calculus and its application in maxima & minima, error & area, and volume.
2. Continuous and discrete systems require knowledge of Fourier series and Harmonic analysis.
3. Advanced techniques to evaluate multiple integrals

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

1. Solve problems related to the concepts of multivariate calculus, such as partial differentiation and its application, Fourier series, integral calculus, and the application of multiple integrals.
2. Use MATLAB/Open source software to solve problems such as partial differentiation, maxima-minima, Fourier series, and multiple integrals.

Detailed Syllabus

Expt. No.	Suggested List of Experiments
1	Problems on Partial derivatives, Euler's theorem on homogeneous functions, implicit functions, and variables treated as constant, total derivatives.
2	Partial derivatives of two variable functions by using MATLAB
3	Problems on Jacobians and their applications, errors, and approximations. Maxima and Minima: maxima and minima of functions of two and three variables.
4	Maxima and Minima(global and local) by using MATLAB with visualization
5	Problems on Jacobians and errors and approximations.
6	Absolute and Relative error for two variable functions by MATLAB
7	Assignment on Programming-1
8	Problems on half-range Fourier series, Harmonic analysis, and application to engineering
9	Fourier series and its plots by using MATLAB
10	Problems on Beta and Gamma functions, differentiation under integral sign (DUIS),
11	Problems on Introduction of curve tracing, double integration, change of order of integration, conversion into polar form, Triple integration: with limits and without limits, Dirichlet's theorem
12	Three-dimensional Cartesian, polar, and cylindrical systems by using GeoGebra
13	Evaluation of Double and triple Integration by MATLAB

14	Problems with evaluation of Area and volume. Visualization of Area, Volume by Geogebra
15	Assignment on Programming-2

References:

1. Higher Engineering Mathematics by H. K. Dass, 22e, S. Chand Publication, Delhi.
2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.
3. Advanced Engineering Mathematics by Peter V. O'Neil, 7e, Thomson Learning.
4. Advanced Engineering Mathematics by M. D. Greenberg, 2e, Pearson Education.
5. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi
6. Introduction to MATLAB for Engineers and Scientists by Sandeep Nagar, Springer.
7. Introduction to MATLAB for engineering students by David Houcque, version 1.2, Northwestern University.

Program:	B. Tech. (Civil)					Semester: II	
Course:	Engineering Physics					Code:	BSH22BS03
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	10	10	30	50

Prior knowledge of:

1. Atom, molecule & nuclei,
2. Current, electricity & magnetism,
3. Electromagnetic Induction

is essential.

Course Objectives:

This course aims at enabling students,

1. To build strong conceptual understanding of Semiconductor Physics & Quantum Physics
2. To explore advances in Physics with introduction of Nanotechnology & Superconductivity
3. To provide consciousness about the importance of Physics principles in various engineering applications

Course Outcomes: After learning the course, the students should be able to:

1. Apply basics of semiconductor physics to explain the behavior of charge carriers inside a semiconductor
2. Distinguish wave behavior of a matter particle for the manipulation of the processes at quantum scale
3. Interpret properties of superconductors & their applications in advanced technologies
4. Summarize properties, preparation methods of nanomaterials & explore their applications in various engineering fields

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**Semiconductor Physics** Band Theory of solids, Electrical conductivity of conductors & semiconductors (qualitative), Hall effect (with derivation), Fermi Dirac probability distribution function, Fermi level, p-n junction, solar cell I-V characteristics, Basics of sensors, Characteristics of sensors-range, sensitivity, resolution, accuracy, repeatability types of sensors-Active and Passive sensors, Applications of sensors.	**8**
II	**Quantum Mechanics** Limitations of classical physics, need of quantum mechanics, wave particle duality of radiation & matter, De Broglie hypothesis, De Broglie wavelength in terms of kinetic & potential energy, concept of wave packet, phase and group velocity, properties of matter waves, Heisenberg's uncertainty principle, wave function & probability interpretation, well behaved wave function, Schrodinger's time independent wave equation, applications of independent wave equation to the problem of (i) particle in rigid box, (ii) particle in a non-rigid box(qualitative),Tunneling effect, scanning tunneling microscope (STM)	**7**

III	**Magnetism and Superconductivity** Magnetism: Classification of magnetic materials, temperature dependent magnetic transitions (Curie and Neel temperature), magnetic hysteresis loop, magneto-resistance, giant magneto-resistance (GMR), application of magnetic materials in magneto caloric effect, adiabatic demagnetization. **Superconductivity:** Introduction, critical temperature, properties of superconductors-zero electrical resistance, persistent current, Meissner effect, critical magnetic field, BCS theory, type I and II superconductors, low Tc and high Tc superconductors, Josephson effect, DC-SQUID-construction, working and applications, applications - superconducting magnets, maglev trains	**7**
IV	**Introduction to Nanoscience** Introduction, surface to volume ratio, quantum confinement, properties of nanomaterials-optical, electrical, mechanical, magnetic; methods of preparation of nanomaterials- bottom-up and top-down approaches, physical methods- high energy ball milling, physical vapor deposition; chemical method - colloidal route for synthesis of gold nanoparticle , aerogels-properties and applications, applications of nanomaterials in medical, energy, automobile, space, defense; introduction to quantum computing.	**8**
	Total	30

Text Books:

1. A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand & Company Pvt. Ltd.
2. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications (P) Ltd.
3. Sensors Handbook- Sabrie Soloman, Second edition, Mc Grew Hill Publications,
4. Nanotechnology -Principles & Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company.

Reference Books:

1. Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge University Press.
2. Handbook of Modern Sensors- Jacob Fraden, Physics, Design and Applications, Fourth edition, Springer Publications,
3. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.
4. Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education.
5. Heat and Thermodynamics, Anandamoy Manna, Pearson Publishers 2011

e-sources:

1. NPTEL Quantum Mechanics course: https://nptel.ac.in/courses/122106034
2. NPTEL Fundamentals of semiconductor devices: https://nptel.ac.in/courses/108108122

Program:	B. Tech. (Civil)						Semester: I	
Course:	Engineering Physics Laboratory						Code:	BSH21BS04
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	50	-	50	100	

Course Objectives:

1. To provide better understanding of concepts, principles of Physics by giving hands on experience
2. To develop an insight in scientific experimental methodologies.

Course Outcomes:

1. To demonstrate concepts of optics by performing experiments using optical instruments
2. To formulate and solve Engineering Physics problems by applying experimental method.

Guidelines: Group A: Student will perform any eight experiments. Based on this student will be having practical exam of 50 marks

Group B: Student will perform any seven experiments.

Detailed Syllabus

Expt. No.	Group A: Any Eight Experiments
1	To determine the radius of curvature of Plano-convex lens using Newton's rings.
2	To determine unknown wavelength by using plane diffraction grating.
3	To verify Malus Law of polarization of light.
4	To determine refractive indices and identification of types of crystal using double refraction.
5	An experiment based on laser I
6	To determine compressibility of given liquid using Ultrasonic Interferometer
7	To study IV characteristics of solar cell and determine fill factor.
8	To determine band gap of given semiconductor.
9	To determine electrical resistivity of given semiconductor using four probe method
10	To determine Plank's constant "h"
Expt. No.	**Group B: Any Seven Experiments**
1	Testing of properties of semiconductor materials using Hall Effect
2	Testing of magnetic susceptibility of different magnetic material using Quinke's method
3	Testing of sound absorption coefficient of different material
4	Study of solar cell using series and parallel combinations with intensity variation
5	Data analysis using Origin/Mat lab and its interpretation
6	Design and assemble Solar based appliances
7	Laser and fiber optics-based experiment

8	Sensor/Ardino based experiment

Reference Books:

1. Lasers & nonlinear Optics-B. B. Laud-Third edition, New Age International (P)Ltd. Publishers.
2. Fundamentals of Optics- Francis A. Jenkins, Harvey E. White, Fourth edition, McGraw Hill Education (India) Pvt. Ltd.
3. Sensors Handbook- Sabrie Soloman, Second edition, Mc Grew Hill Publications,
4. Fundamentals of Physics- Resnick & Halliday (John Wiley &sons)
5. An introduction to Laser's theory and applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.
6. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.

Program:	B. Tech. (Civil)			Semester :			II
Course:	Engineering Geology and Materials in Construction			Code:			BCI22ES04
Credits	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
3	3	-	-	20	20	60	100

Prior Knowledge:

1. Elements of Civil Engineering
2. Geography
3. Chemistry

is essential

Course Objectives: This course aims at enabling students,

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

2. To build conceptual knowledge of manufacturing process, properties and use of different types of building materials like stone, brick, cement mortar and concrete, glass, timber and the materials such as paints and varnishes used for the treatment of surfaces and advance materials to achieve good knowledge about the building materials.

Course Outcomes: After learning the course, the students should be able to:

1. Explain various rocks and minerals with their uses in civil engineering and preliminary geological exploration.
2. Identify geological structures and site conditions for dams, reservoirs and tunnels.
3. Classify the building stones, bricks based on properties and uses.
4. Explain the significance and properties of timber and steel.
5. Classify the cement and concrete types based on their properties and uses.
6. Explain the properties and uses of paints and modern construction materials.

Detailed Syllabus

Unit	Description	Duration (H)
1	Mineralogy, Petrology and Preliminary Geological Studies Introduction to mineralogy and petrology ,physical properties of minerals, classification of minerals, preliminary geological explorations: reconnaissance survey, surface and subsurface geological investigation: methods, significance	7
2	Structural Geology and Role of Engineering Geology in dams and tunneling Structural geology, faults and their types, folds and their types, 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.	8
3	Building Stones: Classification and properties of building stones, relation to their structural requirements, quarrying, dressing, seasoning and preservative treatments. Bricks: Burnt clay bricks-raw materials, manufacturing processes, IS classification, properties, defects, tests as per BIS codes. Fly ash bricks, refractory bricks.	7

4	Timber: Types of natural wood and artificial wood, seasoning and preservative treatments, defects in timber, wood products and wood composites. Steel: Types of steel-mild steel, tor steel, high strength steel properties and uses, commercial forms of steel and aluminum and their uses.	8
5	Lime and Cement: Lime types and uses, cement types and uses, chemical composition of cement, tests on Portland cement Mortar and concrete: Types of mortar, manufacturing process, ingredients, grades, Types of concrete-PCC,RCC, Precast and pre stress concrete,3D printed concrete, basic properties of concrete. Flooring materials: Cement mortar tiles and ceramic tiles	7
6	Paints and Varnishes: Composition, Painting on: plastered surfaces, wood surfaces, metal surfaces. Effect of weather on: Enamels, distemper, white wash and colour wash, varnish, French polish, Wax Polish. Introduction to modern materials: Gypsum, Ferro cement, Fiber Reinforced Polymer FRP, Autoclaved Aerated Concrete (AAC) blocks, Cellular Light Weight Concrete (CLC) blocks, ceramic products, thermal & sound insulating materials, Composite materials, Eco-friendly and smart materials, Sustainable materials.	8
	Total	45

Text Books:

1. Building Materials by S. S. Bhavikatti, Vikas Publication House Private Ltd. First Edition (2014)
2. Engineering Materials: S.R. Rangwala, Charotar Publications.
3.Text Book of Engineering Geology by R. B. Gupte, P.V.G. Publications, Pune, 2001.

Reference Books:

1) Introduction to Engineering Materials: B. K. Agrawal, Tata McGraw Hill, NewDelhi.
2) Engineering Materials: P. Surendra Singh, Vani Education Books,New Delhi
3) Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill. (1995).
4) Engineering and General Geology by Parbin Singh, S.K. Kataria& Sons, 2013.
5) Building Materials by B.C. Punmia, Laxmi Publications.11th Edition (2016)
6) Building Materials by S. K. Duggal, New Age International Publishers. 5th Edition (2019)
7) National Building Code (R 2016).
8) Principles of Engineering Geology and Geotechniques by D. P. Krynine& W. R. Judd. CBS Publishers, New Delhi, 2018.
Engineering Geology by F. G. H Blyth and De Frietus, Reed Elsevier India Ltd, 7th Edition, 1984.

e-Resources

1. **https://nptel.ac.in/courses/105104147**
2. **https://nptel.ac.in/courses/105104191**
3. **https://nptel.ac.in/courses/105102088**

Program:	B. Tech. (Civil)			Semester :		II	
Course:	Engineering Geology and Materials in Construction Laboratory			Code:		BCI22ES05	
	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
Credits	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior Knowledge:

1. Elements of Civil Engineering
2. Geography
3. Basic Chemistry

Course Objectives:

1. To impart the knowledge of different types of rocks & minerals and their application in civil engineering.
2. To build conceptual knowledge of different materials used in construction like stone, bricks, cement, concrete, timber, steel, paints and modern materials.

Course Outcomes: After learning the course, the students will be able to:

1. Classify minerals, various types of rocks and their use in civil engineering.
2. Identify the basic properties of construction materials.
3. Explain the significance of construction materials through field visit

Detailed Syllabus

Term work shall consist of any 8 experiments from Part A and B following list. (Field visit is mandatory)

Part A:EngineeringGeology

1. Megascopic identification of following mineral specimens

Silica group: Rock Crystal, Rosy Quartz, Transparent Quartz, Milky Quartz, Smoky Quartz Feldspar group: Orthoclase, Plagioclase Mica group: Muscovite, Biotite, Olivine group: Olivine, Amphibole group: Hornblende, Asbestos, Ore group: Calcite, Limonite, Kyanite, Graphite, Hematite.

2. Megascopic identification of following different rock specimens

a) Igneousrocks:Muscovite,HornblendeGranite,Diorite,Gabbro,Rhyolite,AmygdaloidalBasalt

b) Sedimentary rocks: Laterite, Conglomerate, Sandstone (Red), Sandstone with Ripple marks, Red Limestone, Black Limestone c) Metamorphic rocks: Quartzite Marble, Slate, Hornblende Gneiss, Mica Schist, Muscovite Schist, Talc Schist.

Part B: Materials in construction

1. Basic field tests on soils.
2. Field tests on cement to check the quality and fineness of cement using sieve.
3. Determine water absorption, efflorescence test of burnt clay brick.
4. Determine compressive strength of burnt clay brick or fly ash brick.
5. Determine flexural strength of flooring tiles.
6. Determine compressive and bending strength of timber.
7. CollectionofBrochures/leaflets/advertisementsofmodern/advancedconstructionmaterialse.g. Protective finishing materials, masonry products etc.
8. Reporton field is it to a constructions to study various geological features and various Construction materials.

Text Books:

1. Building Materials by S.S.Bhavikatti,VikasPublicationHousePrivateLtd.FirstEdition(2014)
2. Building Materials by B.C.Punmia,LaxmiPublications.11thEdition(2016)
3. Building Materials by S.K.Duggal,NewAgeInternationalPublishers.5thEdition(2019)
4. Text Book of Engineering Geology by R.B.Gupte,P.V.G.Publications,Pune,2001.

Reference Books:

1. Introduction to Engineering Materials: B.K. Agrawal,Tata McGrawHill,NewDelhi.
2. Engineering Materials: P. Surendra Singh,Vani Education Books, New Delhi
3. Building Materials Technology by RuthT. Brantley &L. Reed Brantley,Tata McGraw Hill.(1995).
4. Engineering and General Geology by Parbin Singh,S. K.Kataria&Sons,2013.
5. Building Materials by B.C.Punmia,LaxmiPublications.11thEdition(2016)
6. Building Materials by S.K.Duggal,NewAgeInternationalPublishers.5thEdition(2019)
7. National Building Code(R2016).
8. Principles of Engineering Geology and Geo techniques by D. P. Krynine & W. R. Judd. CBS Publishers, New Delhi, 2018.
9. Engineering Geology by F.G. HBlyth and De Frietus, Reed ElsevierIndiaLtd,7thEdition,1984.

E-Resources

4. **https://nptel.ac.in/courses/105104147**
5. **https://nptel.ac.in/courses/105104191**
6. **https://nptel.ac.in/courses/105102088**

Program:	B. Tech. (Civil)			Semester :			II
Course:	Computer programming for problem solving laboratory			Code:			BCI22ES06
	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
Credits	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior Knowledge: NIL

Course Objectives: This course aims at enabling students,

1. To understand the basics of programming language and develop python programs for problem solving

Course Outcomes: After learning the course, the students should be able to:

1. Explain the elements of Python programming.
2. Implement Python code for a given problem statement.

Detailed Syllabus

Sr. No	List of Experiments
	Develop code for the problem statement provided (10 Assignments)
1	Introduction to Python programming
2	Elements of programming
3	Variables and Identifiers, Arithmetic Operators, Values and Types, and Statements
4	Operators, Operators precedence, Expression and Boolean values.
5	Condition: If-else constructions
6	Loops: Purpose and working of Loops, While Loop and For Loop
7	Loop: Nested Loop, Break and Continue.
8	Strings: Length of string and perform Concatenation and Repeat operations in it, Indexing and Slicing of strings
9	Array: Elements, Index, and basic operations.
10	Function: Parts of function, execution of function, keyword, default arguments
11	Use of Num Py Library (With Civil Engineering examples)
12	Use of Matplot lib Library. (With Civil Engineering examples)
13	File Handle: How to write and read various types of files (csv, xlx, txt etc.,)

Text Books:

1) R. G. Dromey, How to Solve it by Computer, 1st Edition, Prentice-Hall International, 1982.
2) Brian W Kernighan, Dennis M Ritchie,C Programming Language,2nd Edition, Pearson, 1988.
3) E. Balagurusamy, Programming in ANSI C, 8th Edition, McGraw Hill,2019.

Reference Books:

I) Problem Solving and Programming Concepts, Maureen Spankle, 9th edition, Pearson, 2011.
2) Head First Python- A Brain-Friendly Guide, Paul Barry, SPD O'Reilly, 2nd Edition.
3) Python: The Complete Reference, Martin C. Brown, McGraw Hill Education.

e-Resources : https://onlinecourses.nptel.ac.in/noc20_cs83/preview

1. https://www.learnpython.org/ 2. https://study.iitm.ac.in/ds/course_pages/BSCS1002.html

Program:	B. Tech. (Civil)			Semester :		II	
Course:	Surveying			Code:		BCI22PC01	
Credits	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	10	10	30	50

Prior Knowledge:

Basic Civil Engineering. (Principles of survey, applications of survey, scale, use of tape, dumpy level etc., is essential)

Course Objectives: This course aims at enabling students,

1. To develop an ability in students to apply knowledge of mathematics, science, and engineering to understand surveying measuring procedures.
2. To make student competent to use necessary equipment and technique for linear and angular measurement in all plane.
3. To prepare students for the fundamentals of Space Based Positioning System & Geographic Information System.

Course Outcomes: After learning the course, the students should be able to:

1. Explain the contouring, profile leveling and cross-sectioning for roads
2. Determine the distance by using tachometric principles.
3. Classify space-based positioning systems and geographic information systems with their application to survey work
4. Prepare data set for curve setting using linear methods.

Detailed Syllabus

Unit	Description	Duration (H)
1	**Levelling and Contouring** a) Levelling: Introduction, types, benchmarks, use of auto/digital level, digital level and laser level in the construction industry, principal axes of dumpy level, testing and permanent adjustments, reciprocal levelling, curvature and refraction corrections, distance to the visible horizon. b) Contouring – direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets, c) Profile leveling and cross-sectioning and their applications.	7
2	**Theodolite and Tacheometric Surveying.** a) Study of vernier transit 20" theodolite, uses of theodolite. Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite. Theodolite traversing – computation of consecutive and independent coordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gale's traverse table. Checks, omitted measurements, area calculation by independent coordinates. b) Tacheometry – Principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points, finding tacheometric constants. Tacheometric contouring.	8
3	**Introduction to SBPS** a) SBPS systems-GPS, GLONASS, Galileo, GAGAN, BeiDou and their features, Segments of SBPS (Space, Control and User), applications of SBPS in surveying. SBPS Co-ordinates & heights, Factors governing accuracy and types of errors in SBPS positioning. b) Introduction and applications of Geographical Information System, DGPS, Drone Survey, Real-Time-Kinematics survey (RTK).	7
4	**Curves** a) Introduction to horizontal and vertical curves, different types and their applications,	8

	elements of simple and compound circular curves. b) Setting out by linear methods: Radial / perpendicular offsets, Offsets from long chord, successive bisection of chord and offsets from chords produced.	
	Total	30

Text Books:

1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , PVG Prakashan.
2. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain,Laxmi Publications.
3. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.

Reference Books:

1. Plane Surveying by A. M. Chandra, New Age International Publishers.
2. Surveying and Levelling by N. N. Basak , Tata McGraw Hill. (2013)
3. Surveying Vol. I & II by Dr. K. R. Arora , Standard Book House. (2013, 2014)
4. Surveying: Theory and Practice by James M. Anderson, Edward M. Mikhail, Tata McGraw Hill. (2013)
5. Plane and Geodetic Surveying for Engineers. Vol. I by David Clark, Constable. (2013)
6. Surveying and Levelling by Subramanian, Oxford University Press.

e-Resources

1.nptel: https://archive.nptel.ac.in/courses/105/104/105104101/

Program:	B. Tech. (Civil)			Semester :		II	
Course:	Professional Practices in Surveying			Code:		BCI22VS02	
	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
Credits	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4		50	-	50	100

Prior Knowledge:

Basic Civil Engineering. (Principles of survey, applications of survey, scale, use of tape, dumpy level etc., is essential)

Course Objectives :

1. To develop the ability in students to carry out required analysis for setting out and execute survey work for small scale construction project.

Course Outcomes:

After learning the course, the students should be able to:

1. Evaluate required distances, angles, reduced levels, and area using various instruments.
2. Analyze and plot data essential for laying out structures and roadways curves.
3. Estimate earthwork for profile and cross-section levelling.

Detailed Syllabus

Perform any ten out of following assignments

1. Area measurement by Digital Planimeter for regular and irregular shapes of catchment areas / leaf / palm..
2. Distance measurement by tape, EDM and digital instruments (Electronic Total Station/mobile app).
3. Study and Use of Dumpy / Auto / digital level for simple / differential leveling in Construction for determining Plinth level / Beam bottom/ setting out sewer gradient w.r.to nearest Bench mark.
4. Contouring: Block / Radial contouring / Tacheometer and generating contours by hands / using any software (minimum contour interval 1 meter).
5. Finding Tachemoetric constants of Tacheometer by field method.
6. Area measurement by Global Positioning System (GPS).
7. Plotting site details on A4 Size drawing sheet by horizontal/vertical angles using 20” vernier transit theodolite.
8. Tacheometry applications to determine horizontal and vertical distance for inaccessible objects.
9. Setting out a building from a given foundation plan (by triplet / drone / electronic Robots)
10. Setting out a circular curve by linear or angular method on A4 size drawing sheet or on ground.
11. Plotting site details on A4 Size drawing sheet with of use of total station by linear and angular measurement.
12. Road project using Auto level for a minimum length of 100 m [Including fixing of alignment, profile levelling, cross-sectioning, plotting of L section and Cross Section]. (One full imperial sheet including plan, L-section and any two typical Cross-sections). Determination of earthwork in cutting and filling by excel sheet / program / software / App.
13. Introduction of DGPS with applications

Text Books:

1 Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , PVG Prakashan.
2.Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain,Laxmi Publications.
3. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.

Reference Books:

1. Plane Surveying by A. M. Chandra, New Age International Publishers.
2. Surveying and Levelling by N. N. Basak , Tata McGraw Hill. (2013)
3. Surveying Vol. I & II by Dr. K. R. Arora , Standard Book House. (2013, 2014)
4. Surveying: Theory and Practice by James M. Anderson, Edward M. Mikhail, Tata McGraw Hill. (2013)
5. Plane and Geodetic Surveying for Engineers. Vol. I by David Clark, Constable. (2013)
6. Surveying and Levelling by Subramanian, Oxford University Press.

Program	B. Tech. (Civil)					Semester: II	
Course:	AEC-I- English					Code: BSH22AE01	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	1	2	-	10	10	30	50

Prior Knowledge: Basic knowledge of English Language is essential.

Course Objectives: This course aims at enabling students,

1. To develop basic LSRW skills for effective communication.
2. To develop a sense of confidence among students to present themselves at professional as well as societal level.
3. To enhance the language competence.

Course Outcomes: After learning the course, the students will be able to;

1. Understand the role of effective listening skills, grammar and vocabulary in effective communication.
2. Formulate grammatically correct sentences and Enrich their vocabulary
3. Demonstrate reading skills to comprehend various documents
4. Communicate effectively and enhance their phonetic skills.

Detailed Syllabus:

Units	Description	Duration (Hrs)
I	**Listening Skills:** Importance of Listening Skills, Types of Listening: Active / Selective / Passive Listening, Barriers to Listening, Tips to Improve Listening Skills.,	**3**
II	**Writing Skills:** Grammar & Vocabulary: Common Errors in English, Modal Auxiliaries. Processes of Word Formation, Words often Confused Elements of Effective Writing, Writing Styles (Formal & Informal), Paragraph Writing (Descriptive, Technical). Professional Writing: Job Application, Leave Application, Enquiry and Complaint Letter. Features of Technical Writing, Report Writing	**4**
III	**Reading Skills:** Importance of Reading, Scanning, Skimming, Reading between the Lines, Reading Comprehension: Factual / Expository / Informative texts, Case Studies, Reading Research Articles. Lesson:1 The Story of An Hour by Kate Chopin, Lesson: 2 The Classical Student by Anton Chekhov.	**4**
IV	**Speaking Skills:** Basic Sounds-IPA, Word Stress, Intonation, Language Functions (Requesting, Apologizing, Complaining, Complementing, Thanking, etc) Art of Asking and Responding to Questions, Impromptu Speaking, Art of Extempore & Presentations, Role Play, Delivering Welcome Speech, Vote of Thanks, Group Discussion.	**4**
Total		**15**

Lab Session	Activities	Duration (Hrs)
1	Listening 1: Listen to the audio and answer the questions (IELTS)	**2**
2	Listening 2 : Listen to the audio and Summarize (Ted Talks)	**2**
3	Grammar: Correct the sentences and understand the business usages.	**2**
4	Vocabulary: Different ways to improve vocabulary and activities	**2**

5	Writing Skills 1: Formal writing such as Job Application, Leave Application, Enquiry and Complaint Letter.	**2**
6	Writing Skills 2: Different Styles of writing and Paragraph Writing (Descriptive, Technical)	**2**
7	Writing Skills 3: Technical Writing, Report Writing; Progress, Accident Report, Event Report.	**2**
8	Reading Activity 1: Communication Case Studies	**2**
9	Reading Activity 2: IELTS based Comprehension Skills	**2**
10	Reading Activity 3: Research Articles and Technical Documents	**2**
11	Reading Activity 4: Literary Reading and Discussion	**2**
12	Speaking Activity 1: IPA Pronunciation and Phonetics Exercises	**2**
13	Speaking Activity 2: Delivering speeches and Mastering the Art of Public Speaking	**2**
14	Speaking Activity 3: Preparing and Participating Group Discussions / Elevator Speeches	**2**
15	Speaking Activity 4: Oral/PPT Presentation with Q&A Session	**2**
Total		**30**

Text Books:

1. Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015

Reference Books:

1. Michael Swan, Practical English Usage, Oxford, 3rd Edition; 2005
2. David F. Beer, Writing and Speaking in the Technology Professions: A Practical Guide, Wiley-IEEE Press; 2nd Edition, 2003
3. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers, Pearson Education; 2011
4. Clifford Whitcomb, Leslie E. Whitcomb, Effective Interpersonal and Team Communication Skills for Engineers, Wiley–Blackwell; Nil edition, 2013.
5. Krishnaswami, N and Sriraman, T, Creative English for Communication, Macmillan.Saran Freeman, Written Communication in English, Orient Longman.

E Sources -

1. https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vWlA1-FXdmtGD4TbPCXo-
2. https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC
3. https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1

Program:	B. Tech. (Civil)			Semester: II			
Course:	AEC-1-German					Code :	BSH22AE02
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	1	2	-	10	10	30	50

Prior knowledge of
English Language is essential.

Course Objectives:

This course aims at enabling students,

1. To get familiar with the basics of German language and develop their interest in the language.
2. To identify the desired information while reading and listening simple German texts.
3. To acquire basic knowledge of German speaking countries.
4. To frame simple sentences in German.

Course Outcomes:

After learning the course, the students should be able to:

1. Demonstrate an understanding of simple texts in German.
2. Apply basic grammar rules to frame simple sentences in German.
3. Develop simple dialogues in German reflecting situations encountered in daily life.
4. **Construct** simple texts in German.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**Introduction to German Language** **Topics:** Greetings; Alphabet; Numbers; Days; Months; Seasons; Personal details; Family; Hobbies; Self-introduction; Things of day-to-day use; Food & Beverages; Buying goods of day-to-day use; Clock time; Basic knowledge of German speaking countries **Listening skills:** Listen and understand spellings, numbers, clock time, details of persons, short easy day-to-day conversations in German **Reading skills:** Read and comprehend from visiting cards, brief profiles, simple instruction boards and advertisements, short easy texts, short messages, short letters, and emails in German, read texts aloud and respond by answering questions accordingly	4
II	**Basic German Grammar and Sentence Structure** • **Personal Pronouns:** Nominative • **Verbs and Verb-Conjugation:** Regular, irregular, separable, modal auxiliaries • **Types of Articles:** Definite, indefinite, negative, possessive • **Cases:** Nominative, accusative • **Prepositions:** With accusative case • **Types of the sentences:** Declarative, interrogative, imperative • **Tenses:** Present Solving simple grammar exercises to get used to basic sentence structure in German	4

III	**Speaking Skills** • Spelling and pronouncing words correctly • Giving brief self-introduction in German • Asking for personal details and providing the required information • Requesting for things of day-to-day use and reacting on requests in appropriate manner Writing short easy German dialogues and presenting them with expressions	3
IV	**Writing Skills** • Writing short easy sentences in German • Using German punctuation and orthographic rules correctly in given texts • Taking dictation for words and simple sentences • Correcting errors in given texts Writing simple texts, short messages, letters emails on given topics	4
	Total	15

Lab	Activities	Duration (Hrs)
1	**Vocabulary:** Exercises torecall and enhance vocabulary	2
2	**Listening 1:** Listen to the audio and repeat(phonetics)	2
3	**Listening 2:** Listen to the audio and select the correct option	2
4	**Reading 1:** Read short easy texts and fill up the information in table	2
5	**Reading 2:** Read short easy texts and mark true or false	2
6	**Reading 3:** Read short easy texts and answer the questions	2
7	**Grammar 1:** Solve simple grammar exercises	2
8	**Grammar 2:** Construct correct sentences by applying grammar rules	2
9	**Speaking 1:** Spell and pronounce the words correctly	2
10	**Speaking 2:** Give your short introduction	2
11	**Speaking 3:** Frame simple questions, requests and reply	2
12	**Writing 1:** Fill up simple data in registration forms	2
13	**Writing 2:** Correct errors in given draft	2
14	**Writing 3:** Fill in the sentences and rewrite the texts, short messages, emails, and letters	2
15	**Presentation:** Basic information of India and German speaking countries in German	2
	Total	30

Text Books:

1. Menschen A1.1: Sandra Evnas, Angela Pude, Franz Pecht, Hueber Verlag, Ismaning Germany, 2016

Reference Books:

1. Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015
2. Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag,Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018
3. Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005

e-sources:

1. **NPTEL Course lectures (IIT Madras) link:** https://onlinecourses.nptel.ac.in/noc24_hs29/preview
2. **DW Learn link:** https://learngerman.dw.com/en/learn-german/s-9528
3. **Goethe-InstitutLink:**https://www.goethe.de/en/spr/ueb.html
4. **EasyGerman link:** https://www.easygerman.org

Program:	B. Tech. (Civil)					Semester: II	
Course :	AEC-I (Japanese)					Code:	BSH22AE03
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	1	2	-	10	10	30	50

Prior knowledge of:
1. English/Marathi/Hindi language for learning Japanese language.

Course Objectives:
This course aims at enabling students,
1. To be aware of Japanese Scripts (Hiragana, Katakana) and basic Kanjis
2. To familiarize themselves with the Japanese language and use basic greetings in day-to-day life.
3. To express themselves using basic sentences and develop cross cultural skills and understanding of gestures, family and community, perceptions.
4. To develop language skills namely Listening, Speaking, Reading and Writing skills for socializing, at basic level.

Course Outcomes:
After learning the course, the students should be able to:
1. **Recognize** Japanese scripts through oral and written communication.
2. **Interact** with the people using Japanese greetings in to their day-to-day life.
3. **Demonstrate** the basic Kanjis with meanings.
4. **Construct** simple demonstrative sentences.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	Introduction: **Hiragana Script.** Listening: Short video skit on self-introduction Speaking: Song of greetings. Reading: Hiragana words Writing: Japanese scripts (Hiragana) Test on Hiragana	5
II	Introduction: **Katakana script** Listening: English words Speaking: Song on body parts. Reading: Katakana words Writing: Locating countries on map, Word hunt.	4
III	Introduction to Kanjis Writing: Learn to write kanjis with stroke order.	3
IV	わたしはマイク.ミラーです。 Listening:Conversation based on L-1 Speaking:Self introduction Reading:Lesson reading no.-1 Writing:Writing about yourself. Grammar: Introduction to1.Particles (は、か、も、か) 2.Verbs (です、ではありません)	3
	Total	**15 Hrs**

Practical/Lab sessions		
Lab session	**Activities**	**Duration (Hrs)**
1	Writing Skill 1: Hiragana script	2
2	Speaking skill 1: Japanese greetings	2
3	Reading Skill 1: Reading and recognizing 'Hiragana' words	2
4	Listening Skill 1: Listening and writing 'Hiragana' words	2
5	Reading Skill 2: Reading 'Katakana' words	2
6	Writing Skill 2: World map activity	2
7	Speaking Skill 2: Self introduction	2
8	Listening Skill 3: Listening and identifying the numbers.	2
9	Reading Skill 3: Reading Numbers with writing practice.	2
10	Speaking Skill 3: Practicing Japanese Greetings.	2
11	Writing Skill 3: Creating Kanjis chart using strokes, 'Kun Yomi' and 'On Yomi'	2
12	Listening Skill 4: Conversation in the office	2
13	Speaking Skill 4: Dialogues between people of different nationality.	2
14	Reading Skill 4: Chapter-1 reading	2
15	Writing Skill 4: Basic sentence formation using grammar.	2
	Total	**30 Hrs.**

Textbook:

1. Minna no Nihongo Part Iand II Publication :GOYAL PUBLISHERS & DISTRIBUTORS PVT. LTD. ,Author: TsuruoYoshiko (Compiled),Edition:2018
2. NihongoShohoPublication:JALTAP, Author:JALTAP(With permission of Japan Foundation, Tokyo), Edition:April 2008

Reference Books:

1. Genki
2. MOMO Author: Japan Foundation, NewDelhi, Publication: Goyal Publisher & Distributors(P) Ltd.,Edition:October2007
3. MOMO Japanese workbook Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors(P)Ltd.,Edition:October2007
4. MOMO Japanese workbook Japan Foundation, New Delhi,Publication:Goyal Publisher & Distributors(P)Ltd.,Edition:October2007

E references:

1. https://onlinecourses.nptel.ac.in/noc23_hs120/preview
2. https://nptel.ac.in/courses/121104005

Program	B. Tech. (Civil)					Semester: II	
Course:	AEC-I Business Storytelling					Code: BSH22AE04	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme			
	Lecture	Practical	Tutorial	CIE		SA	Total
				FA1	FA2		
2	1	2	-	10	10	30	50

Prior Knowledge: Basic knowledge of English Language is essential.

Course Objectives: This course aims at enabling students,

1. To understand storytelling as one of the tools of influential communication.
2. To strengthen their creativity, critical thinking and social skills.
3. To use stories to face leadership, management and professional challenges.

Course Outcomes: After learning the course, the students will be able to

1. Identify nuances of storytelling method as an influential communication
2. Demonstrate the ability to engage and inspire others through the development of narratives, tone and style
3. Apply storytelling techniques to communicate effectively in a business context
4. Develop stories to build, maintain professional relationships, deliver messages and motivate others toward action..

Detailed Syllabus:

Units	Description	Duration (Hrs)
I	**Concept and Scope:** What is a story? A Brief History & Importance of Storytelling, Basics of Storytelling -Entertainment, Engagement, Personalization, Critical Thinking, Observation Skills in Storytelling, Benefits of Storytelling, Storytelling in Engineering, Business Storytelling, Activity: Analysis of Steve Jobs Commencement Speech at Stanford (2005)	3
II	**Process of Storytelling:** Elements of a Story - Context and Relevance, Style and Detailing, Plot, and Characters, The Flow of the Story - Relevance - Action - Result, Know the Purpose – Inspire Action, Educate People, Showcase Values, Build Collaboration, Know your Audience - Educational, Social Background and Age, Developing Narratives: Characteristics of a Narrative, Data Visualization, Presenting a Word Picture, Triggering Emotions of the Audience, Choosing Media - Audio, Written, Oral and Digital Storytelling ,Activity: Analysis of a Short Story: 'The Three Hermits by Leo Tolstoy', The Last Painting by O' Henry	4
III	**Types of Stories:** **Types of Stories** - Customer Story, Origin Story, Event Story, Product Stories, Storytelling Techniques for Presentations, Using Power Words Effectively, Using Narratives to Manage Conflicts, Using a Narrative to Interpret the Past and Shape the Future, Storytelling in Marketing, Story Strategies - Using Anchor Stories **Case studies** - Brand storytelling -Steve Jobs / Jack Maa - Product Presentation, Lido Anthony "Lee" Iacocca.	4

IV	**Crafting a Story** Crafting a Story from a Picture/an Idea/Situation/Artifacts, Storyline - Beginning / Motive / Struggle / Achievement, Six-word Story - Memoirs to Being with, Detailing of Character and the Context, Delivering a Story – Tone / Emotions / Voice Modulation **Activity**-Developing and Delivering Presentation through Storytelling on the Given Situation/Context	4
Total		**45**
Lab Session	**Activities**	**Duration (Hrs)**
1	Basic of Storytelling: Using Five Senses in storytelling activity and Elements of Storytelling	2
2	Analysis of a Short Story: 'The Three Hermits by Leo Tolstoy', and The Last Painting by O' Henry.	2
3	Character Study: Create a detailed character profile of a fictional character, including their background, motivations, and personality traits. Write a short story or scene that showcases this character in action	2
4	Personal Storytelling: Write and present a short personal story that highlights a challenge you've faced and how you overcame it	2
5	Collaborative Storytelling: Partner with another student to create a collaborative story. Take turns writing alternating sections, focusing on maintaining a consistent tone and narrative flow.	2
6	Historical Business Story: Research and narrate a significant historical event or moment in a well-known business's journey, focusing on how storytelling played a role in shaping public perception	2
7	Social Impact Story: Develop a story that demonstrates how a business initiative or project positively impacted a community or addressed a social issue	2
8	Customer Success Story: Craft a narrative that showcases a customer's journey with your fictional business	2
9	Change Management Story: Design a narrative that communicates a change initiative within a company, addressing challenges, resistance, and the ultimate benefits of the change	2
10	Investor Pitch Story: Craft a persuasive story for a startup pitch. Highlight the problem, solution, market opportunity, and potential for growth in a captivating way	2
11	Leadership Story: Compose a story that illustrates effective leadership qualities and strategies. Highlight a leader's ability to motivate, inspire, and guide a team toward success	2
12	Cultural Storytelling: Explore how storytelling can bridge cultural gaps in a global business context. Share a story that demonstrates cultural sensitivity and understanding	2
13	Ethical Dilemma Story: Present a complex ethical dilemma faced by a business or individual. Use storytelling to explore various perspectives and potential solutions	2
14	Marketing Campaign Story: Design a storytelling-based marketing campaign for a specific product or service launch, incorporating different media and channels	2
15	Crisis Turnaround Story: Narrate a scenario where a business successfully navigateda crisis through strategic communication and storytelling, ultimately regaining trust and reputation.	2
Total		**30**

Text Books:

1. Kendall Haven,StorySmart,LibrariesUnlimited,2014

Reference Books:

1. Kendall Haven, Story Proof,LibrariesUnlimited,2007.
2. Rob Biesenbach,Unleash the Power of Storytelling: WinHearts,ChangeMinds,GetResults,EastlawnMedia,2018.
3. Yiannis Gabriel, Story telling inOrganizations:Facts,Fictions,andFantasies,OxfordUniversityPress,2011.

E-resources:

1. TheArtofBusinessStorytelling|AmeenHaque|TalksatGoogle,https://www.youtube.com/watch?v=77FUr6ZsWjY
2. MarketingStorytelling-https://www.referralcandy.com/blog/storytelling-examples/
3. 5examplesofgreatstorytellingfromJackMahttps://www.youtube.com/watch?v=3nHOxONWfEs
4. Sixwordsstory-NicoleKahnhttps://www.youtube.com/watch?v=16sY1iLc2d4
5. KevinHart-Tellinggreatstorieshttps://www.youtube.com/watch?v=vn_L4OPU_rg

Program:	B. Tech. (Civil)					Semester: II	
Course:	Life Skills II					Code:	BSH22CC02
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of: Nil

Course Objectives: This course aims at:

1. To equip them with essential skills and knowledge that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals.
2. To develop students' vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.

Course Outcomes:

After learning the course, the students will be able to

1. **Demonstrate** the ways to nurture their passion.
2. **Develop** skills growth mindset to be successful in personal and professional life.
3. **Demonstrate** adaptability and flexibility for any environment.
   Apply essential skills for successful and happy life management.

Course Guidelines:

1. The students are instructed to perform all the activities suggested by the course faculty.
2. The assessment of life skills activities will be done on the basis of students' performance, attitude, behavior and understanding of subject.
3. The students are suggested to attend all the sessions of the life skills course.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**Nurture Your Passion** Developing Hobbies- Importance, Ways and Benefits , Exploring Skills - Singing/Painting/Dancing etc, Sports: Basketball, Table tennis, Football and Volleyball, Performing Arts: Painting/ Sketching/ Drawing, Stage performance, Let's Play to Learn - games and play forms possible, like, Puzzles & Brainteasers, quiz. • Activity/Worksheet 1: Nurture Your Passion • Activity/Worksheet 2: Importance of Hobbies • Activity/Worksheet 3: Stage Performance • Activity/Worksheet 4: Performing Arts: Painting/ Sketching/ Drawing	15
II	**Lead Yourself - Growth Mindset** Understanding the concept for personal development, Embracing change: Coping with the dynamic nature of life, Resilience and perseverance: Overcoming obstacles and setbacks**,** Developing self-leadership skills and taking initiative/ responsibilities. • Activity/Worksheet 5: Understanding the Concept of	15

	Personal Development • Activity/Worksheet 6: Embracing Change: Coping with Dynamic Nature of Life • Activity/Worksheet 7: Resilience & Perseverance: Overcoming Obstacles & Setbacks	
III	**Adaptability and Flexibility** Adaptability in a rapidly changing world, Problem-solving and decision-making in dynamic situations. Approaching Problem Differently, Embracing uncertainty: Coping with ambiguity and making the most of new opportunities, Flexibility in teamwork: Navigating diverse team dynamics effectively • Activity/Worksheet 8: Adaptability in Rapidly Changing World • Activity/Worksheet 9: Flexibility in Teamwork	**15**
IV	**Life Management** Financial Literacy-Saving is earning, Value of money, Coping up with Virtual Life and Reality, Understanding the responsibilities and impact of Global Citizenship, Environmental awareness and sustainable practices (v) Social responsibility: Contributing positively to the community. • Activity/Worksheet 10: Financial Literacy & Virtual Life	**15**
	Total	**60**

Reference Books:

1) "Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books
2) "The Financial Diet: A Total Beginner's Guide to Getting Good with Money" by Chelsea Fagan and Lauren VerHage
3) "Grit: The Power of Passion and Perseverance" by Angela Duckworth Publisher: Scribner, 2018

E Sources -

1) Skills You Need (www.skillsyouneed.com): This website offers comprehensive information and practical guidance on a wide range of life skills, including communication, time management, problem-solving, and more
2) Mind Tools (www.mindtools.com): Mind Tools provides resources on personal effectiveness, leadership, communication skills, and other essential life skills to enhance professional and personal development
3) TED Talks (www.ted.com): TED Talks offer inspiring and informative speeches by experts and thought leaders covering various life skills topics, including resilience, emotional intelligence, and personal growth
4) Very well Mind (www.verywellmind.com): This website covers mental health, emotional well-being, and self improvement topics that contribute to overall life skills development

Vision and Mission of Applied Sciences and Humanities (AS & H) Department

Vision

To provide value-added quality education that promotes essential technical skills, critical-thinking, communication skills and human values to make impactful contributions to the society.

Mission

Being a student-centric department, our mission is –

1. To develop a strong base of engineering sciences through innovative and experiential learning.
2. To provide excellent harmony of conducive environment and moral support for joyful learning.
3. To strive for overall development of students by providing the right platform to nurture all personality traits.
4. To create research attitude and endeavor innovation, creativity.

Vision and Mission of Civil Engineering Department

Vision

To establish as a premier civil engineering department in Maharashtra in the coming five years by providing quality education, fostering innovation with ethical values to serve the society.

Mission

1. Fostering value-based education to achieve academic excellence with the right attitude and professional ethics.
2. Inculcating a culture of research and innovation, with an aim of serving society in a sustainable manner.
3. Developing skilled civil engineers with an ability to provide solutions to meet national and global challenges in accordance with the needs of the society.