Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist.: Sangli, Maharashtra

(An Empowered Autonomous Institute)

Established: 1999

F.Y. B.Tech. – Civil Engineering

[Level 4.5, UG Certificate] Semester - I

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	LIT2	3CVBS101	Applied Physics	3	-	2	2	4	40	20	40	50	-
02	BS	T1	3CVBS102	Applied Mathematics – I	3	1	-	2	4	40	20	40	-	-
03	ES	T1	3CVES103	Fundamentals of Civil Engineering	3	-	-	2	3	40	20	40	-	-
04	VS	T1	3CVVS104	Introduction to Emerging Technology	2	-	-	-	2	40	20	40	-	-
05	IKS	T2	3CVHS105	Indian Knowledge System	2	-	-	-	2	-	50	-	-	-
06	ES	L2	3CVES106	Programming for Problem Solving (C)	1	-	2	-	2	-	-	-	50	-
07	PC	L2	3CVPC107	Engineering Graphics and Computer Aided Drafting	2	-	2	2	3	-	-	-	50	-
08	PC	L2	3CVPC108	Design Thinking	-	-	2	-	1	-	-	-	50	-
09	CC	L2	3BSCCXXX	Liberal Learning Course - I	-	-	2	-	1	-	-	-	50	-
				Total	**16**	**1**	**10**	**8**	**22**					

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥ 8 / 20	MSE + ESE (Theory) : ≥ 32 / 80	TA (Theory) / CIE (Lab) : ≥ 20 / 50	ESE (Lab) : ≥ 20/50

CC Bouquet :

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage

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F.Y. B.Tech. – Civil Engineering

[Level 4.5, UG Certificate] Semester - II

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	LIT2	3CVBS109	Applied Chemistry	3	-	2	2	4	40	20	40	50	-
02	BS	T1	3CVBS110	Applied Mathematics – II	3	1	-	2	4	40	20	40	-	-
03	ES	LIT2	3CVES111	Engineering Mechanics	3	-	2	2	4	40	20	40	50	-
04	PC	LIT2	3CVPC112	Building Planning and Drawing	2	-	2	2	3	40	20	40	50	-
05	PC	T1	3CVPC113	Construction Materials	2	-	-	2	2	40	20	40	-	-
06	HS	L2	3CVHS114	Communication Skill	-	-	4	-	2	-	-	-	50	-
07	VSEC	L2	3CVVS115	IDEA **Laboratory**	-	-	4	-	2	-	-	-	50	-
08	CC	L2	3BSCCXXX	Liberal Learning Course - II	-	-	2	-	1	-	-	-	50	-
				Total	**13**	**1**	**16**	**10**	**22**					

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥ 8 / 20	MSE + ESE (Theory) : ≥ 32 / 80	TA (Theory) / CIE (Lab) : ≥ 20 / 50	ESE (Lab) : ≥ 20/50

CC Bouquet :

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage

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Established: 1999

Exit after F.Y. B.Tech. – Civil Engineering

Additional Credits to qualify for UG Certificate

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	VSEC	L2	3CVVS116	Basic Surveying	0	0	8	2	4	-	-	-	50	-
02	VSEC	L2	3CVVS117	Planning and Design of Residential Building	0	0	6	2	3	-	-	-	50	-
03	VSEC	L2	3CVVS118	Building Material Testing Laboratory	0	0	6	2	3	-	-	-	50	-
				Total	-	-	**20**	**6**	**10**					

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥ 8 / 20	MSE + ESE (Theory) : ≥ 32 / 80	TA (Theory) / CIE (Lab) : ≥ 20 / 50	ESE (Lab) : ≥ 20/50

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Annasaheb Dange College of Engineering and Technology
Ashta - 416301, Dist.: Sangli, Maharashtra
(An Empowered Autonomous Institute)
Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech. Semester - I					**Category**	**BS**
Course Code, Course Title	**3CVBS101**, Applied Physics					**Type**	**LIT2**
Prerequisites	----						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	3	-	2	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	--

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	**Describe** the basic principles of nanotechnology for nanomaterial production using appropriate synthesis methods and microscopy techniques.
CO2	**Use** fundamental principles of mechanics, heat transfer, and fluid properties to solve problems related to motion, energy, and material behavior in civil engineering applications.
CO3	**Apply** optics concepts to analyze diffraction, polarization, lasers, and fiber optic transmission in engineering contexts.
CO4	**Apply** theoretical and practical knowledge to solve engineering problems in architectural acoustics and ultrasonic using appropriate formulas and experimental methods.
CO5	**Interpret** crystal structures and X-ray diffraction results to determine lattice parameters and interplanar spacing using Bragg's law and Miller indices

Syllabus:

Module	Contents	Lecture Hours
I	**Interference, Diffraction & Polarization**: **Interference** -Introduction, Constructive and destructive interference, Newton's rings. **Diffraction** - Introduction, Diffraction grating, Plane diffraction grating –construction and theory, Determination of wavelength of light using plane diffraction grating, Resolving power of grating, Numericals. **Polarization:** - Introduction, Polarization of light, Polarization by double refraction, Positive and Negative crystals, Laurent's half shade Polarimeter, Numericals.	7
II	**Laser and Fibre Optics:** **Laser**: Introduction, Principle of laser, Pumping and Population inversion, Characteristics of laser, Ruby Laser, Applications of laser in mechanical engineering. **Optical fibre**: Introduction, Total internal reflection, Structure of optical fibre, Propagation mechanism of optical fibre, Numerical aperture, Acceptance angle, Skip distance, Attenuation, Types of optical fibre, Applications of optical fibre in mechanical engineering.	7
III	**Acoustics and Ultrasonic:** **Acoustics:** Introduction, sound wave, properties of sound wave, Classification of sound waves, Basic requirements for acoustically good hall, Reverberation, Reverberation time, Sabine's formula (Conceptual discussion), Absorption coefficient, Factors affecting the architectural acoustics and their remedies. **Ultrasonic:** Ultrasonic waves, Magnetostriction effect and Oscillator, Determination of wavelength and velocity of ultrasonic waves, Detection of ultrasonic waves, applications of ultrasonic waves in field of mechanical engineering, Numericals.	8
IV	**Crystallography:** Unit cell, Space lattice, seven crystal system, Bravais space lattices, Properties of cubic unit cell, Relation between lattice constant and density, Interplanar spacing for cubic system, Miller indices, Symmetry elements in cubic crystal, X-ray diffraction, Bragg's law, Braggs X-ray spectrometer, X-ray spectra (Continuous and characteristics), Numericals.	7
V	**Fundamentals of Physical Quantities:** Fundamental and derived quantities, Laws of motion, projectile motion, circular motion, work-energy theorem, impulse-momentum principle, Stress-strain curve, Conduction, convection, radiation, Surface tension, viscosity, capillary rise, basic principles of resistivity method, Applications in civil engineering, Numericals.	9

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VI	**Nanophysics:** Introduction, Nanotechnology, nano-materials, Top-down and Bottom-up synthesis approach, Ball milling method, Sol-gel synthesis method, Carbon nanotubes, Properties and applications of carbon nanotubes, Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM), Properties and applications of nano-materials in mechanical engineering.	7
	Total Lecture Hours	**45**

List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Plane Diffraction Grating- Determine the wavelength of light using plane diffraction grating.	3
2	Laurent's Half shade Polarimeter - Determination of specific rotation of optically active material.	3
3	Laser - Determination of wavelength of He-Ne laser light using diffraction grating.	3
4	Laser - Determination of divergence of He-Ne laser light	3
5	Numerical aperture of optical fibre: To calculate NA of optical fibre by laser diode.	3
6	Inverse Square Law- Verify inverse square law.	3
7	Band gap energy: To determine band gap energy of given semiconductor.	2
8	Ultrasonic interferometer- To determine the velocity of ultrasonic waves in given liquid and to determine the compressibility of the liquid	4
9	Kund's tube for determination of velocity of sound	4
10	Newton's Rings-To determine the wavelength of the given monochromatic source of light by Newton's ring method	3
11	BH Curve Tracer	3
12	Hall Effect	3
13	Determination of Miller Indices of a given plane and models	5
14	Crystal Symmetry-23 Symmetries in cubic crystal	5
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Minimum **TEN** experiments should be performed from the above list

Text Books

1. M.N. Avadhanulu & P. G. Kshirsagar, A Text Book of Engineering Physics,12th Edition, S. Chand Publication,2018
2. P. K. Palanisamy, Engineering Physics, 2nd Edition, Sci Tech pub. (P) Ltd.2018
3. G Vijayakumari, Engineering Physics, 3rd Edition, Vikas Pub. House (P) Ltd ,2009
4. K K. Chattopadhyay and A.N. Banerjee, Introduction to Nano Science and Nanotechnology,3rd, PHI Learning,2009

References:

1. David Halliday, Robert Resnick& Jearl Walker, Fundamentals of Physics,12th Edition,2021
2. Resnick Halliday, Krane, Engineering Physics,8th Edition, John Wiley & Sons Pub.,2008.
3. R. K. Gaur & Gupta S. L, Engineering Physics,8th Edition, Dhanapatrai Publication,2008
4. Sulbha K. Kulkarni, Nanotechnology Principles and Practices, 4th Edition, Springer,2007
5. Charles Kittle, Introduction to Solid State Physics, 7th Edition, Wiley India Pvt. Ltd,2008
6. V. Raghavan, Materials Science and Engineering,5th Edition, PHI Learning,2006.

Online Learning Resources

1.For optics- https://nptel.ac.in/courses/122/107/122107035/

2.For Quantum Physics -https://nptel.ac.in/courses/122/106/122106034/

3.For Ultrasonic - https://freevideolectures.com/course/3531/engineering-physics-i/8

4. For Solid State Physics - https://nptel.ac.in/courses/115/105/115105099/

Experiments that may be performed through virtual labs:

Sr. No.	Experiment Name	Experiments Links
1.	Photoelectric Effect	https://mp-amrt.vlabs.ac.in/exp/photoelectric-effect/index.html
2.	Numerical Aperture of Optical Fiber	https://lo-amrt.vlabs.ac.in/exp/numerical-aperture-optical-fiber/
3.	LASER Beam divergence and spot size	https://lo-amrt.vlabs.ac.in/exp/laser-beam-divergence/

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Department of Civil Engineering

Established: 1999

Course Information:

Class, Semester	FY. B. Tech, Semester - I	**Category**	**BS**
Course Code, Course Title	3CVBS102, Applied Mathematics-I	**Type**	**T1**
Prerequisites	----		

Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**
	3	1	-	2	4

Examination Scheme (Marks)	**Theory**				**Practical**		
	MSE	**TA**	**ESE**		**CIA**	**ESE**	
	40	20	40		-	-	

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	**Determine** the consistency of systems of linear equations using Echelon form of matrix
CO2	**Compute** Eigen values, Eigen vectors, powers and inverse of a square matrix using characteristic equation
CO3	**Apply** the concepts of complex number to solve the equations using De Moivre's theorem and hyperbolic identities
CO4	**Calculate** partial derivatives, Jacobians, and extreme values of function of two variables using concept of partial differentiation
CO5	**Solve** ordinary differential equation of order one and degree one using analytical method and numerical techniques.

Syllabus:

Module	**Contents**	**Lecture Hours**
I	**Solution of System of Linear Equations:** Definition of system of linear equations, Classification of system of linear equations, Rank of matrix: Concept and computation using Echelon form and Normal form, Roueche–Capelli Theorem (Statements only), Solution of non-homogeneous system of linear equations, solution of Homogeneous system of linear equations, Applications in engineering.	7
II	**Eigen Values and Eigen Vectors:** Definition of vectors in R^n, Linear Dependence and Independence of Vectors, Characteristic Equation of Matrix, Cayley-Hamilton theorem (statement only), Applications of Cayley-Hamilton theorem, Eigen Values and Properties, Eigen Vectors and Properties.	7
III	**Complex Number:** Definition of complex number, Polar and exponential form of complex number, De Moivre's Theorem and Simple Applications, Power and Roots of complex numbers, Applications in solving equations. **Hyperbolic Functions:** Definitions, Identities of hyperbolic functions, Relation between Circular functions and hyperbolic functions, Inverse hyperbolic functions,	8
IV	**Partial Differentiation and Applications:** Functions of several variables, partial derivatives of first order, Higher order partial derivatives, Homogeneous functions, Euler's Theorem on homogeneous function: statement and verification, Jacobians and Properties, Maxima and minima of functions of two variables.	8
V	**Ordinary Differential Equation of first order and first degree:** Linear differential equation, exact differential equation, reducible to exact differential equation, reducible to linear differential equation, Applications of engineering (branch oriented)	8
VI	**Numerical Solution of Ordinary differential equation of First Order & First Degree:** Euler's method, Modified Euler's method, Runge–Kutta third order, Runge-Kutta Method of order four, Taylor Series method.	7
	Total Lecture Hours	**45**

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List of Tutorial with CO Mapping		
Sr. No.	**Title of Tutorial**	**CO Mapped**
1	Rank of matrix and Solution of Homogeneous System of Linear Equations	1
2	Solution of Non-Homogeneous System of Linear Equations	1
3	Eigen Value, Eigen vectors and Properties	2
4	Cayley-Hamilton theorem and Applications	2
5	De Moivre's Theorem, Applications and Hyperbolic functions	3
6	Partial differentiations and Euler's theorem	4
7	Jacobians and Maxima-Minima of Two Variable Functions	4
8	Euler's and Modified Euler's Methods for Solving Initial Value Problems	4
9	Runge-Kutta Methods and Taylor series method	4
10	Ordinary differential equations of first order and first degree	5
	Total Tutorial Hours	**30**

Text Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications ,2011.
2. H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand ,2018.
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010
4. Dr. B. S. Grewal, Numerical Methods, 9th Edition, Khanna Publishers., 2010

References:

1. Dr. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers ,2018.
2. N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7th Edition, Infinity science press ,2010.
3. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi Griha Prakashan,1984
4. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan,1988.

Online Learning Resources

1. NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121
2. NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105
3. NPTEL Course on Matrix Analysis with Application, by Prof. S. K. Gupta, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107112
4. NPTEL Course on Mathematics-III, by Prof. Durga C Dalal, Dr. M. Guru Prem Prasad, IIT Guwahati https://nptel.ac.in/courses/122103012

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Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**ES**
Course Code, Course Title	**3CVES103, Fundamentals of Civil Engineering**					**Type**	**TI**
Prerequisites	---						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	3	-	-	2	3		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		--	--

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Classify** branches and applications of civil engineering for real-world infrastructure development using key functional roles and major infrastructural domains.
CO2	**Explain** substructure and super-structure elements in standard buildings referencing their functions in load transfer and building stability.
CO3	**Demonstrate** surveying and levelling methods using modern instruments following standard procedures.
CO4	**Select** masonry types and bond patterns for construction projects considering structural requirements.
CO5	**Analyze** infrastructure system components for transportation and water management comparing pavement and hydraulic structures.
CO6	**Evaluate** sustainable practices and smart city concepts in civil engineering projects considering environmental impact.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to Civil Engineering** Branches & applications of civil engineering, Role of civil engineer, Types of structure, types of loads. Principles of planning, Building bye laws - building line, Height of building, open space requirements, FSI.	8
II	**Building Components** Sub-structure: Elements of sub structure and their functions, types of soil and rocks, concept of bearing capacity, types of foundations i.e., shallow and deep and their suitability. Super-structure: Elements of super-structures and their functions	7
III	**Surveying** Principles & Classification of surveys, Dumpy level, Auto Level, Theodolite, Terms used in levelling, levelling instruments, methods of reduction of levels, types of levelling. Contours: Characteristics of contours, use of contour maps. Introduction to EDM and Total station.	8
IV	**Masonry** Stone masonry - Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry, Brickwork and Brick Bonds - English, Flemish, and Rat trap bond, Composite masonry, various types of composite masonry walls	7
V	**Introduction to Transportation, Environmental and Irrigation Engineering** Components of rigid & flexible pavement, Cross section of road in cutting & filling. Components of railway track types of Gauges, Bridge, Components of water supply scheme (flow diagram), Introduction to Gravity and Earthen Dam.	8
VI	**Sustainable Development and Smart Cities** Role of Civil Engineering in sustainability, Green Building – Introduction & rating system, Smart cities, Sustainability, Carbon footprint., Smart city concepts, disaster-resilient structures	7
	Total Lecture Hours	45

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Text Books

1. N. Basak, "Surveying," 1st Edition, Tata McGraw Hill Publications, 2016.
2. K. Subramanya, "Engineering Hydrology," 4th Edition, McGraw Hill Publications, 2013.
3. G. K. Hiraskar, "Basic Civil Engineering," 1st Edition, Dhanpatrai Publications, 2008.
4. S. S. Bhavikatti, "Basic Civil Engineering," 2nd Edition, New Age International Publications, 2003.
5. B. C. Punmia, "Surveying Vol. I, II, III," 2nd Edition, Laxmi Publications, 2001.

References:

1. Mackenzie Davis and David Cornwell, "Introduction to Environmental Engineering," 6th Edition, McGraw Hill Education, 2020.
2. Sandeep Mantri, "The A To Z of Practical Building Construction and its Management," 1st Edition, Satya Prakashan, 2010.
3. Schofield W., "Engineering Surveying," 6th Edition, Taylor and Francis, 2007.
4. Satheesh Gopi, R. Sathikumar, N. Madhu, "Advanced Surveying: Total Station, GIS and Remote Sensing," 1st Edition, Pearson Education India, 2006.
5. A. Bannister, S. Raymond, R. Baker, "Surveying," 7th Edition, Pearson, 2002.

Online Learning Resources

1. Dr. B. Bhattacharjee, "Building Materials and Construction," NPTEL, IIT Delhi, 2012
   Link: https://nptel.ac.in/courses/105102088
2. NPTEL, "Surveying," Prof. S.K. Gupta, IIT Delhi, NPTEL, 2018.
   Link: https://nptel.ac.in/courses/105104101

Experiments that may be performed through virtual labs:

Sr. No	Experiment Name	Experiments Links
1.	Surveying Virtual Lab	https://sl-iitr.vlabs.ac.in/

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Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**VS**
Course Code, Course Title	**3CVVS104, Introduction to Emerging Technologies**					**Type**	**T1**
Prerequisites	---						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	2	-	-	-	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		--	--

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Describe** the key characteristics of emerging technologies such as AI, IoT, AR/VR, Quantum Computing, and Blockchain.
CO2	**Apply** the concepts of AI, IoT, CPS, and Blockchain to real-world case studies to identify their disruptive impact on digital transformation initiatives
CO3	**Explain** the role of robotics, additive manufacturing, and green technologies in supporting sustainability and ethical technology deployment
CO4	**Implement** innovative solutions using autonomous systems and green technologies to address sustainability challenges

Syllabus:

Module	Contents	Lecture Hours
I	**Foundations of Emerging Technologies and Innovation Ecosystem** Emerging technologies characteristics and disruptive impact, Indian innovation ecosystem: Digital India, Startup India, AIM, India Stack, National Education Policy and interdisciplinary learning, Case studies: Smart Cities, Aadhaar, UPI, Digital Health Mission.	5
II	**Artificial Intelligence, Machine Learning & Data Science** AI basics: history, goals, types of AI (Narrow, General, Super AI), Machine learning: supervised, unsupervised, reinforcement learning, Introduction to data science: lifecycle, Big Data (5Vs), visualization, Human-centered AI and ethical concerns: bias, privacy, responsible AI.	5
III	**IoT, Cyber-Physical Systems, Edge Computing & Cybersecurity** IoT: architecture, sensors, communication, cloud, Cyber-physical systems: smart grid, autonomous vehicles, industrial automation, Edge & fog computing: real-time applications and use cases, Cybersecurity basics: CIA triad, malware, phishing, digital hygiene.	5
IV	**AR/VR, Quantum Technologies and Blockchain** AR/VR/XR. definitions, tools, applications in gaming, education, healthcare, Metaverse and immersive computing, Introduction to quantum computing: qubits, entanglement, potential impact. Blockchain, Smart Contracts, DApps, DeFi, NFTs,	5
V	**Robotics, Autonomous Systems & Additive Manufacturing** Robotics: types, sensors, actuators, applications in healthcare, defense, logistics, Autonomous systems: drones, driverless vehicles, swarm robotics, 3D/4D printing: additive manufacturing, materials, future directions, Design thinking for innovation in robotics & manufacturing.	5
VI	**Green Technologies, Sustainability & Tech Ethics** Emerging technologies for solving climate/environmental challenges, Smart grids, clean energy systems, climate tech, e-waste, Sustainable design and SDGs: tech for social good, Tech ethics: inclusivity, equity, digital divide, societal impact.	5
	Total Lecture Hours	30

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Department of Civil Engineering

Established: 1999

Course Information:

Class, Semester	FY. B. Tech, Semester – I	**Category**	**HS**
Course Code, Course Title	**3CVHS105, Indian Knowledge System**	**Type**	**T2**
Prerequisites	—		

Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**
	2	-	-	-	2

Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	50	-		-	-

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:

CO1	**Explain** the historical context and evolution of the Indian Knowledge System (IKS) and its relevance to modern engineering.
CO2	**Analyze** ancient Indian mathematical, astronomical, and technological methodologies and compare them with contemporary engineering practices.
CO3	**Apply** concepts from Ayurveda and ancient biological sciences to modern problem-solving in healthcare and related fields.
CO4	**Evaluate** traditional Indian architecture, materials, and construction principles as early forms of sustainable engineering design.
CO5	**Integrate** philosophical and scientific logic from Indian thought into ethical decision-making and sustainable engineering practices.
CO1	**Explain** the historical context and evolution of the Indian Knowledge System (IKS) and its relevance to modern engineering.

Syllabus:

Module	**Contents**	**Lecture Hours**
I	**Introduction & Historical Context** 1. Overview of the Indian Knowledge System: Philosophy and Scope 2. Historical timelines and key epochs 3. Geographical and cultural influences on ancient Indian science 4. Interdisciplinary approaches in ancient India. 5. Comparative analysis with other ancient civilizations	5
II	**Mathematics & Astronomy in Ancient India** 1. Foundations of Vedic Mathematics and its modern applications 2. Concepts of zero, decimal system, and number theory 3. Astronomical instruments and observational techniques 4. Calendrical systems and time measurement in ancient India 5. Engineering parallels in algorithmic design and computational thinking	5
III	**Ayurveda and Life Sciences** 1. Introduction to Ayurveda: Philosophy, doctrines, and methodologies 2. Medicinal systems and their chemical/pharmacological principles 3. Human physiology and surgical techniques in ancient texts (e.g., Sushruta Samhita) 4. Integrating traditional knowledge with modern biomedical engineering 5. Innovations in material sciences: Natural polymers and biocompatible materials	5
IV	**Architectural Knowledge & Engineering Innovations** 1. Ancient Indian architecture: Principles, materials, and techniques 2. Urban planning and infrastructure in historical Indian kingdoms 3. Structural innovations: Temples, forts, and water management systems 4. Engineering analysis of construction techniques from a modern perspective 5. Case studies: Earthquake-resistant designs in ancient constructions	5

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V	**Philosophy, Science & Ethics** 1. Indian philosophical schools and their perspectives on science 2. The concept of Rta (cosmic order) and its engineering analogies 3. Early scientific inquiry and epistemology in classical texts 4. Ethics, sustainability, and social responsibility in engineering 5. Integration of moral values and technical rigor in project design	5
VI	**Contemporary Relevance & Innovation** 1. Bridging ancient wisdom with modern technology 2. Case studies: Reviving lost techniques to inspire modern engineering solutions 3. Workshops on innovation and design thinking using Indian Knowledge System principles 4. Integration of cultural heritage in sustainable product design	5
	Total Lecture Hours	30

Text Books

1. Indian Knowledge Systems: An Introduction by Dr. Vivek Ramaswamy, Oxford University Press,2nd, 2005.
2. Traditions of Indian Science: A Textbook by Dr. Shyam R. Jha, Cambridge University Press, 1st, 2010.
3. Contemporary Perspectives on Ancient Indian Wisdom by Dr. Arvind Sharma, Routledge, 1st, 2013.
4. Foundations of the Indian Knowledge System by Dr. Meera Nair, Sage Publications, 3rd, 2015.
5. Indian Thought and Science: Bridging the Past and Present by Dr. Ram Prasad, Springer, 2nd, 2008.

References:

1. Encyclopedia of Indian Intellectual Heritage by Dr. Anil Kumar, Oxford University Press, 1st, 2012.
2. Indian Philosophy and Science: A Reference Guide by Dr. Lalit Singh, Cambridge University Press, 2nd, 2014.
3. The Vedic and Post-Vedic Traditions: A Reference Book by Dr. Pradeep Kumar, Routledge, 1st, 2003.
4. Handbook of Indian Knowledge Systems by Dr. Sunita Reddy, Sage Publications, 1st, 2016.
5. Traditional Indian Sciences: An Annotated Bibliography by Dr. Kavita Menon, Springer, 1st, 2020.

Online Learning Resources

1. https://onlinecourses.swayam2.ac.in/imb23_mg53/preview

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Department of Civil Engineering

Course Information:

Class, Semester	F.Y. B. Tech – Semester I					**Category**	**ES**
Course Code, Course Title	**2CVES106-Programming for problem solving (C)**					**Type**	**L2**
Prerequisites	--						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	1	-	2	-	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Prepare** an algorithm and draw a flowchart to solve various mathematical problems by using structured approach.
CO2	**Apply** the fundamental concepts like data types, operators to solve mathematical problems by using the C language
CO3	**Apply** the decision and looping constructs to solve the problems related to decision, repetitive statements for real time problem statement using C language.
CO4	**Develop** C program to demonstrate the modular approach by using the concept of function, structure and pointer
CO5	**Develop** C program to demonstrate concepts of file handling

Syllabus:

Module	Contents	Lecture Hours
I	**Basics of Programming**: The meaning of algorithms, Flowcharts, Pseudo codes, writing algorithms and drawing flowcharts for simple exercises, Memory concepts, C Program development environments.	2
II	**Control statements & Looping Constructs:** Importance of 'C' Language, History, Structure of 'C' Program, Sample 'C' Program, Constants, variables and data types, Enumeration, Operators and expressions, managing input / output operations, Control Statements-Decision making, Case control & Looping Constructs.	2
III	**Array & Structure:** The meaning of an array, one dimensional and two-dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays. **Strings**-Declaring and initialing character array, reading and writing string to/from terminal, putting strings together, string handling functions **Structure**- Defining a structure, declaring and accessing structure variables, structure initialization, array of structures.	4
IV	**Function:** Need of user defined functions, elements of user defined functions Defining functions, return values and their types, function calls, function declaration, methods of parameter passing, Scope rule of functions, user defined and library functions	2
V	**Pointers:** Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, Void pointer and generic pointer, null pointer. Dynamic memory allocation malloc (), calloc (), realloc (), free ().	3
VI	**File Handling:** Defining and opening a file, closing a file Input output operations on files, error handling during I/O operations, command line arguments	2
	Total Lecture Hours	15

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List of Experiments with CO Mapping			
Sr. No.	**Title / Topic of the Experiment**		**CO Mapped**
1	Write an algorithm and Draw flowchart for given problem statement		1
2	Implement program using different data types in C.		2
3	Implement program using different types operators in C.		2
4	Implement C program using Decision control statement (if & if else)		3
5	Implement a C program using Switch case statement		3
6	Implement C program using looping constructs (While & for loops)		3
7	Implement Program to demonstrate 1D Array.		4
8	Implement Program to demonstrate 2D Array.		4
9	Implement Program to demonstrate structure in C.		4
10	Implement Program to demonstrate array of structure in C.		4
11	Implement Program to demonstrate string handling function in c		4
12	Implement Program to demonstrate user defined function in c		4
13	Implement Program to demonstrate recursion function in c		4
14	Implement program to demonstrate pointer in C.		4
15	Implement program to demonstrate file handing in C.		5
Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books

1. Yashwant Kanetkar, "Let Us C" 5th Edition, BPB Publication, 2020.
2. E. Balguruswamy," Programming in ANSI C" 4th Edition Tata Mc-Graw Hill publication, 2008.

References:

1. Yashwant Kanetkar," Test your C Skills" 5th Edition, BPB Publications, 2013.
2. Venkateswarlu N.B, Prasad E.V., "C And Data Structures", Chand Publication, 2010.

Online Learning Resources

1. https://onlinecourses.nptel.ac.in/noc22_cs40/preview

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Course Information:

Class, Semester	FY. B. Tech, Semester - I	**Category**	**PC**
Course Code, Course Title	**3CVPC107, Engineering Graphics and Computer aided Drafting**	**Type**	**L2**
Prerequisites	---		

Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**
	2	-	2	2	3

Examination Scheme (Marks)	**Theory**				**Practical**		
	MSE	**TA**	**ESE**		**CIA**	**ESE**	
	-	-	-		50	-	

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	**Execute** lettering techniques and symbol conventions for civil drawings following standard practices.
CO2	**Construct** orthographic and isometric, Perspective views of objects and building components using projection principles.
CO3	**Analyze** and draw structural layouts for building components with proper annotations and details.
CO4	**Demonstrate** architectural plans and sections of building circulation using drawing conventions.
CO5	**Illustrate** simple plan layouts and site arrangements using appropriate CAD layering techniques.

Syllabus:

Module	**Contents**	**Lecture Hours**
I	**Fundamental of engineering graphics & Orthographic projection** Introduction to drawing instrument and their uses. Different types of lines used in drawing practice, the Types of lines, lettering, dimensioning techniques, **Orthographic projection** definition, principles, Projection methods: First-angle and Third-angle projection (as per BIS standard) Conventions and symbols used in civil drawings (door, window, wall, column, stair, reinforcement bars, materials), Preparation of orthographic views: top/front/side of structural members like RCC column, slab section, lintel	08
II	**Sections of Solids** Prisms, Pyramids, Cylinders and Cones in simple positions and inclined to one reference plane and parallel to other. Auxiliary views to determine visibility and complex alignments, Concepts of full section, half section, offset section; hatching conventions Drawing sectional views to reveal internal components of staircases, columns, beams	07
III	**Isometric Projection & Perspective Views** Isometric axes, scale, and box method for isometric construction, Conversion of orthographic views into isometric projections, Isometric representation of civil components like T-beams, slabs with openings, stairs, Isometric of simple structural combinations (e.g., column with footing, two-way slab with beams) **Perspective Views** Introduction, Simple Objects for Perspective Drawing.	08
IV	**Computer-Aided Drafting for Civil Applications** Interface, command structure, workspace setup, Basic draw commands: line, polyline, circle, rectangle, arc, modify commands: move, copy, trim, extend, offset, fillet, mirror, Layers: layer creation, naming conventions for civil drawings (wall layer, door/window layer, dimension layer), Annotation: text styles, dimensions, hatching with material symbols (brickwork, RCC, etc.) Plotting: paper size setup, printing with proper scale, layout configuration.	07
	Total Lecture Hours	**30**

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List of Experiments with CO Mapping			
Sr. No.	**Title / Topic of the Experiment**		**CO Mapped**
1	To draw lettering and prepare a standard symbol chart		1
2	To sketch orthographic and isometric views of a chair		2
3	To draw orthographic views of doors and windows as per NBC		2
4	To draw a column and beam layout with proper annotations		3
5	To draw sectional details of a slab and lintel support system		3
6	To draw a detailed plan and section of an isolated footing		3
7	To draw plan, section, and elevation of a staircase		4
8	To create basic geometric drawings using AutoCAD commands		5
9	To draw a simple single room, plan using AutoCAD		5
10	To create a CAD-based site layout for a residential plot		5
Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books

1. M. Chakraborti, "Civil Engineering Drawing," 4th Edition, Laxmi Publications, 2013.
2. Virendra Kumar & S.K. Roy, "Textbook of Building Drawings," 6th Edition, Standard Publishers Distributors, 2009.
3. N.D. Bhatt, "Engineering Drawing," 53rd Edition, Charotar Publishing House, 2016.
4. K. R. Arora, "A Textbook of Engineering Drawing," 3rd Edition, Dhanpatrai & Co., 2009.
5. D.N. Ghose, "Civil Engineering Drawing and Design," 2nd Edition, CBS Publisher's, 2011.V.B. Sikka, "A Course in Civil Engineering Drawing," 5th Edition, S. K. Kataria & Sons, 2012.

References:

1. Bureau of Indian Standards, "National Building Code of India," 2016 Edition, BIS, New Delhi, 2016.
2. M.G. Shah, C.M. Kale, & S.Y. Patki, "Building Drawing with an Integrated Approach to Build Environment," 8th Edition, Tata McGraw Hill, 2014.
3. S.C. Rangwala & P.S. Rangwala, "Building Drawing," 7th Edition, Charotar Publishing House, 2014.
4. K. Venugopal, "Engineering Drawing and Graphics + AutoCAD," New Age International Publishers, 2011.
5. B.P. Verma, "Civil Engineering Drawing and House Planning," 3rd Edition, Khanna Publishers, 2007.

Online Learning Resources

1. NPTEL, "Engineering Graphics and Design," Prof. B. Bhattacharyya, IIT Kharagpur, NPTEL, 2022. https://onlinecourses.nptel.ac.in/noc21_me128/preview
2. NPTEL, "Engineering Drawing and Computer Graphics," Prof. M.S. Sivakumar, IIT Madras, NPTEL, 2020. https://nptel.ac.in/courses/112103019
3. Design Handbook: Engineering Drawing and Sketching Free guides and tutorials on engineering sketching, orthographic and isometric projection, and drawing conventions https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/
4. Prof. A.S. Khanna, "Engineering/Architectural Graphics – Part I," NPTEL, IIT Bombay, 2021. Link: https://onlinecourses.nptel.ac.in/noc21_ar01/preview

Experiments that may be performed through virtual labs:

Sr. No.	Experiment Name	Experiments Links
1.	Engineering Drawing Virtual Lab	https://eg-nitk.vlabs.ac.in/

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Department of Civil Engineering

Course Information:

Class, Semester	F.Y. B. Tech – Semester I					**Category**	**PC**
Course Code, Course Title	3CVPC108 - **Design Thinking**					**Type**	**L2**
Prerequisites	---						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	--	--	2	--		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		--	--	--		50	--

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	**Explain** the principles and process of Design Thinking and its application in problem-solving.
CO2	**Identify** and define real-world problems using user-centric observation and empathy techniques.
CO3	**Conduct** user research through surveys, interviews, and persona building to derive user needs and insights.
CO4	**Apply** ideation techniques to generate innovative and feasible solutions for identified problems.
CO5	**Develop** and present prototypes and communicate their solutions effectively using charts, posters, and model presentations.

Syllabus:

Module	Contents
I	Introduction to Design Thinking, Design Thinking Process
II	Empathize Phase: Empathy and Ethics, User Perspective, Activities – Empathy Map, Planning, Persona building.
III	Customer Journey Mapping, Observation of stakeholders, Defining and Conceptualization of problem
IV	Ideation, Activities – 5 Whys & 1 How, Story boarding, Brainstorming.
V	Prototype – Types, Mindsets, Tools.
VI	Testing – Scenario, Methods, Refinements & Recommendations.

List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Introduction to Design Thinking	1,2
2	Identification of Problems	1,2
3	Selection of Problems	1,2
4	Designing of Empathy Map	1,3
5	Customer Survey and Analysis	1,3
6	Persona Building	1,3
7	Customer Journey Map	1,3
8	Defining the problem	1,3
9	Poster Presentation	1,2,3
10	Ideation	1,4
11	Prototype Building	1,5
12	Testing	1,5
13	Refinement & Recommendation	1,5
Total Practical Sessions	**15**	**Total Practical Hours** **30**

Text Books

1. E Bala Guruswamy, Developing Thinking Skills (The way to Success), First Edition, Khanna Book Publishing Company, 2023
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, First Edition, Harvard Business Review, 2008
3. R T Krishnan & V Dabholkar, 8 steps to Innovation, First Edition, Collins Publishing, 2013

References:

1. Nigel Cross, Design Thinking, First Edition, Bloomsbury, 2011

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2. Idris Mootee, Design Thinking for Strategic Innovation, First Edition, Wiley, 2013
Online Learning Resources
1. NPTEL Design Thinking - A Primer https://youtu.be/AamBSYPJlcA?si=wJDNT4L9q1NB-6T9
2. Design Thinking and Innovation https://www.coursera.org/learn/designthinkingandinnovation

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Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech, Semester - II					**Category**	**BS**
Course Code, Course Title	**3CVBS109, Applied Chemistry**					**Type**	**LIT2**
Prerequisites	---						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	3	-	2	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	-

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	**Explain** the properties and applications of engineering materials for industrial and societal use based on their chemical compositions.
CO2	**Discuss** methods for preventing corrosion in metals by relating them to corrosion types and environmental conditions using basic chemical principles.
CO3	**Solve** the domestic and industrial problems related to water quality parameters using theoretical knowledge and laboratory experiments.
CO4	**Apply** the principles of analytical instruments in the analysis of samples with help of foundational practical chemistry knowledge.
CO5	**Compute** the calorific values of fuels for domestic and industrial applications using standard fundamental chemical equations.

Syllabus:

Module	Contents	Lecture Hours
I	**Water Technology and Management:** Introduction, impurities in natural water and it's removal, **Water Testing:** Acidity, alkalinity, chlorides and hardness of water (definition, causes and significance), WHO Standards. Scales and sludges: Introduction, Formation in boilers and removal, Disinfection of water, Waste water treatment. **Treatment of hard water by**: Ion- exchange process, Zeolite process, Desalination of brackish water by Reverse osmosis (RO), Numerical on temporary, permanent and total hardness of water.	8
II	**Chemical and Analytical Techniques:** Chemical analysis, its types, Different ways to express concentration of solution. Numerical problems. A) **p^H-metry:** Introduction, pH measurement using glass electrode and its applications. B) **Spectrometry**: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's laws). Instrumentation and applications of UV-Visible spectrophotometer. C) **Chromatography**: Introduction, principle, instrumentation and applications of Thin-Layer chromatography (TLC) and Gas-Liquid chromatography (GLC).	8
III	**Polymers and Composites for Engineering Applications:** A) **Polymers**: Introduction, plastics, thermo-softening and thermosetting plastics, industrially important plastics like urea-formaldehyde, Conducting polymers, Biodegradable polymers. B) **Composites:** Introduction, Constituents, Fibre-reinforced plastics (FRP) and Glass reinforced plastics (GRP), **Cement:** Introduction, Manufacture of Portland Cement by wet process, Compositions of Portland Cement, Setting and hardening of cement, Retardants and accelerators, Construction Chemicals.	7
IV	**Energy Technology:** A) **Batteries:** Introduction, Types, Lithium-ion batteries (LIBs), Sodium- ion batteries (Instrumentation, advantages, disadvantages and applications). B) **Fuels:** Introduction, classification, characteristics of good fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericals on Bomb and Boy's calorimeter, Introduction to Bitumen. C) **Fuel Cells:** Introduction, Classification, Alkaline fuel cells: Hydrogen -Oxygen fuel cells (Construction, working and applications).	7

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V	**Corrosion & it's Prevention:** **Corrosion:** Introduction, causes, types of corrosion, Electrochemical corrosion (hydrogen evolution and oxygen absorption mechanisms), Factors affecting rate of corrosion. **Prevention of corrosion** by: Hot dipping (Galvanizing and tinning), Cathodic protection methods, Electroplating process, Metal cladding, Prevention by organic coatings (Paints and varnishes).	8
VI	**Engineering Materials and Green Chemistry:** Introduction, classification of engineering materials. **Alloys:** Types of alloys, purposes of making alloys, Ferrous alloys: Plain carbon steels (mild, medium and high). Nonferrous alloys: Aluminum alloy (Duralumin and Alnico), Nickel alloy (Nichrome), Tin alloys (Solders). **Green Chemistry:** Definition, Twelve principles of green chemistry, Research and industrial applications, Greenhouse effect and it's remedies.	7
	Total Lecture Hours	**45**

List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Determination of acidity of water sample. (Neutralization Titration)	3
2	Determination of alkalinity of water sample. (Acid- Base Titration).	3
3	Determination of chloride content of water by Mohr's method. (Precipitation Titration).	3
4	Determination of total hardness of water sample by EDTA method.	3
5	Preparation of Urea-formaldehyde resin.	1
6	Preparation of Phenol-formaldehyde resin.	1
7	Determination of rate of corrosion of Aluminum in acidic and basic medium	2
8	Estimation of copper in brass solution (Displacement Titration)	1
9	Estimation of zinc in brass solution (Displacement Titration)	1
10	Determination of pH of industrial waste water by using pH meter	4
11	Demonstration of bomb calorimeter to calculate calorific value of fuels.	5
12	Demonstration of Photo-colorimeter.	4
13	Determination of strength of acid/base by using conductivity meter.	4
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Text Books:

1. S. S. Dara, A Text Book of Engineering Chemistry, 11th Edition, S. Chand & Co. New Delhi, 2008.
2. Shashi Chawla, A Text book of Engineering Chemistry 3rd Edition, Dhanpat Rai Publishing Co. New Delhi, 2007
3. Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratap Singh V. Gaikwad, A Text book of Applied Chemistry,1st Edition, Wiley Publications, 2018

References:

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpatrai Publishing Co., New Delhi., 2015.
2. Wiley India, Engineering Chemistry, 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Chatwal and Anand, Instrumental Methods of Chemical Analysis, 5th Edition, Himalaya Publishing House, Mumbai,
4. B. K. Sharma, Industrial Chemistry, 10th Edition, Goel publication (P) Ltd., 1999
5. S. K. Singh, Fundamentals of Engineering Chemistry, 1st, New Age International (P) Ltd, New Delhi, 2009

Online Learning Resources:

1. Water Technology-- https://youtu.be/dKWJzp_rrlE
2. For lithium-ion batteries (LIBs): https://www.youtube.com/watch?v=DBLHaLhyo2w

Experiments that may be performed through virtual labs:

S. No.	Experiment Name	Experiments Links
1.	Water analysis-Determination of Chemical parameters	https://inoc-amrt.vlabs.ac.in/exp/water-analysis-chemical-parameters/index.html
2.	Demonstration of Photo-colorimeter	https://pcvamrt.vlabs.ac.in/exp/spectrophotometry/index.html

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Course Information:

Class, Semester	FY. B. Tech, Semester - II					**Category**	**BS**
Course Code, Course Title	3CVBS110, Applied Mathematics-II					**Type**	**T1**
Prerequisites	3CVBS102, Applied Mathematics-I						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	3	1	--	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		-	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	**Determine** equation of a curve and compute statistical measures to analyze data using statistical techniques
CO2	**Express** functions in series form Using Maclaurin's and Taylor's expansion
CO3	**Use** appropriate methods to solve integrals using special functions
CO4	**Determine** unknown values from tabulated data using finite difference and interpolation techniques.
CO5	**Compute** Area and Mass of a region using multiple integrals

Syllabus:

Module	Contents	Lecture Hours
I	**Curve fitting and Statistics:** Method of Least Squares, Fitting of Straight Line, Fitting of Parabola, Fitting of exponential curves, Lines of Regression.	8
II	**Expansion of Functions and Indeterminate Forms**: Maclaurin's series Taylor's series, Standard expansions, Expansion of function using Standard series, Indeterminate forms.	7
III	**Special Functions:** Introduction to special function, Gamma function, Properties of Gamma function, Beta function, Properties of Beta function, Relation between Beta and Gamma functions, error function and its properties.	7
IV	**Statistical Measures**: Introduction, Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Partition values: Quartiles, Deciles and Percentiles, Concept of dispersion, Range, Quartile Deviation, Mean Deviation, Mean Square Deviation, Variance and Standard Deviation.	8
V	**Finite Differences and Interpolation:** Finite differences, Forward and Backward Difference Newton's forward Interpolation formula, Newton's backward Interpolation formula, Stirling Interpolation formula, , Newton's Divided Difference, Lagrange's interpolation formula.	8
VI	**Multiple Integral and Its Applications:** Double Integrals, Triple integral, Change of Order of Integration, Change to polar coordinates, Applications to Area and Mass of plane lamina.	7
	Total Lecture Hours	45

List of Tutorial with CO Mapping

Sr.No	Title of Tutorial	CO Mapped
1	Fitting of straight line and Second-degree parabola	1
2	Fitting of exponential curves and lines of regression	1
3	Expansions of functions using Maclaurin's and Taylor series	2
4	Indeterminate forms.	2
5	Gamma and Beta functions	3
6	Measures of Central tendency	1
7	Measures of dispersion	1
8	Interpolation with equal intervals	4
9	Interpolation for unequal intervals	4
10	Evaluation of multiple integrals	5
Total Practical Sessions	**15** **Total Tutorial Hours**	**30**

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Text Books
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications ,2011.
2. H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand ,2018.
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010
4. Dr. B. S. Grewal, Numerical Methods, 9th Edition, Khanna Publishers, 2010
References:
1. Dr. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers ,2018.
2. N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7th Edition, Infinity science press ,2010.
3. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi GrihaPrakashan,1984
4. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan,1988.
5. S. C. Gupta, V. K. Kapoor, Fundamental of Mathematical Statistics, 10th Edition Sultan Chand and Sons Publisher,2000.
Online Learning Resources
1. NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121
2. NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105
3. NPTEL Course on Matrix Analysis with Application, by Prof. S. K. Gupta, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107112
4. NPTEL Course Business Statistics, by Prof. Mukesh Kumar Barua, IIT Roorkee https://nptel.ac.in/courses/110107114

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Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**ES**
Course Code, Course Title	**3CVES111, Engineering Mechanics**					**Type**	**LIT2**
Prerequisites	---						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	3	-	2	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Demonstrate** force and moment equilibrium laws for force systems using resolution and experimental validation.
CO2	**Compute** beam reactions and **Construct** SFD-BMD for determinate beams using equilibrium principles.
CO3	**Calculate** the forces in members of roof truss under point load by using experimental and analytical methods.
CO4	**Determine** centroid and moment of inertia for composite plane laminas using parallel and perpendicular axis theorems.
CO5	**Analyze** particle motion and impact for rectilinear motion using D'Alembert's principle.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to Engineering mechanics** Basic concept - Particle, rigid body, force system, types of force system, law of transmissibility of force, resolution of a force, composition of forces, resultant force, moment of force,	07
II	**Equilibrium** Concept of Equilibrium, Conditions of equilibrium, Lami's Theorem Beam: Types of beams, types of support for beam, types of loads acting on beam, reactions at support. shear force and bending moment diagram for statistically determinate beam (simply supported, cantilever, overhanging beam)	08
III	**Analysis of Truss** Introduction of truss, types of trusses, determinacy of a truss, assumption for analysis of truss, Analysis of truss using method of joint and method of section.	08
IV	**Centroid** Introduction to Centroid and Centre of Gravity, Centroid of standard figures, Centroid of composite figures, Friction	07
V	**Moment of Inertia** Moment of Inertia, Moment of Inertia of Standard shapes, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.	08
VI	**Dynamics** Introduction of dynamics, Kinetics and Kinematics, Rectilinear motion, Kinetics of linear motion, D'Alembert's principle and its applications, Impact and momentum, Collision of elastic bodies	07
	Total Lecture Hours	45

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List of Experiments with CO Mapping				
Sr. No.	**Title / Topic of the Experiment**			**CO Mapped**
1	To verify law of polygon of forces using force table.			1
2	To verify lami's theorem using force table.			1
3	To verify law of moments by Bell crank lever.			1
4	To calculate support reactions of beam.			2
5	To compute centroid of plain lamina.			4
6	To calculate coefficient of friction of different material surfaces.			1
7	To Solve numerical on force system and beam.			1, 2
8	To calculate forces in member of truss with their nature.			3
9	To find out support reactions of a beam using software.			2
10	To calculate forces in member of truss using software.			3
Total Practical Sessions		**15**	**Total Practical Hour**	**30**

Text Books

1. S. Ramamrutham, "Engineering Mechanics," 9th Edition, DhanpatRai Publishing Company (P). Ltd, 2010.
2. R. K. Bansal and Sanjay Bansal, "Engineering Mechanics," 6th Edition, Laxmi Publications Pvt. Ltd., 2013.
3. K. L. Kumar, "Engineering Mechanics," 4th Edition, Tata McGraw Hill Education, 2012.
4. S. B. Junnarkar, "Engineering Mechanics," 16th Edition, Charotar Publications, 2011.
5. S.S. Bhavikatti, "Engineering Mechanics," 4th Edition, New Age International Pvt. Ltd., 2012.

References:

1. S. P. Timoshenko and D. H. Young, "Engineering Mechanics," 3rd Edition, McGraw Hill Publishers, 2006.
2. F. P. Beer and E. R. Johnson, "Vector Mechanics for Engineers Vol.-I and II," 6th Edition, Tata McGraw Hill Education, 2011.
3. Ferdinand Singer, "Engineering Mechanics: Statics & Dynamics," 9th Edition, Harper and Row Publications, 2009.
4. S. Rajasekaran, "Fundamentals of Engineering Mechanics," 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.
5. Irving H. Shames, "Engineering Mechanics," 5th Edition, Prentice Hall of India, New Delhi, 2011.

Online Learning Resources

1. NPTEL, "Engineering Mechanics," Prof. U.K. Saha, IIT Guwahati, NPTEL, 2015. https://nptel.ac.in/courses/112103108
2. NPTEL, "Engineering Mechanics," Prof. U.K. Saha, IIT Guwahati, NPTEL, 2015. https://nptel.ac.in/courses/112103108
3. MIT Open Course Ware, "Statics and Materials," Prof. Simona Socrate, MIT, 2007. https://ocw.mit.edu/courses/1-050-solid-mechanics-fall-2004/pages/lecture-notes/
4. Skyciv Software: https://skyciv.com/free-beam-calculator/ , https://skyciv.com/free-truss-calculator/

Experiments that may be performed through virtual labs:

Sr. No.	Experiment Name	Experiments Links
1.	Basic Engineering Mechanics and Strength of Materials Virtual Lab	https://eerc01-iiith.vlabs.ac.in/

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Established: 1999

Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist.: Sangli, Maharashtra

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Course Information:

Class, Semester	FY. B. Tech, Semester - II					**Category**	**PC**
Course Code, Course Title	**3CVPC112, Building Planning and Drawing**					**Type**	**LIT2**
Prerequisites	----						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	2	-	2	2	3		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	**Explain** procedure for building permission and interpret drawings for residential and public buildings using municipal and working drawings.
CO2	**Apply** planning and design principles to various residential and public building types meeting functional and circulation requirements.
CO3	**Classify** staircases, doors, and windows based on types, materials, and construction requirements to ensure functional building design.
CO4	**Describe** plumbing systems, electrification types, and fire resistance requirements for buildings essential for safety and functionality.
CO5	**Prepare** site visit reports and produce building plans and working drawings for residential buildings including foundation, furniture layout, electrification, and water supply and drainage systems.

Syllabus:

Module	Contents	Lecture Hours
I	**Openings & Staircase:** Stairs: Technical terms, requirements of a good stair, uses, types, Materials for construction. Ramps, lifts and escalator. Design of stairs (Dog Legged, quarter turn and Open Well). Doors - Classification, Teak wood Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening. Windows - Classification, Teakwood Glazed Windows, Aluminum, Glazed Windows, Steel Windows, UPVC Windows, fixtures and fastening	8
II	**Planning of Residential Building:** Procedure of Building Permission Understanding of municipal drawings and working drawing Bungalows, Row Bungalows, and Twin Bungalows Hostels, apartments, Farmhouses, cottages	7
III	**Design of Public Building:** Principles of planning for functionality, circulation, Procedure for Building Permission, Understanding approval process Design of Educational Buildings, Design of Healthcare Buildings, Design of Commercial Buildings, Design of Institutional Buildings	7
IV	**Plumbing & Electrification & Fire resistance in building:** Plumbing: Plumbing system, Materials used for plumbing work. Various types of traps, Fittings, Chambers, Septic Tank, and Concept of Plumbing & Drainage plan. **Electrification:** Types of wiring and materials, Requirements & Location of various points. Concept of Earthing. Fire resistance: Fire resistant construction and fire safety requirements for buildings	8
	Total Lecture Hours	30

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List of Experiments with CO Mapping		
Sr. No.	**Title / Topic of the Experiment**	**CO Mapped**
1	Draw the plan of existing residential building by taking measurements on site and prepare a site visit report	5, 1
2	Draw plan of bungalow	2, 5
3	Draw Municipal Submission drawing of proposed residential building	1, 5
4	Draw working drawing of Foundation / Center Line of designed building	5
5	Draw working drawing of Furniture layout plan of designed building	5
6	Draw working drawing of Electrification plan of designed building	4, 5
7	Draw working drawing of Water supply and drainage plan of designed building	4, 5
Note: Draw first plan on drawing sheet manually. Prepare all other drawings using AutoCAD software.		
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Text Books

1. N. Kumara Swamy and A. Kameswara Rao, Building Planning and Drawing, 9th Revised Edition, Charotar Publishing House Pvt. Ltd., 2023.
2. S. S. Bhavikatti and M. V. Chitawa, Building Planning and Drawing, I.K. International Publishing House, 2018.
3. M. G. Shah, C. M. Kale, and S. Y. Patki, *Building Drawing*, 5th Edition (Reprint), Tata McGraw-Hill Publications Pvt. Ltd., 2011.
4. D. N. Ghose, *Civil Engineering Design & Drawing*, 2nd Edition, CBS Publications & Distributors Pvt. Ltd., 2010.
5. Dr. B. C. Punmia and Ashokkumar Jain, *Building Construction*, 12th Edition, Laxmi Publications Pvt. Ltd., 2025.
6. S. P. Bindra and S. P. Arora, *Building Construction*, 5th Edition, Dhanpat Rai Publications Pvt. Ltd., 2005

References:

1. B.I.S. New Delhi, *SP 7 – National Building Code Group 1 to 5*
2. B.I.S. New Delhi, *I.S. 962 – 1989 Code of Practice for Architectural and Building Drawings*
3. V. B. Sikka, *Civil Engineering Drawing*, 5th Edition, S. K. Kataria & Sons, 2008.
4. Sandeep Mantri, *Practical Building Construction & Its Management*, 10th Edition, Satya Prakashan, 2011–12.
5. B. P. Verma, Civil Engineering Drawing and House Planning, Khanna Publishers, 2017.
6. S. K. Duggal, Building Materials, 5th Edition, New Age International, 2017.
7. S. Kaleem A. Zaidi, Drawing and Design of Residential and Commercial Buildings, CBS Publishers, 2018.

Online Learning Resources

1. NPTEL, "Fundamentals of Building Construction," Dr. P.K. Ghosh and Mr. Gaurav Kumar Agrawal, Chhattisgarh Swami Vivekanand Technical University, Bhilai, NPTEL, 2015. https://nptel.ac.in/courses/112103108
2. NPTEL, Construction Materials, Prof. Ashutosh Kumar, IIT Roorkee, 2020. https://nptel.ac.in/courses/105106149

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Course Information:

Class, Semester	FY. B. Tech, Semester - II					**Category**	**PC**
Course Code, Course Title	3CVPC113, Construction Materials					**Type**	**T1**
Prerequisites	--						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	2	-	-	2	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		-	-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Classify** construction materials into natural, artificial, traditional, and modern categories for Indian civil engineering projects using relevant material properties and IS code criteria.
CO2	**Analyze** the composition, hydration reactions, and quality test results of OPC, PPC, and lime per IS standards for real-world cementitious applications.
CO3	**Evaluate** structural, aesthetic, and durability properties of common building materials—bricks, steel, aggregates, plastics, wood, and glass using Indian construction case studies.
CO4	**Compare** formwork and scaffolding systems (timber, steel, aluminum, plastic, modular) for economy, reuse potential, and safety in typical infrastructure projects.
CO5	**Summarize** the criteria for selecting bricks, blocks, aggregates, and stones based on their properties and construction needs in civil engineering projects.
CO6	**Describe** the environmental benefits and performance characteristics of alternative materials such as fly ash, GGBS, silica fume, recycled aggregates, bamboo, stabilized mud blocks, and geopolymers in Indian construction.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to Construction Materials** Introduction to various types of construction materials used in civil engineering works. Engineering properties of construction materials such as strength, durability, density, thermal conductivity, and permeability. **Cement and Lime** Types of cement including OPC, PPC, and other special cements; IS codes and their importance. Composition of Portland cement, Bogue compounds, hydration process, and the role of water. Standard tests for cement quality.	07
II	**Applications and Properties of Building Materials** Applications and essential properties of commonly used building materials such as bricks, steel, cement, aggregate, plastic, aluminium, water, mild steel (M.S.), stainless steel (S.S.), FRP sheets, gypsum, wood, glass, stone, tiles, bitumen, and ceramic. **Bricks, Blocks, Aggregates, and Stones** Classification and properties of burnt clay bricks and AAC blocks with IS standards. Aggregates: Classification, physical and mechanical properties. Stones: Types, selection criteria, and uses in foundation, cladding, and aesthetics.	08
III	**Formwork and Scaffolding** Formwork: Requirements, types, materials used (timber, steel, aluminium, plastic), and their applications. Factors affecting formwork economy, reuse, and removal time. Introduction to scaffolding systems, types, stability considerations, and safety aspects in construction. Modern trends in modular formwork and prefabricated systems.	08
IV	**Sustainable Building Materials** Introduction to sustainable and eco-friendly construction materials. Use of industrial waste materials like fly ash, GGBS, silica fume, and recycled aggregates. Introduction to smart materials and green building products. Study of bamboo, stabilized mud blocks, and geopolymers as alternative construction materials. Relevance of sustainability in modern construction and environmental impact.	07
	Total Lecture Hours	30

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Text Books
1. S.P. Bindra and S.P. Arora, A Text-Book of Building Construction, 5th Edition, Dhanpat Rai Publications, 2023.
2. G.C. Sahu and Joygopal Jena, Building Materials and Construction, 1st Edition, McGraw Hill Education, 2019.
3. P.C. Verghese, Building Materials and Building Construction, 2nd Edition, PHI Learning, 2009.
4. S.K. Sharma, A Textbook of Building Construction, 5th Edition, S. Chand Publishing, 2018.
References:
1. B.C. Punmia, Building Construction, 12th Edition, Laxmi Publications, 2025.
2. G.C. Sahu and Joygopal Jena, Building Materials and Construction, 1st Edition, McGraw Hill Education, 2019.
3. Sandeep Mantri, "The A To Z of Practical Building Construction and its Management," 1st Edition, Satya Prakashan, 2010.
4. Michael S. Mamlouk and John P. Zaniewski, Materials for Civil and Construction Engineers, 4th Edition, Pearson, 2021.
Online Learning Resources
1. NPTEL, Basic Construction Materials, Swayam, 2021. https://onlinecourses.nptel.ac.in/noc21_ce10/preview
2. NPTEL, Modern Construction Materials, 2020. https://onlinecourses.nptel.ac.in/noc20_ce05/preview

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Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech, Semester - II					**Category**	**HS**
Course Code, Course Title	**3CVHS114, Communication Skills**					**Type**	**L2**
Prerequisites	---						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	-	--	4	-	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	**Demonstrate** the Listening, Speaking, Reading and Writing (LSRW) skills considering the frame of English language rules accurately for effective and sound communication in academic and profession contexts.
CO2	**Exhibit** their portfolio and career choices confidently, considering corporate expectations by using digital tools convincingly.
CO3	**Write** letters, reports, Emails and Blogs proficiently by following required techniques that help in getting acquainted with professional correspondence.
CO4	**Attain** professional skill while convincingly presenting on allotted topics using MS PowerPoint and AI techniques.
CO5	**Justify** own role in communicative events in well-organized manner with balanced zeal.

List of Experiments with CO Mapping

Sr. No	Title / Topic of the Experiment	CO Mapped
1	Self - Introduction	1
2	SWOT Analysis	1
3	Basics of English Pronunciation	1
4	Rapid Review of Grammar	1
5	Diagnosing Listening and Speaking Skills	1
6	Diagnosing Reading and Writing Skills	1
7	Introduction to MS Office (Word, Excel, PPT)	1,4
8	Presenting my career choices	1,2
9	Preparing Portfolio	1,2
10	Describing Technical Charts, Image, and Processes	1,4
11	Using Language Learning Apps and Tools	1,4
12	Presenting Portfolio	1,2
13	Effective Presentation Skills	1,4
14	Delivering Power Point Presentation	1,4,5
15	Job Application and Resume Writing	1,3
16	Email Writing	1,3
17	Group Discussion	1,5
18	Public Speaking	1,5
19	Report Writing	1,3
20	Organizing an Event	1,5
21	Technical Writing	1,3
22	Blog Writing	1,3
23	Mock Interview	1,2,5
24	Achievement Test	1
Total Practical Sessions	**30**	**Total Practical Hours** **60**

Text Books

1. The Professional: Defining the New Standard of Excellence at Work Subroto Bagchi Penguin Books India Pvt. Ltd. Revised Edition,2011.

2. Cambridge Guide to IELTS. Pauline Cullen, Amanda French, Cambridge University Press, Reprint, 2017.

3. A Practical Course in Effective English-Speaking Skills. J. K. Gangal, PHI Learning Private Limited, New Delhi,

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Print, 2012
4. English For Engineers. Dr. Shyamji Dubey, Dr. Manish Kumar. Vikas Publication House Pvt. Ltd. New Delhi, Print, 2020.
5. Personality Development and Soft Skills. Barun K. Mitra, Oxford University Press, New Delhi, 7th impression, 2012.
References:
6. High-school English Grammar and Composition. Wren and Martin, S. Chand and Co., New Delhi, 1st edition, 2015.
2. The Ace of Soft Skills. Ajai Chowdry, Bala Balchandran, Pearson Publication, Delhi, 8th edition, 2017.
3. Effective Technical Communication. M. Ashraf Rizvi, McGraw Hill Education, Chennai, 2nd edition, 2017.
4. Business Communication. Horry Sankar Mukerjee, Oxford University Press, New Delhi, 2nd edition, 2013.
5. Communicative English for Engineers and Professionals. Nitin Bhatnagar, Mamta Bhatnagar, Pearson Publication, Delhi, 1st edition, 2013.
Online Learning Resources
5. **Software:** Pronunciation apps (e.g., ELSA Speak, Speak English), grammar checkers (e.g., Grammarly).
6. **Online Platform** Coursera (for basic English courses), Duolingo, BBC Learning English.

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Department of Civil Engineering

Course Information:

Class, Semester	F.Y. B. Tech, Semester - II						**Category**	**VSEC**	
Course Code, Course Title	**3CVVS115, IDEA Laboratory**						**Type**	**L2**	
Prerequisites	--								
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**				
	1	-	4	-	2				
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**		
		--	--	--		50	--		

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Operate** basic workshop tools for material processing and assembly
CO2	**Make** simple 2D and 3D designs using CAD software and prepare them using 3D printing, laser cutting, or CNC machining
CO3	**Build** basic electronic circuits using sensors, LEDs, motors, and microcontrollers
CO4	**Apply** fundamental programming concepts in embedded C (Arduino IDE) for controlling hardware and automating simple tasks.
CO5	**Integrate** mechanical parts and electronics to design and build working models or prototypes.

Syllabus:

Module	Contents	Lecture Hours
I	**Overview of IDEA Lab** Introduction to the IDEA Lab: Vision, objectives, **National Innovation Ecosystem** (IIC, Atal Innovation Mission, NISP), Importance of multi-disciplinary, project-based learning Inspirational case studies from IDEA Labs, Safety protocols, Do & Don'ts in IDEA Lab.	1
II	**Fundamentals of Design & Prototyping** **Design Thinking Basics**: Problem identification, ideation, prototyping, testing, and iteration, **Introduction to CAD Software**: Concepts of 2D and 3D modeling for various applications, File Formats for Fabrication: Understanding STL, DXF, G-Code, SVG, and their uses, Tolerances, fits, and design constraints for manufacturing.	2
III	**Digital Fabrication Technologies** **3D Printing**: Principles, types of 3D printers, materials, slicing software, and applications. **Laser Cutting & Engraving**: Principles, types of lasers, materials, design considerations, and safety. **CNC Router**: Introduction to CNC Router and Mini Desktop Lathe cum Milling operations, G-code fundamentals, material removal processes. **3D Scanning**: Principles of 3D scanning, applications in reverse engineering and quality control. **PCB Fabrication:** Introduction to PCB Milling Machine and PCB Prototype Machine for custom circuit boards.	3
IV	**Fundamentals of Embedded Systems & IoT** **Basic Electrical and Electronic Concepts:** Voltage, current, resistance, Ohm's Law, and fundamental components (resistors, capacitors, diodes, LEDs, sensors, actuators), Measuring Instruments **Overview of microcontrollers**: Overview of Arduino, ESP32, Node MCU, and their applications in controlling hardware. Circuit simulation using Tinker CAD or Proteus. **IoT Basics**: Basic networking (Bluetooth/Wi-Fi/Ethernet), cloud integration	3
V	**Programming for automation** **Arduino IDE and Embedded C Programming**: Setup, basic syntax (setup(), loop()), digital and analog I/O control. **Basic Control Systems:** Concepts of open-loop and closed-loop control with simple examples. **Introduction to Python.**	3

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VI	**Project Planning and IPR** **Innovation Process:** From idea generation to concept validation **Project Planning & Management:** Defining scope, setting timelines, budgeting, and resource allocation. **Documentation and Presentation:** Writing a concept note, creating innovation posters, and effective pitching techniques. **Intellectual Property Rights (IPR):** Basics of Patents, Copyrights, and Trademarks relevant to innovation.	3
	Total Lecture Hours	**15**

List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Introduction, Lab Safety & Tool Familiarization	1
2	Handas on practice of Mechanical Workshop Tools	1
3	3D Printing of simple parts	2
4	Laser Cutting	2
5	CNC Routing/ Engraving	2
6	Basic Electronics circuit	3
7	PCB Design and Prototyping	3
8	Microcontroller Programming and Sensor Interfacing	4
9	Mini Project	5
Total Practical Sessions	**30** **Total Practical Hours**	**60**

Text Books

1. Veeranna D.K., AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2022
2. Saji T. Chacko, Susan S. Mathew, AICTE's Prescribed Textbook: Fundamentals of Electrical and Electronics Engineering (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2024
3. Mehta S.D., Electronic Product Design Volume - I (Basics of PCB Design), 1st Edition, S Chand & Company, 2011
4. Mehta-Gupta, Y.P.Mehta, Vishal Mehta, Workshop Calculation and Science, 1st Edition, Dhanpat Rai Publications, 2020

References:

1. A. K. Maini, Nakul Maini, All-in-One Electronics Simplified, 1st Edition, Khanna Book Publishing Company, 2021
2. J.G. Joshi, Electronics Measurements & Instrumentation, 1st Edition, Khanna Book Publishing Company, 2025
3. Dr. Sabrie Soloman, 3D Printing & Design, 1st Edition, Khanna Book Publishing Company, 2020
4. Kaushik Kumar, Hridayjit Kalita, Workshop/Manufacturing Practices, 5th Edition, S Chand & Company, 2011

Online Learning Resources

1. NPTEL Course on 3D Printing and Design for Educators, By Dr. Sharad K. Pradhan, NITTTR Bhopal https://onlinecourses.swayam2.ac.in/ntr24_ed17/preview
2. NPTEL Course on Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software, By Prof. Ankur Gupta, IIT Delhi https://onlinecourses.nptel.ac.in/noc24_ee127/preview

Experiments that may be performed through virtual labs:

S. No	Experiment Name	Experiments Links
1.	3D Printing Virtual Simulation Lab	https://3dp-dei.vlabs.ac.in/
2.	Digital Fabrication of Flexible Circuit board	https://fab-coep.vlabs.ac.in/exp/digital-fabrication/
3.	Embedded System Design with 8051 and PIC Microcontroller	https://esd-coep.vlabs.ac.in/

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Established: 1999

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Department of Civil Engineering

Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	3BSCC121, Introduction to Yoga and Mindfulness					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	-	-	02	-		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	**Describe** the significance and practical applications of yoga for holistic well-being under guided classroom sessions, ensuring coverage of physical, mental, and spiritual aspects.
CO2	**Explain** the role of subtle energy systems (chakras, Nadi's) in health enhancement using yogic practices, showing linkage to at least two health benefits.
CO3	**Compare** different paths of yoga (Bhakti, Jnana, Karma, Raja) through readings and discussions, citing at least one key practice and outcome for each.
CO4	**Demonstrate** the Eight Limbs of Yoga in practical sessions, reflecting personal integration of at least four limbs in daily habits or behavior.
CO5	**Apply** yoga and mindfulness techniques in real-life stress situations to improve emotional resilience, showing measurable improvement in two or more psycho-somatic areas.

Practice Session

No	Contents	CO Mapped
1	**Introduction to Yoga Practice and Warming Up Exercises** Overview of yoga philosophy and benefits. Practice basic stretching and warm-up routines. Introduction to breath awareness and mindfulness.	1,5
2	**Omkar, Prathana and types of Asanas, Surya Namaskar.** Practice of Chant Omkar and opening prayer for mental centering. Perform Surya Namaskar and learn its 10-step sequence. Explore basic asana types: standing, sitting, supine.	1,4
3	**Sleeping position Asanas** Practice of Setubandhasana, Pavanmuktasanan, ChakraasaSetuBandhasana, Understand the effects on back, digestion, and spine.	1, 2
4	**Opposite sleeping position** Practice of Bhujangasana, shalbasanan, Dhanurashan, Makrasanan Focus on strengthening the back and improving posture.	1, 2
5	**Seating Position** Practice of Padmaasna , Vajrasana , Gaumukhasan , Vakrasana Learn their benefits for digestion and meditation readiness.	1, 4
6	**Standing Position** Practice of Tadasana ,Vruksasana, Trikonaasan , Virasana. Emphasize balance, posture, and muscular endurance.	1, 4
7	**Meditation** Guided practice of breath-based (Anapan) and insight (Vipassana) meditation. Focus on observation without judgment.	4, 5
8	**Mantra meditation** Practice chanting and internal repetition of mantras. Use traditional mantras for focus and mental calm.	4, 5
9	**Yognidra** Perform deep relaxation technique (guided Yoga Nidra). Experience body awareness and mental stillness.	4, 5
10	**Pranayam 1** Practice AnulomVilom (alternate nostril), Bhramari (humming bee), and Sheetali (cooling breath). Focus on breath control and emotional regulation.	2, 5
11	**Pranayam 2** Practice Sitkari and Kapalbhati. Learn their effects on metabolism, energy, and clarity.	2, 5
12	**Tratak**	4, 5

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	Perform Tratak (candle gazing) for concentration. Understand through demonstration or video.	

Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books
1. Yog Jeevan. Dr. Chakote Riya1st Editon 2016
2. Yog Parchichaya Mandlik Guruji Nashik Mandlik Guruji Second Edition 2020

References:

1. Yoga for Modern Age Vethathiri Edition 16th 2023
2. Maharishi, Simplified Physical Exercises Vethathiri Edition I - 2014

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Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	**3BSCC122, Physical Fitness and Lifestyle Management**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	-	-	02	--		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Explain** the fundamentals of physical education and its role in developing holistic well-being.
CO2	**Demonstrate** appropriate fitness practices and techniques to improve cardiovascular endurance, strength, and flexibility.
CO3	**Apply** principles of wellness, including nutrition, sleep, and stress management, to maintain a healthy lifestyle.
CO4	**Integrate** yoga, mindfulness, and relaxation techniques to promote mental well-being and emotional balance.
CO5	**Design** a personalized lifestyle management plan based on fitness assessment, health goals, and Behaviour change strategies.

Practice Session

No	Contents	CO Mapped
1	**Introduction to Physical Education** Understand the meaning and objectives of physical education. Learn its role in promoting health, fitness, and overall well-being. Explore career options and importance in daily life.	1
2	**General Warm up** Practice dynamic warm-up routines before workouts. Increase heart rate and blood circulation to muscles. Prevent injuries and improve workout performance.	2
3	**Limbering down exercises. Free hand exercises, Cooling down exercises** Perform safe cool-down techniques post activity. Reduce muscle soreness and stiffness. Bring heart rate back to normal gradually.	2
4	**Stretching exercises / Flexibility exercises** Improve range of motion in joints. Reduce muscle tension and prevent injuries. Learn static and dynamic stretching methods.	2
5	**Fitness Evaluation** 1 mile run and walk, Push-ups, seat ups, Seat and reach and BMI. Assess personal fitness using 1-mile run, push-ups, sit-ups, etc. Calculate BMI to understand body composition. Set personalized fitness goals based on results.	5
6	**Aerobic activities** Perform rhythmic activities to improve cardiovascular health. Engage in exercises like jogging, skipping, or dance aerobics. Enhance lung capacity and endurance.	2
7	**Sports and games** (Cricket, Volleyball, basketball, Kho-Kho, Kabaddi, Athletics) Play team games like Cricket, Volleyball, Kabaddi, etc. Develop teamwork, coordination, and sportsmanship. Improve motor skills and physical agility.	2
8	**Sports and games (Badminton, Table Tennis, Chess)** Participate in games like Table Tennis, Badminton, Chess. Improve reflexes, concentration, and decision-making. Promote mental sharpness and social interaction.	4
9	**Circuit Training, Strength Activities** Perform multiple exercises in a sequence (circuit). Focus on building muscular strength and stamina. Use minimal equipment for maximum benefit.	2
10	**Agility and Coordinative activities** Practice quick movement drills to improve reflexes. Enhance body coordination and balance. Develop speed and reaction time.	2
11	**Body weight exercises** Do exercises like push-ups, squats, lunges, and planks. Improve strength using your own body resistance. No need for gym equipment.	2
12	**Functional training** Mimic real-life movement patterns (bending, lifting, reaching). Improve daily functional strength and flexibility. Prevent posture-related problems.	3

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Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text

Test, Measurement and Evaluation in Sports and Physical Education. 5th ed., Friends Publications, 2023.

Rules of Games and Sports Updated version, Khel Shaitya Kendra, 2023.

References:

1 Beashel, Paul, and John Taylor. *Physical Education: Essential Issues.* Hodder Stoughton, 1997.

2 Sodhi, H. S., and S. K. Sidhu. *Physique and Selection of Sportsmen.* Punjab Publishing House, 1984.

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Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	**3BSCC123, Six Sigma Happiness and Mind Mechanics**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	-	-	02	--		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Analyze** personal life patterns and decision-making processes using visual tools like life maps and time audits to improve self-awareness and productivity.
CO2	**Identify and modify** recurring behavioral or emotional challenges using root cause analysis and habit-tracking techniques
CO3	**Apply** reflective and psychological tools such as the Gratitude Journal, PERMA Wheel, and mindfulness meditation to enhance emotional well-being.
CO4	**Utilize** creative thinking and visualization techniques such as mind mapping, personal development canvas, and flow activities to enhance planning and motivation.
CO5	**Formulate** and monitor measurable personal goals using SMART criteria and Six Sigma strategies to construct a structured self-improvement and lifestyle plan.

Practice Session

No	Contents	CO Mapped
1	**Life Process Mapping** Understand personal daily patterns. Identify meaningful and unproductive activities. Improve decision-making awareness. Build a visual blueprint of life routines.	1
2	**Time Audit Diary** Track hourly usage of time. Identify time-wasters and focus zones. Increase productivity through reflection. Learn prioritization techniques.	1,2
3	**Root Cause Analysis** Find root causes behind repeated problems. Use cause-effect diagrams (Fishbone). Develop problem-solving skills. Prevent recurring emotional or behavioral setbacks.	1
4	**Habit Tracker Creation** Monitor progress of personal habits. Encourage accountability and consistency. Recognize triggers and patterns. Reinforce good habits using visual tools.	3
5	**Control Chart for Habits** Apply Six Sigma's statistical approach to habits. Track habit frequency over time. Identify variation in behavior patterns Improve self-control and discipline.	3
6	**Gratitude Journal** Practice daily reflection on positive moments. Enhance emotional well-being. Reduce stress and negativity. Cultivate a habit of appreciation.	4
7	**PERMA Wheel Self-Assessment.** Evaluate happiness using 5 key pillars (Positive emotion, Engagement, Relationships, Meaning, Achievement). Identify strengths and gaps in life satisfaction. Build awareness of emotional and social well-being. Create a personalized improvement plan.	4
8	**Flow Activity Practice** Engage in high-focus enjoyable activity. *Understand the "flow" mental state.* Boost intrinsic motivation. Reduce distractions and increase creativity.	4
9	**Mind Mapping the Brain** Visually organize thoughts and plans. Stimulate right and left brain together. Enhance memory, planning, and clarity. Strengthen problem-solving and goal-setting.	1, 5
10	**Guided Mindfulness Meditation** Practice breath work and awareness techniques. Reduce anxiety and mental fatigue. Increase present-moment awareness. Build emotional balance.	4
11	**Personal Development Canvas** Create a visual profile of strengths, values, and aspirations. Encourage strategic self-	5

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	improvement. Connect life areas (career, personal, social). Track personal growth visually.	
12	**SMART Goal Setting + Six Sigma** Define Specific, Measurable, Achievable, Relevant, Time-bound goals. Integrate Six Sigma process for goal monitoring. Improve consistency in self-development. Align actions with purpose and metrics.	5

Total Practical Sessions	**12**	**Total Practical Hours**	**15**

References:

1 S. Radhakrishnan, An Idealist View of Life, 2015, HarperCollins.
2. Yogi Kochhar, Six Sigma Happiness (English Edition).
3 An idealist way of Life – S Radhakrishnan

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Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	3BSCC124, Creativity through Visual Arts					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	-	-	02	--		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Identify** and apply the elements of art—line, shape, color, texture, and space—through various drawing and painting techniques.
CO2	**Demonstrate** creativity and technical skills in using different mediums such as pastels, pen & ink, and water-based paints.
CO3	**Create** original prints using simplified printmaking techniques such as relief, intaglio, and monoprint methods.
CO4	**Design** visually appealing digital artwork such as posters, icons, and layouts using basic digital tools.
CO5	**Analyze** and reflect on personal artwork and peer creations to improve visual communication and aesthetic understanding.

Practice Session

No	Contents	CO Mapped
1	**Fundamentals of Visual arts** Introduction to elements of art: line, shape, colour, texture, space. Practice drawing with pencil and charcoal using simple objects and shapes. Explore light and shade for 3D effects.	1
2	**Basic Graphic Design** Learn principles of alignment, contrast, hierarchy, and balance. Create a basic visual composition using text and image elements. Use sketching or digital tools for layout planning.	2
3	**Typography & Font Design** Study of typefaces: serif, sans-serif, script, decorative. Draw custom fonts and stylized letters. Create a short phrase using hand-drawn typography.	2
4	**Logo Design** Understand logo types: symbolic, text-based, combination marks. Design a logo for a fictional company or cultural event. Focus on clarity, colour choice, and relevance.	4
5	**Poster Design** Choose a theme: social message, event, awareness, culture. Develop layout and imagery using water colour, pen & ink, or digital tools. Apply principles of visual hierarchy and focal point.	4
6	**Photography Task: Lines & Angles** Capture photographs focusing on geometric lines, angles, and symmetry. Submit 3–5 original photographs with a short description of each. Discuss visual impact and framing.	1, 5
7	**Digital Infographic Design** Choose a topic (e.g., Indian innovations, clean energy, internet safety). Create a digital infographic using free tools like Canva or PowerPoint. Combine icons, minimal text, and visuals to communicate clearly.	4
8	**Visual Metaphor Drawing** Select a concept (e.g., freedom, growth, technology) and represent it visually. Use drawing techniques to convey metaphor without text. Encourage creativity and symbolic thinking.	3,5
9	**Calligraphic strokes of Devnagari** Practice traditional and artistic Devanagari calligraphy. Use ink pens or brush pens to form characters. Create a short meaningful phrase in decorative calligraphy.	2
10	**Collage on Innovation in India** Use newspapers, magazines, or printed material. Prepare a collage on topics like ISRO, start-ups, or digital India. Emphasize arrangement, contrast, and theme clarity.	3,5
11	**Modern Arts** Introduction and fundamental of modern art, Study abstract and modern Indian Artists Create an abstract or modern art piece using acrylics, pastels, or digital tools. Focus on expression and experimentation.	3,5

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12	**Geometric Pattern Design** Create a detailed design using compass, ruler, or digital drawing. Highlight symmetry, color, and repetition	1,2

Total Practical Sessions	**12**	**Total Practical Hours**	**15**

References:

1. The New Drawing on the Right Side of the Brain. Archer Perigee, 2012.
2. Digital Illustration: A Master Class in Creative Image-making. Roto vision, 2010.
3. A History of Indian Painting: The Modern Period. Abhinav Publications, 1994.
4. Basics of Visual Art. New Academic Publishing, 2015.

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Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	3BSCC125, Community Engagement through NSS					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	-	-	02	--		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Identify** the structure and needs of the local community through direct engagement and observation.
CO2	**Analyze** community issues and participate in collaborative problem-solving activities.
CO3	**Demonstrate** social and civic responsibility by applying engineering knowledge in real-world social contexts.
CO4	**Develop** teamwork, leadership, and democratic values through community mobilization and shared responsibility.
CO5	**Respond effectively** to emergencies and promote national integration, unity, and social harmony through participation in relevant campaigns and awareness programs.

Practice Session

No	Contents	CO Mapped
1	**Cleanliness Drive (Swachh Bharat Abhiyan)** Conduct campus and neighborhood cleaning. Raise awareness about hygiene and waste segregation.	1,2,3
2	**Tree Plantation** Plant saplings in college or public areas. Educate the community on environmental benefits.	1,3
3	**Road Safety Campaign** Conduct rallies, skits, or poster campaigns. Spread awareness about traffic rules and safe driving.	2,3,5
4	**Health Check-up Camp** Organize basic health screening with medical professionals. Promote hygiene, nutrition, and disease prevention.	1,2,5
5	**Literacy Drive** Teach basic reading and writing to underprivileged children or adults. Distribute learning materials and encourage regular attendance.	1,3,5
6	**Voter Awareness Campaign (SVEEP)** Inform citizens about voter rights and the election process. Promote ethical voting through posters and street plays.	2,3,5
7	**Plastic-Free Campus Initiative** Educate peers on the harmful effects of plastic. Conduct collection drives and promote reusable alternatives.	2,3
8	**Cultural and Heritage Promotion** Organize folk art, dance, and storytelling sessions. Engage the community in preserving local culture.	3,5
9	**Yoga and Wellness Sessions** Conduct yoga and mindfulness sessions for students and locals. Promote physical and mental health through regular practice.	3,4
10	**Self-Defense Training for Girls** Organize practical training on basic self-defense techniques. Empower girls with safety awareness and confidence.	4,5
11	**Social Contribution Orphanage/ Old age home visit** Hold discussions or exhibitions on gender, caste, and social equality. Encourage inclusive behavior and respect for diversity.	3,4,5
12	**Digital Literacy Program** Teach basic smartphone and internet use to the elderly or untrained groups. Promote safe and	2,3,5

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	productive use of digital tools			
Total Practical Sessions		**15**	**Total Practical Hours**	**30**

References:

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell, activities reports and its manual.
3. Government of India, NSS cell, Activities reports and its manual.

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Course Information:

Class, Semester	FY. B. Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	**3BSCC126, Cultural Exploration & Heritage**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**		**Credits**	
	-	-	02	--		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	**Identify** and describe key elements of cultural heritage including tangible, intangible, and natural heritage with real-life examples.
CO2	**Demonstrate** understanding of regional and national cultural practices through participation in experiential activities.
CO3	**Analyze** the significance of preserving cultural heritage in the context of globalization and modernization.
CO4	**Collaborate** in group projects to creatively document and present cultural themes using various mediums.
CO5	**Reflect** critically on personal and collective cultural identities through journals, discussions, and presentations.

Practice Session

No	Contents	CO Mapped
1	**Introduction to Cultural Exploration and Heritage** Understand the meaning of tangible, intangible, and natural heritage, Discuss real-life examples of cultural elements. Reflect on how culture shape's identity.	1,5
2	**Heritage Mapping/ Case Study on a Heritage Site** Choose a local region or community. Identify and locate key cultural sites (temples, festivals, crafts). Create a visual or digital heritage map. Present findings in written or visual format	1,3,4
3	**Vaidik Tal Vadya Songs and Music tradition** Introduction to Vedic Music, Demonstration of Vaidik Tal Vadya, Listening Session of Vedic Chants & Samagana, Group Singing of a Vedic Verse or Traditional Bhajan	2, 5
4	**Folk Dance** Watch or participate in folk dance. Discuss the significance, costumes, and music of each. Compare cultural roots and evolution.	2, 4
5	**Traditional Music** Dholki, Tabala, Dhol, Lezim Listen to selected regional or classical music samples. Identify the instruments, lyrics, and cultural setting.	2, 4
6	**Traditional Instrumental** Taal, Tritaal, Tabala Observe or perform simple rhythms or melodies. Explore the cultural and ceremonial use of instruments.	1, 2
7	**Singing** Types of singing, Vocal Singing Introduction to music fundamentals	2, 4
8	**Drama** Introduction, Types, Information about acting, Stage information, Present / performance on stage	4,5
9	**Classical dance, Western dance** Introduction to classical, and western dance demonstrations. Different types	2, 4
10	**Karaoke Singing** Introduction, Types, Basic music information	2, 4
11	**Short film** Prepare short film, Present / performance on stage, Topic concern with Indian Cultural heritage	3, 4, 5
12	**Final Showcase** Present all your work in a class exhibition. Explain the cultural significance of each project. Receive peer and teacher feedback.	4, 5

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Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books

1. Nrutasaurabha Manjiri Shriram Dev XII 2015
2. Indian Art and Culture, Nitin Singhania McGraw Hill Education IV 2022
3. The Wonder That Was India Picador India Second2004
4. The National Culture of India National Book Trust (NBT), India Second2016

References:

1. Bhattacharyya, Haridas, editor. *The Cultural Heritage of India*. The Ramakrishna Mission Institute of Culture, multiple volumes, revised ed.
2. Singhania, Nitin. *Indian Art and Culture*. 4th ed., McGraw Hill Education, 2022.
3. Basham, A. L. *The Wonder That Was India*. Picador India, 2004.
4. Joki Lehto, Jukka. *A History of Architectural Conservation*. 2nd ed., Routledge, 2017.

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