Established:1999

Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist. : Sangli, Maharashtra

(An Empowered Autonomous Institute)

F.Y. B. Tech. – Aeronautical Engineering
Semester -I [Level 4.5, 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	BS	T1	3AEBS101	Applied Mathematics - I	3	1	-	2	4	40	20	40	-	-
02	BS	LIT2	3AEBS102	Applied Physics	3	-	2	2	4	40	20	40	50	-
03	ES	LIT2	3AEES103	Engineering Graphics	2	-	4	2	4	40	20	40	50	-
04	ES	T1	3AEES104	Basic Mechanical Engineering	3	-	-	2	3	40	20	40	-	-
05	ES	L1	3AEES105	Programming for problem solving using C++	1	-	2	2	2	-	-	-	50	50
06	HS	T2	3AEHS106	Indian Knowledge System	2	-	-	-	2	-	50	-	-	-
07	VS	L2	3AEVS107	IDEA Laboratory	1	-	2	2	2	-	-	-	50	-
08	CC	L2	3BSCCXXX	Liberal Learning Course-I	-	-	2	-	1	-	-	-	50	-
				Total	**15**	**1**	**12**	**12**	**22**					
				Total Contact Hours	**28**									

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) / CIA (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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Course Information:

Class, Semester	FY. B.Tech, Semester - I					**Category**	**BS**	
Course Code, Course Title	3AEBS101, Applied Mathematics-I					**Type**	**T1**	
Prerequisites	-							
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 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 equations of order one and degree one using analytical methods 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, Rouché–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 Rn, 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

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Module	Contents	Lecture Hours
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**

List of Tutorial with CO Mapping

S.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	Eigenvalue, Eigen vectors and Properties	2
4	Cayley-Hamilton theorem and Applications	2
5	De Moivre's Theorem and Applications	3
6	Hyperbolic functions	3
7	Partial differentiations and Euler's theorem	4
8	Jacobians and Maxima-Minima of Two Variable Functions	4
9	Euler's and Modified Euler's Methods for Solving Initial Value Problems	5
10	Runge-Kutta Methods and Taylor series method	5
11	Exact and reducible to exact differential equation	5
12	Linear and reducible to linear differential equation	5
Total Tutorial Sessions	**15**	**Total Tutorial Hours** **15**

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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 EngineeringMathematics , 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 EngineeringMathematics , 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 onEngineering 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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Course Information:

Class, Semester	FY. B.Tech, Semester - I					**Category**	**BS**	
Course Code, Course Title	3AEBS102, 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 the principles of magnetism and semiconductor physics to select suitable materials for 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	**Diffraction & Polarization :** **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.	6
II	**Laser and Fiber Optics :** **Laser:** Introduction, Principle of laser, Pumping and Population inversion, Characteristics of laser, Ruby Laser, Applications of laser in electrical 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 electrical engineering.	7

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Module	Contents	Lecture Hours
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 the field of electrical 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, Interplanner 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	**Semiconductors , Magnetic and Dielectric materials :** **Semiconductor** - Introduction, types of semiconductor, Band theory of semiconductor, Fermi energy and its location in semiconductor, conductivity of semiconductor, Hall effect. **Dielectrics** - Introduction to dielectrics, Dielectric parameter, dielectric polarization, types of polarization, Dielectric materials- solid, liquid, gaseous, Frequency and temperature dependence of dielectric material. **Magnetism** - Types of magnetic material, soft and hard materials, Hysteresis effect, Domain theory of ferromagnetism.	10
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 electrical engineering .	7
	Total Lecture Hours	**45**

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Plane Diffraction Grating- Determination of 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	Determination of wavelength of He-Ne laser light using diffraction grating.	3
4	Determination of divergence of He-Ne laser light	3

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S.No.	Title / Topic of the Experiment	CO Mapped
5	Numerical aperture of optical fibre: Calculation of NA of optical fibre using laser.	3
6	Verification of inverse square law.	3
7	Determination of band gap energy of given semiconductor.	2
8	Determination of 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	Determination of the wavelength of the given monochromatic source of light by Newton's ring method	3
11	Study of B-H Curve of given sample	3
12	Study of Hall Effect and determination of Hall voltage	3
13	Determination of Miller Indices of a given plane and models	5
14	Study of 23 Symmetries in cubic crystal	5
Total Practical Sessions	**15**	**Total Practical Hours**	**30**

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

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References:

1. David Halliday, Robert Resnick&Jearl Walker, Fundamentals of Physics,12th Edition,2021.
2. ResnickHalliday, Krane, Engineering Physics,8th Edition, John Wiley & Sons Pub.,2008.
3. R. K. Gaur & Gupta S. L, Engineering Physics,8th Edition, Dhanapat Rai 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. Raghvan, 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:

S.No.	Experiment Name	Experiment 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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Course Information:

Class, Semester	FY. B.Tech, Semester - I					**Category**	**ES**
Course Code, Course Title	3AEES103, Engineering Graphics					**Type**	**LIT2**
Prerequisites	-						
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**		**Self Study**	**Credits**	
	2	-	4		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	Construct engineering curves and geometric figures with accurate proportions, smooth transitions, and proper line quality, using standard drawing tools and methods.
CO2	Interpret and draw orthographic projections of points, lines, and planes, ensuring the correct use of projection conventions, views, and dimensioning, based on descriptive data or 3D representations.
CO3	Generate projections of regular and truncated solids, such as prisms, pyramids, cylinders, and cones, maintaining proper orientation and visibility, under conditions involving different solid positions relative to reference planes.
CO4	Produce sectional views and true shapes of sectioned solids, ensuring correct placement of cutting planes and proper hatching, based on internal features description.
CO5	Create orthographic and isometric views of objects with consistent dimensions, line types, and spatial orientation, using 2D or 3D drawings or physical models as input.
CO6	Demonstrate professional drafting practices with neatness, accuracy, and adherence to standard conventions in both individual and team-based environments using CAD tools.

Syllabus:

Module	Contents	Lecture Hours
-	**Concepts and Conventions (Not for Examination)** Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout, and folding of drawing sheets - Lettering and dimensioning.	2
I	**Engineering Curves:** Basic Geometrical constructions, Curves used in engineering practices: Conics - Construction of ellipse, parabola, and hyperbola by eccentricity method - Construction of cycloids - Construction of involutes - Drawing of tangents and normal to the above curves.	5

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Module	Contents	Lecture Hours
II	**Projection of Points, Lines:** Introduction to first-angle and third-angle methods of projection. **Projections of Points:** Introduction and location of points - Projections of points on both reference planes. **Projections of Lines:** Introduction and Orientation of straight lines - Traces of Straight Line - Projections of straight line inclined to both the reference planes - Determination of true lengths and true inclinations by rotating line method.	5
III	**Projection of Planes and Solids:** **Projections of Planes:** Introduction and orientation of planes - Projections of planes inclined to one reference plane and perpendicular to the others - Projections of planes inclined to both the reference planes by the rotating object method. **Projections of Solids:** Projection of simple solids like prisms, pyramids, cylinders, cones, and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by the rotating object method.	5
IV	**Projection of Sectioned Solids and Development of Surfaces:** **Projection of Sectioned Solids:** Introduction to sectioned solids - Section plane parallel to the reference planes - Section plane is inclined to one of the principal planes and perpendicular to the others - Obtaining the true shapes of the section views. **Development of Surfaces:** Introduction to development of surfaces - Methods of development - development of lateral surfaces of simple and sectioned solids.	5
V	**Orthographic Projections:** Introduction to Orthographic Projection - Planes of Projection - Four Quadrants - First Angle and Third Angle Projection - Representation of Three-Dimensional Objects.	4
VI	**Isometric Projections:** Introduction - Principle of Isometric Projection - Isometric Scale - Isometric Drawing of Prisms, Pyramids, Cylinders, Cones, Spheres, and Truncated Solids	4
	Total Lecture Hours	**30**

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Drawing of Engineering Curves	1
2	Drawing of Line, Planes Inclined to the Reference Planes	2
3	Drawing of Planes and Solids Inclined to the Reference Planes	3
4	Drawing of Projections of Sectioned Solids and Development Surfaces.	3,4
5	Drawing of Projections of orthographic views	2,5

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S.No.	Title / Topic of the Experiment	CO Mapped
6	Drawing of Isometric Projection	5
7	Computer-Aided Drafting of Engineering Curves.	1,6
8	Computer-Aided Drafting of Line, Planes Inclined to the Reference Planes	2,6
9	Computer-Aided Drafting of Planes and Solids Inclined to the Reference Planes	3,6
10	Computer-Aided Drafting of Projections of Sectioned solids and development surfaces.	3,4,6
11	Computer-Aided Drafting of Projections of orthographic views of simple solids.	2,5,6
12	Computer-Aided Drafting of Isometric Projection.	5,6

Total Practical Sessions	30	Total Practical Hours	60

Text Books

1. ND Batt & VM Panchal, Engineering Drawing, 50th Edition, Charotar Publication House, Bombay, 2010.
2. Basant Agrawal and C M Agrawal, Engineering Drawing, 2nd Edition, McGraw-Hill Education, 2018.

References:

1. Dhananjay A Jhole, Engineering Drawing, 5th Edition, Tata McGraw-Hill, 2011.
2. K. Venugopal, Engineering Drawing & Graphics, 5th Edition, New Age Publication, 2012.
3. M. B. Shah and B. C. Rana, Engineering Drawing, 2nd Edition, Pearson Education, 2012.
4. Warren. J. Luzadder, Fundamentals of Engineering Drawing, 11th Edition, Prentice-Hall of India, 1999.
5. Jim Bethune, David Byrnes, Engineering graphics with Auto CAD 2020, 1st Edition, Macromedia Press, 2019.

Online Learning Resources

1. NPTEL Course on Engineering Graphics and Design, by Prof. Naresh Varma Datla, Prof. S. R. Kale, IIT Delhi https://onlinecourses.nptel.ac.in/noc25_me173/preview
2. The Complete AutoCAD Course: 30 Days Drafting and Modeling. https://www.udemy.com

Experiments that may be performed through virtual labs:

S.No.	Experiment Name	Experiment Links
1	Projections of Points	https://eg-nitk.vlabs.ac.in/exp/projections-of-points/
2	Orthographic Views	https://eg-nitk.vlabs.ac.in/exp/isometric-to-orthographic-view/

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ADCET

Course Information:							
Class, Semester	FY. B.Tech, Semester - I					**Category**	**ES**
Course Code, Course Title	3AEES104, Basic Mechanical Engineering					**Type**	**T1**
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	Explain the fundamentals of thermodynamics, power transmission, manufacturing processes and lubrication for a given system using basic mechanical engineering principles.
CO2	Select the manufacturing processes for a given job with the help of basics of manufacturing engineering.
CO3	Calculate the thermodynamic properties / performance of a given system using fundamentals of thermodynamics.
CO4	Solve the numerical on power transmission using given data with the help of basics of power transmission.

Syllabus:

Module	Contents	Lecture Hours
I	**Manufacturing Processes: -** Introduction to manufacturing processes, fundamentals of Casting, advantages, disadvantages and limitations of casting, sand casting, mold, patterns, core, gating system, runners and risers, chills, permanent mold casting, investment casting, continuous casting. Various metal forming operations, hot and cold working of metals such as forging, rolling, extrusion, wire drawing. Overview and classification of joining processes, welding process, Soldering, Brazing, riveted and bolted joints	8
II	**Machine Tools:** Metal removing processes and their applications Lathe: Principle, types, operations, turret/capstan, semi/automatic, various lathe operations. Milling - classification of milling machines, construction and working of column and knee type milling machine, milling operations Drilling - Classifications, construction & working of Radial drilling machine, Various operations on drilling machines, Geometry of twist drill.	7

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Module	Contents	Lecture Hours
III	**Mechanical Power Transmission and Energy conversion devices** Type of Belt and belt drives, chain drive, Types of gears and gear Trains, Types of Coupling, Types of Bearings, Types, Construction, working and applications of Pumps, compressor and Hydraulic Turbines.	8
IV	**Thermodynamics** Thermodynamic State, Process, Cycle, Thermodynamic System, Heat, work, Internal Energy, First Law of Thermodynamics, Application of First Law to steady Flow and Non-Flow processes, Limitations of First Law Statements of Second Law of Thermodynamics.	7
V	**Introduction to I C Engine** Air standard cycles- Carnot Cycle, Joule Cycle, Otto Cycle, Air Standard efficiency.Carnot Engine, Construction and Working of C.I. and S.I., Two stroke, Four Stroke engines	8
VI	**Introduction to Refrigeration and Air Conditioning** Carnot refrigerator, Refrigerant types and properties, Vapor compression and vapor absorption system, solar refrigeration, Window Air Conditioning, Psychometric properties of moisture, Applications of refrigeration and air conditioning.	7
	Total Lecture Hours	**45**

Text Books

1. Elements Of Workshop Technology [Vol - 1,2] S.K. Hajra Choudhury & Nirjhar Roy 17th 2016.
2. Design of Machine Elements V. B. Bhandari Mc Graw Hill 10th reprint 2000
3. Engineering Thermodynamics R. Joel The English Language Book. 5th 1999
4. Engineering Thermodynamics Achultan Prentice Hall of India.Society 2nd 2011
5. Thermal Engineering R. K. Rajput Laxmi Publication, Delhi. 8th 2010
6. Elements of Heat Engine (Vol. I, II, III) Patel and Karamchandani Acharya Book Depot

References:

1. Thermal Engineering P. L. Ballaney Khanna Publication 22nd 2000
2. Refrigeration and Air Conditioning, C.P. Arora & Domkunwar Dhanpat Rai Publication 8th Revised 2009
3. Fluid Mechanics and Machinery Modi Seth Standard Book House 1st 1973
4. Theory of Machines Khurmi & Gupta S. Chand 14th 2012
5. Engineering Thermodynamics P.K.Nag Tata Mc-Graw Hill 4th 2012 Reprint
6. Energy Technology, S. Rao and Dr. B. B. Parulekar Khanna Publication 3rd 2012
7. Internal Combustion Engine R. Ganeshan Tata Mc-Graw Hill 4th 2012
8. Internal Combustion Engine R. K. Rajput Laxmi Publication 2nd 2008

Online Learning Resources

1. NPTEL Course on Basic Mechanical Engineering by Prof. H.K. Dass, IIT Delhi
   https://nptel.ac.in/courses/111105035

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Course Information:								
Class, Semester	FY. B.Tech, Semester - I					**Category**	**ES**	
Course Code, Course Title	3AEES105, Programming for problem solving using C++					**Type**	**L1**	
Prerequisites	-							
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**			
	1	-	2	2	2			
Examination Scheme (Marks)	**Theory**		**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
			-	-	-		50	50

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

CO1	Write and execute a C++ program using variables, operators, and basic I/O (cin/cout) with correct syntax and readability.
CO2	Develop programs using conditional statements (if-else, switch) and loops (for/while) to solve problems like calculators, number series, or patterns.
CO3	Design modular programs using functions (overloading, parameter passing) and arrays (1D/2D) to implement algorithms like factorial, Fibonacci, or array operations.
CO4	Implement memory-efficient programs using pointers, dynamic allocation, and structures to manage data (e.g., student records) with minimal runtime errors.
CO5	Construct C++ classes applying OOP concepts (encapsulation, inheritance) to model real-world entities (e.g., Bank Account, Person-Student) with proper member access.
CO6	Develop programs using search/sort algorithms (linear, bubble sort) and file handling (ifstream/ofstream) to process data stored in text files.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to C++ Programming:** Structure of a C++ program; Variables and data types (int, float, char, bool, string); Operators (arithmetic, relational, logical, assignment); Input and Output using cin, cout; Basic syntax, comments, and code readability.	2
II	**Control Flow and Loops:** Decision-making using conditional statements: if, if-else, nested if, and switch-case; Looping constructs: for, while, and do-while loops; Use of pass, break, and continue; Application of loops in simple number-based and pattern-based problems.	3

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Module	Contents	Lecture Hours
III	**Functions, Arrays, and Strings:** Function definition and declaration, passing parameters by value and reference, function overloading and scope; One-dimensional and two-dimensional arrays, array traversal, initialization, and usage; Character arrays and string manipulation using built-in functions, basics of std::string class.	3
IV	**Pointers and Structures:** Pointers and memory addresses, declaration and initialization, pointer arithmetic; Pointers with arrays and functions; Structures and structure variables, nested structures, accessing members using dot and arrow operators; Difference between structures and classes (basic idea).	2
V	**Object-Oriented Programming Concepts:** Basic concepts of OOP: encapsulation, abstraction, inheritance, and polymorphism; Classes and objects, defining and accessing class members; Constructors and destructors, constructor overloading; Inheritance types (single, multilevel).	2
VI	**Searching, Sorting and File Handling:** Linear and binary search algorithms; Basic sorting algorithms: bubble sort, selection sort, insertion sort; File handling in C++: opening and closing files, reading from and writing to text files using ifstream, ofstream, and fstream classes.	3
	Total Lecture Hours	**15**

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Write a C++ program to demonstrate input/output, use of variables, and basic operators.	1, 2
2	Write a program to use conditional statements (if, else, switch) for a simple calculator or grading system.	2
3	Write a program using loops (for, while, do-while) to generate number series and patterns.	2, 3
4	Implement a function to compute factorial, sum of digits, or Fibonacci series using function calls.	3
5	Demonstrate function overloading with different parameter types.	3
6	Write a program to perform basic array operations: search, insert, delete (1D arrays).	3, 6
7	Write a program to manipulate strings using character arrays and built-in functions (strlen, strcpy, etc.).	3

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S.No.	Title / Topic of the Experiment	CO Mapped
8	Implement a program using pointers and arrays; show pointer arithmetic and dynamic memory allocation.	3, 4
9	Define a structure for student data and write a program to accept and display student records.	4, 6
10	Create a class data members and member functions; include constructors and display details.	3, 5
11	Demonstrate inheritance by creating base class Person and derived class Student.	5
12	Write a program to perform file operations: write and read student records using file streams.	6

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

Text Books

1. E. Balagurusamy, Programming in C++, 8th Edition, McGraw Hill, 2020.
2. Yashavant Kanetkar, Let Us C++, 1st Edition, BPB Publications, 2021.

References:

1. B. Chandra, C++ Programming, 1st Edition, BPB Publications, 2020.
2. K. R. Venugopal, Rajkumar Buyya, Mastering C++, 2nd Edition, Tata McGraw Hill, 2013.

Online Learning Resources

1. LearnCpp.com – Full beginner-to-advanced course. https://www.learncpp.com/
2. GeeksforGeeks C++ – Tutorials & examples. https://www.geeksforgeeks.org/cpp/c-plus-plus/

Experiments that may be performed through virtual labs:

S.No.	Experiment Name	Experiment Links
1	Implement a function to compute factorial, sum of digits, or Fibonacci series using function calls.	https://ps-iiith.vlabs.ac.in/exp/factorials/
2	Write a program to manipulate strings using character arrays and built-in functions (strlen, strcpy, etc.).	https://ps-iiith.vlabs.ac.in/exp/string-operations/

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Course Information:

Class, Semester	FY. B.Tech, Semester - I					**Category**	**HS**
Course Code, Course Title	3AEHS106, 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.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction & Historical Context** Overview of the Indian Knowledge System: Philosophy and Scope, Historical timelines and key epochs, Geographical and cultural influences on ancient Indian science, Interdisciplinary approaches in ancient India. Comparative analysis with other ancient civilizations.	5
II	**Mathematics & Astronomy in Ancient India** Foundations of Vedic Mathematics and its modern applications, Concepts of zero, decimal system, and number theory, Astronomical instruments and observational techniques, Calendrical systems and time measurement in ancient India, Engineering parallels in algorithmic design and computational thinking	5
III	**Ayurveda and Life Sciences** Introduction to Ayurveda: Philosophy, doctrines, and methodologies, Medicinal systems and their chemical/pharmacological principles, Human physiology and surgical techniques in ancient texts (e.g., Sushruta Samhita), Integrating traditional knowledge with modern biomedical engineering, Innovations in material sciences: Natural polymers and biocompatible materials	5

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Module	Contents	Lecture Hours
IV	**Architectural Knowledge & Engineering Innovations** Ancient Indian architecture: Principles, materials, and techniques, Urban planning and infrastructure in historical Indian kingdoms, Structural innovations: Temples, forts, and water management systems, Engineering analysis of construction techniques from a modern perspective, Case studies: Earthquake-resistant designs in ancient constructions	5
V	**Philosophy, Science & Ethics** Indian philosophical schools and their perspectives on science, The concept of Rta (cosmic order) and its engineering analogies, Early scientific inquiry and epistemology in classical texts, Ethics, sustainability, and social responsibility in engineering, Integration of moral values and technical rigor in project design	5
VI	**Contemporary Relevance & Innovation** Bridging ancient wisdom with modern technology, Case studies: Reviving lost techniques to inspire modern engineering solutions, Workshops on innovation and design thinking using Indian Knowledge System principles, 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. Indian Knowledge System(IKS): Concepts and Applications in Engineering - https://onlinecourses.swayam2.ac.in/imb23_mg53/preview

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Course Information:

Class, Semester	FY. B.Tech, Semester - I					**Category**	**VS**	
Course Code, Course Title	3AEVS107, IDEA Laboratory					**Type**	**L2**	
Prerequisites	-							
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**		**Self Study**	**Credits**		
	1	-	2		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	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

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Module	Contents	Lecture Hours
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, NodeMCU, and their applications in controlling hardware. Circuit simulation using TinkerCAD 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
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

S.No.	Title / Topic of the Experiment	CO Mapped
1	Introduction, Lab Safety & Tool Familiarization	1
2	Hands on practice of Mechanical Workshop Tools	1
3	3D Printing of simple parts	2
4	Laser Cutting	2
5	CNC Routing/ Engraving	2

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S.No.	Title / Topic of the Experiment			CO Mapped
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		**15**	**Total Practical Hours**	**30**

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	Experiment 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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F.Y. B. Tech. - Aeronautical Engineering
Semester -II [Level 4.5, 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	BS	T1	3AEBS109	Applied Mathematics - II	3	1	-	2	4	40	20	40	-	-
02	BS	LIT2	3AEBS110	Applied Chemistry	2	-	2	1	3	40	20	40	50	-
03	PC	T1	3AEPC111	Engineering Mechanics	3	1	-	2	4	40	20	40	-	-
04	ES	T1	3AEES112	Basic Electrical & Electronics Engineering	3	1	-	2	4	40	20	40	-	-
05	ES	L2	3AEES113	Design Thinking	-	-	2	2	1	-	-	-	50	-
06	HS	L2	3AEHS114	Communication skills	-	-	4	1	2	-	-	-	50	-
07	ES	T1	3AEES115	Introduction to Emerging Technologies	2	-	-	1	2	40	20	40	-	-
08	ES	L1	3AEES116	Python Programming for Engineers	-	-	2	1	1	-	-	-	50	50
09	CC	L2	3BSCCXXX	Liberal Learning Course-II	-	-	2		1	-	-	-	50	-
				Total	**13**	**3**	**12**	**12**	**22**					
				Total Contact Hours	**28**									

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) / CIA (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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Course Information:								
Class, Semester	FY. B.Tech, Semester - II					**Category**	**BS**	
Course Code, Course Title	3AEBS109, Applied Mathematics-II					**Type**	**T1**	
Prerequisites	3AEBS101, 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

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Module	Contents	Lecture Hours
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

S.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 functions	3
6	Beta functions	3
7	Measures of Central tendency	1
8	Measures of dispersion	1
9	Interpolation with equal intervals	4
10	Interpolation for unequal intervals	4
11	Evaluation of multiple integrals	5
12	Applications of multiple integrals	5
Total Tutorial Sessions	**15** **Total Tutorial Hours**	**15**

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 EngineeringMathematics , 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

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References:

1. Dr. B. S. Grewal , Higher Engineering Mathematics , 44th Edition, Khanna Publishers ,2018.
2. N. P. Bali, Manish Goyal , Advanced EngineeringMathematics , 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 onEngineering 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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Course Information:

Class, Semester	FY. B.Tech, Semester - II					**Category**	**BS**
Course Code, Course Title	3AEBS110, Applied Chemistry					**Type**	**LIT2**
Prerequisites	-						
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**		**Self Study**	**Credits**	
	2	-	2		1	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 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 the 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, Water Testing: Acidity, alkalinity, chlorides and hardness of water (definition, causes and significance), Disinfection of water.Treatment of hard water by: Zeolite process, Reverse Osmosis, Numericals on temporary, permanent and total hardness of water.	5
II	**Chemical and Analytical Techniques:** Chemical analysis, its types, Different ways to express concentration of solution, Numerical problems. **A. pH-metry:** Introduction, pH measurement using glass electrode and it's applications. **B. Spectrometry:** Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's laws). **C. Chromatography:** Introduction, principle, instrumentation and applications of Gas-Liquid chromatography (GLC).	5

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Module	Contents	Lecture Hours
III	**Polymers and Composites for Engineering Applications:** **Polymers:** Introduction, Plastics: Thermo-softening and thermosetting plastics, industrially important plastics like PVC, PTFE (Teflon), ABS, urea-formaldehyde, **Composites:** Introduction, Constituents, Fibre-reinforced plastics (FRP) and Glass reinforced plastics (GRP)	5
IV	**Energy Technology:** **A. Batteries:** Introduction,Types of batteries, battery characteristics, Lithium ion batteries (LIBs) (Instrumentation, advantages and applications). **B. Fuels:** Introduction, classification, characteristics of good fuels, types of calorific value (higher and lower), Combustion of fuels, Bomb calorimeter, Numerical on GCV and NCV, Fuels in propellants and aircraft industries, Introduction to solar cells.	5
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), Electroplating process, Metal cladding.	5
VI	**Metallic Materials:** Introduction, classification, purposes of making alloys with examples. **Ferrous alloys:** Plain carbon steels (mild, medium and high). **Nonferrous alloys:** Aluminum alloy (Duralumin and Alnico), Nickel alloy (Nichrome), Tin alloys (Solders), Alloys used in aircraft industries.	5
	Total Lecture Hours	**30**

List of Experiments with CO Mapping

S.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 Aluminium 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

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S.No.	Title / Topic of the Experiment	CO Mapped
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-colorimeters.	4
13	Determination of strength of acid/base by using conductivity meter.	4
14	Demonstration of H2-O2 fuel cell/ battery.	5
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 Chawala, A Text book of Engineering Chemistry 3rd Edition, Dhanpat Rai Publishing Co. New Delhi, 2007
3. Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratapsingh V. Gaikwad, A Text book of Applied Chemistry,1st Edition, Wiley Publications, 2018

References:

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai 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, 2005.
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
3. Wikipedia - Composite materials: https://en.wikipedia.org/wiki/Composite_material

Experiments that may be performed through virtual labs:

S.No.	Experiment Name	Experiment 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://pcv-amrt.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	3AEPC111, Engineering Mechanics					**Type**	**T1**
Prerequisites	-						
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	Apply fundamental principles of mechanics (force systems, moments, equilibrium) to resolve and compute resultant forces in engineering systems.
CO2	Analyze forces in beams and trusses using equilibrium conditions, free-body diagrams, and methods of joints/sections for structural stability.
CO3	Determine centroid and moment of inertia for plane laminae using standard formulas and axis theorems for engineering applications.
CO4	Evaluate projectile motion under different conditions (horizontal, inclined, varying elevations) using kinematic principles.
CO5	Apply kinetics principles (D'Alembert's, Work-Energy, Impulse-Momentum) to solve real-world problems involving linear/circular motion and collisions.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to Engineering Mechanics** Basic concepts - Basic Concepts, Units, Particles, Body, Rigid body, Force, Types of force systems, Principles of transmissibility of force, Resolution of a force, Resultant force, Moment of a force, Couple, Varignon's theorem.	7
II	**Equilibrium of Forces** Concept of equilibrium, Conditions of equilibrium, Free Body Diagram, Lami's theorem, Law of moments, Introduction to surface friction, Surface friction for bodies on horizontal and inclined planes. Beams: Types of Loads, Types of supports, Types of Beams, Analysis of Simple and Compound beams using conditions of equilibrium.	8
III	**Analysis of Truss** Introduction of truss, Types of Trusses, Determinacy of a Truss, Method of Joints, Method of Section, Assumptions for analysis of truss, Analysis of truss using method of Joints, Analysis of Simple truss with maximum seven members.	7

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Module	Contents	Lecture Hours
IV	**Centroid and Moment of Inertia** Centroid of plain laminae, Moment of Inertia, Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Radius of Gyration.	7
V	**Projectile Motion** Definitions, Motion of a body projected horizontally, Inclined projection at an level ground, Inclined projection with point of projection and point of strike at different levels, Projection on inclined plane	8
VI	**Kinetics of Linear and Circular Motion of a Particle** Kinematics of linear motion, Motion under variable acceleration. Kinetics of linear motion, D'Alembert's Principle, Work-Energy Principle, Impulse Momentum Principle, Kinetics of Circular Motion. (No numericals on kinematics) **Collision -** Introduction, Phenomena of Collision, Law of conservation of Momentum, Newton's Law of Collision of Elastic Bodies, Coefficient of Restitution, Types of Collisions, Direct Collision of Two Bodies, Loss of Kinetic Energy during Collision, Direct and Indirect Impact of a Body with a fixed plane of reference	8
	Total Lecture Hours	**45**

List of Tutorials with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Force Systems & Resultants – transmissibility, resolution, Varignon's theorem	1
2	Equilibrium & FBDs – conditions, Lami's theorem, law of moments	1
3	Friction & Beams – friction on planes, supports, loads, beam analysis	2
4	Truss Basics – determinacy, methods of joints and sections	2
5	Truss Problems – simple truss analysis (≤7 members)	2
6	Centroid & M.I. – standard shapes, parallel/perpendicular axis theorem	3
7	Projectile Motion I – horizontal & inclined projection on level ground	4
8	Projectile Motion II – different levels & projection on inclined plane	4
9	Kinetics Principles – D'Alembert, Work-Energy, Impulse-Momentum	5
10	Collisions – laws, coefficient of restitution, impact problems	5
Total Practical Sessions	**15**	**Total Practical Hours**	**15**

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Text Books

1. S. Ramamrutham, Engineering Mechanics, 9th, Dhanpat Rai Publishing Company (P). Ltd, 2010
2. R. K. Bansal and Sanjay Bansal, Engineering Mechanics, 6th, Laxmi Publications Pvt. Ltd.,2013
3. K. L. Kumar, Engineering Mechanics, 4th, Tata McGraw Hill Education, 2012

References:

1. Timoshenko and Young, Engineering Mechanics, 3rd, McGraw Hill Publishers, 2006
2. F. P. Beer and E. R. Johnson, Vector Mechanics for Engineers Vol.-I and II, 6th, Tata McGraw Hill Education, 2011
3. Ferdinand Singer, Engineering Mechanics: Statics & Dynamics, 9th, Harper and Row Publications, 2009

Online Learning Resources

1. NPTEL Course on Engineering Mechanics, by Prof. K. Ramesh, IIT Madras
   https://onlinecourses.nptel.ac.in/noc21_me70

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Course Information:

Class, Semester	FY. B.Tech, Semester - II					**Category**	**ES**	
Course Code, Course Title	3AEES112, Basic Electrical & Electronics Engineering					**Type**	**T1**	
Prerequisites	-							
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	Solve the DC circuits with independent sources using Kirchhoff laws and Network Theorems for solving elementary electrical problems.
CO2	Analyze single-phase and three-phase AC circuits to determine voltages, currents, and power using phasor concepts and sinusoidal waveform parameters.
CO3	Describe electrical protection, wiring, and Basic machines and transformers using understanding of basic power distribution and energy conversion.
CO4	Distinguish between semiconductor devices, rectifiers, transistors, and fundamentals of digital electronics to understand their role in Real Life applications.
CO5	Explain the basics of communication system using appropriate transmitter and receiver blocks for analyzing signal transmission and reception.

Syllabus:

Module	Contents	Lecture Hours
I	**DC Circuits:** Ohms's Law, Equivalent Resistance, Kirchhoff current Law, Kirchhoff voltage laws, Mesh analysis, Nodal analysis. Superposition Theorem.	7
II	**AC Circuits:** Representation of sinusoidal waveforms, peak, average & RMS values. Real, Reactive and Apparent Power, Power triangle, Analysis of single-phase ac circuits. (R, L and C) Basics of three phase circuits, star and delta configuration, voltage and current relation.	8
III	**DC Machine:** Principle, Construction, Types and working of DC machine and , EMF and Torque equation of DC machine **AC Machine:** Single-phase transformer and its EMF Equation and application, Working of Single Phase Induction Motor	8
IV	**Semiconductor device and applications:** Introduction to PN junction and Zener diode, half wave and full wave rectifier, bipolar junction transistors input output characteristics – CE, CC, CB configuration	7

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Module	Contents	Lecture Hours
V	**Digital Electronics:** Difference between analog and digital signal, number conversion system, introduction to logic gates, Boolean algebra and theorems, introduction to sequential circuits SR and JK flip flop.	7
VI	**Communication Systems:** Block schematic of basic communication system – Frequency spectrum - Base band signals, RF bands, Necessity of modulation, Types of modulation – AM, FM, Phase modulation and pulse digital modulation – AM /FM transmitters and receiver - Noise types, . Introduction to radio wave propagation, Ground wave, Space wave and sky wave.	8
	Total Lecture Hours	**45**

List of Tutorials with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	To solve problems on Ohm's Law and Equivalent Resistance in DC Circuits	1
2	To solve problems using Kirchhoff's Current and Voltage Laws	1
3	To solve problems on DC circuits using Nodal, Mesh and Superposition Theorem	1
4	To solve problems on RMS, Average values, and Phasor Representation of Sinusoidal Waveforms	2
5	To solve problems on Power Triangle and Power Factor in AC Circuits	2
6	To solve problems on Single-Phase AC Circuits with R, L, and C elements	2
7	To solve problems on Three-Phase Star-Delta Circuits: Voltage and Current Relations	2
8	To demonstrate constructional features and solve EMF & Torque Equation of DC Machines	3
9	To demonstrate working and applications of DC Motors and Generators	3
10	To demonstrate principle and solve EMF Equation of Transformer	3

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S.No.	Title / Topic of the Experiment	CO Mapped
11	To demonstrate working and applications of Single-Phase Induction Motor	3
12	To demonstrate VI Characteristics of PN Junction and Zener Diodes with Rectifier Applications	4
13	To demonstrate and solve problems on BJT characteristics in CE, CB, and CC Configurations	4
14	To solve problems on Logic Gates and Boolean Algebra for Digital Circuits	4
15	To demonstrate and solve problems on Communication System Block Diagram and Modulation Techniques	5
Total Practical Sessions	**15**	**Total Practical Hours** **15**

Text Books

1. D. P. Kothari, I. J. Nagrath,Basic Electrical Engineering,4th,Tata McGraw Hill,2019
2. D. C. Kulshreshtha,Basic Electrical Engineering,2nd,McGraw Hill.,2020
3. D. P. Kothari,Basic Electrical & Electronics Engineering ,2nd,TMH New Delhi, 2020
4. B.P.Lathi,Modern Digital and Analog Communication Systems,4th ,Oxford University Press,2017

References:

1. Millman and Halkias , Integrated Electronics,2nd,McGraw Hill,2010
2. A.K. Thereja and B.L. Thereja, Electrical Technology volume II,2nd,S. Chand & Co. Publications,2007
3. L. Bakshi and A. Bakshi, Basic Electrical Engineering,1st,Technical Publications, Pune,2005
4. Herbut Taub , Donald L. Schilling, Goutam Saha , Taubs Principles Of Communication Systems, 4th, McGraw Hill Education, 2017

Online Learning Resources

1. Basic Electrical Circuits by Prof. Gajendranath Chowdary https://onlinecourses.nptel.ac.in/noc25_ee91/preview
2. Introduction to Semiconductor Devices by Prof. Naresh Kumar - https://onlinecourses.nptel.ac.in/noc25_ee92/preview
3. Digital Circuits by Prof. Santanu Chattopadhyay https://onlinecourses.nptel.ac.in/noc25_ee125/preview
4. RF Circuits and Systems - Basics of Communication Theory by Professor Payam Heydari https://www.udemy.com/course/rf-circuits-and-systems-basics-of-communication-theory/?kw=communication+basics&src=sac&couponCode=MT130825A

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Course Information:

Class, Semester	FY. B.Tech, Semester - II					**Category**	**ES**
Course Code, Course Title	3AEES113, Design Thinking					**Type**	**L2**
Prerequisites	-						
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**		**Self Study**	**Credits**	
	-	-	2		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	Lecture Hours
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.	-
	Total Lecture Hours	-

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List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	**Introduction to Design Thinking** **Activity:** Make a group of 2-4 students. Give each group a simple, relatable problem (e.g., "Long queues at the campus canteen" or "Difficulty in finding parking on campus"). Ask them to: Empathize: Identify users and their pain points. Define: Write a clear problem statement. Ideate: Brainstorm possible solutions. Sketch: Draw their proposed solution on chart paper. Present: Each group will present their idea briefly.	1,2
2	**Identification of Problems** **Activity 1**: Present case study (in group) how companies like Airbnb, Apple, IDEO, Netflix, Samsung, Toyota used Design Thinking to drive innovation. **Activity 2:** User Interviews – The student or group should walk around the campus or their locality to observe and identify at least three (per student) real-life problems faced by users (students, faculty, staff, and community). Conduct interviews to gather qualitative insights. Steps: 1. Observation: Note down pain points using observation and informal interviews. 2. Listing: Write a list of problems identified. 3. Shortlisting: Apply criteria like relevance, feasibility, user impact, and alignment with SDGs to shortlist one problem to work on for further Design Thinking phases.	1,2
3	**Selection of Problems** **Activity:** Students will present (PPT) their selected problem, why they chose it, who the users are, and the evidence collected.	1,2
4	**Designing of Empathy Map** **Activity:** Prepare Empathy Map – Visualize what users say, do, think, and feel.	1,3
5	**Customer Survey and Analysis** **Activity:** Students create a structured survey (MCQ, likert scale, open ended questions etc.) using google forms and prepare charts (bar, pie etc) and do the analysis.	1,3
6	**Persona Building** **Activity:** Based on findings from Observations and interviews, Customer Survey and Analysis from previous experiments, identify pattern i.e. common characteristics, behaviors, needs, pain points, and goals among users and create persona template.	1,3
7	**Customer Journey Map** **Activity:** Select the persona created in the previous experiment, define the Scenario, List Stages/Phases of the Journey, Map User Actions, Identify User Emotions, Identify Touchpoints, Identify Pain Points and opportunities for Improvement.	1,3
8	**Defining the problem** **Activities:** • Observation of Stakeholders – Note behaviors and pain points. • 5 Whys Method (Drill Down) – Uncover root causes behind a problem. • Root Cause Mapping – Visual diagram connecting symptoms to core issues. • Refine Problem Statement – Create a focused, actionable problem definition.	1,3

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S.No.	Title / Topic of the Experiment	CO Mapped
9	**Poster Presentation** **Activity:** Use A2/A1 sheet and draw charts, diagrams, sketches, and minimal text to represent experiment no 1-8.	1,2,3
10	**Ideation** **Activities:** SCAMPER Model – Modify existing ideas by Substituting, Combining, Adapting, etc. Brainstorming (Crazy 8 Method) – Rapid sketching of 8 ideas in 8 minutes. Mind Mapping – Visually connect ideas around a central problem/theme. Use the suitable and best one activity from above.	1,4
11	**Prototype Building** **Activities:** Storyboarding – Sketch out user scenarios and interactions. Prototyping – Build a working model or prototype or model.	1,5
12	**Testing** **Activities:** Scenario-Based Testing – Test ideas in realistic user scenarios. Peer Testing – Get feedback from other participants or teams.	1,5
13	**Refinement & Recommendation** **Activities:** Final Presentation – Showcase prototype or working model. Documentation of Learnings – Reflect on the process, improvements, and impact (Make a report). Apply for IPR/Incubation/Research Grant/Paper Publication.	1,5

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

Text Books

1. E Balaguruswamy, *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
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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Course Information:

Class, Semester	FY. B.Tech, Semester - II					**Category**	**BS**	
Course Code, Course Title	3AEHS114, Communication Skills					**Type**	**L2**	
Prerequisites	-							
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**		**Self Study**	**Credits**		
	-	-	4		1	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 professional 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 a well-organized manner with balanced zeal.

List of Experiments with CO Mapping

S.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

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S.No.	Title / Topic of the Experiment	CO Mapped
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 Pvt Ltd, New Delhi, Print, 2012
4. English For Engineers. Dr. Shyamaji 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.

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References:

1. 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. Hory 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

1. Software: Pronunciation apps (e.g., ELSA Speak, Speak English), grammar checkers (e.g., Grammarly).
2. Online Platform Coursera (for basic English courses), Duolingo, BBC Learning English.

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Course Information:

Class, Semester	F.Y. B.Tech – Semester II					**Category**	**ES**
Course Code, Course Title	**3AEES115 Introduction To Emerging Technologies**					**Type**	**T1**
Prerequisites	--						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	02	00	00	01	02		
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. Quantum AI. 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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Course Information:

Class, Semester	FY. B.Tech, Semester - II					**Category**	**ES**	
Course Code, Course Title	3AEES116, Python Programming for Engineers					**Type**	**L1**	
Prerequisites	-							
Teaching Scheme (Per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**			
	-	-	2	1	1			
Examination Scheme (Marks)	**Theory**		**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
			-	-	-		50	50

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

CO1	Write and execute Python programs using Google Colab with proper syntax, variables, and control flow structures that produce accurate computational results with ≥90% correctness.
CO2	Develop modular data processing solutions by implementing functions, lists/dictionaries, and file operations that handle real-world data formats with complete functional requirements met.
CO3	Analyze engineering datasets using NumPy for numerical computing and Pandas for data manipulation to derive statistically valid conclusions.
CO4	Generate professional engineering visualizations using Matplotlib and construct predictive models with scikit-learn that achieve ≥85% accuracy in trend representation/prediction tasks .
CO5	Solve domain-specific engineering problems by applying Python's scientific stack (NumPy/Pandas/Matplotlib) to deliver documented solutions meeting industry-standard analysis protocols.
CO6	Write and execute Python programs using Google Colab with proper syntax, variables, and control flow structures that produce accurate computational results with ≥90% correctness.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Introduction to Python in Google Colab: Basic syntax, variables, data types, input/output, arithmetic operations, and comments.	1,6
2	Markdown Documentation in Google Colab: Formatting documentation using headings, lists, code blocks, LaTeX equations, and embedded images.	5
3	Control Flow: Conditionals and Loops: Implementing logic with if-elif-else, for/while loops, and loop controls (break, continue).	1,6
4	Functions in Python: Defining functions, parameters, return values, default arguments, and variable scope.	2

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S.No.	Title / Topic of the Experiment	CO Mapped
5	Working with Data Structures: Core operations with lists, tuples, and dictionaries: creation, indexing, methods, and iteration.	2
6	String Manipulation and File Handling: String methods, f-strings, reading/writing files (open(), with), and file modes.	2
7	Numerical Computing with NumPy: NumPy arrays, mathematical operations, slicing, broadcasting, and statistical functions.	3,5
8	Data Analysis with Pandas: Series/DataFrames, CSV I/O, filtering, sorting, handling missing data, and basic aggregation.	3,5
9	Data Visualization with Matplotlib: Creating and customizing line plots, bar charts, histograms, and scatter plots.	4,5
10	Scientific Computing with SciPy: Equation solving (optimize), numerical integration, and scientific constants.	3,5
11	Introduction to Machine Learning with scikit-learn. Linear regression: dataset splitting, model training, predictions, and accuracy evaluation.	4
12	Mini Project: Solving Engineering Problem using Python: Apply Python tools (NumPy, Pandas, Matplotlib) to analyze and solve a practical engineering problem — e.g., sensor data analysis, energy consumption patterns, structural data interpretation, or environmental measurements. Emphasis on real-world relevance, data preprocessing, analysis, and visualization.	3,4,5
Total Practical Sessions	**15**	**Total Practical Hours** **30**

Text Books

1. Dr. R. Nageswara Rao, Core Python Programming, 2nd Edition, Dreamtech Press, 2018.

References:

1. Sheetal Taneja, Naveen Kumar, Python Programming – A Modular Approach, 1st Edition, Oxford University Press India, 2018.
2. Jeeva Jose, P. Sojan Lal, Introduction to Computing and Problem Solving with Python, 2nd Edition, Khanna Book Publishing Co., 2019.

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Online Learning Resources
1. Google's Python Class https://developers.google.com/edu/python 2. Khan Academy – Intro to Python https://www.khanacademy.org/computing/computer-programming/sql 3. Kaggle – Python Course https://www.kaggle.com/learn/python

Experiments that may be performed through virtual labs:

S.No.	Experiment Name	Experiment Links
1	Introduction to Python in Google Colab: Basic syntax, variables, data types, input/output, arithmetic operations, and comments.	https://python-iitk.vlabs.ac.in/exp/arithmetic-operations/
		https://python-iitk.vlabs.ac.in/exp/data-types/
2	String Manipulation and File Handling: String methods, f-strings, reading/writing files (open(), with), and file modes.	https://python-iitk.vlabs.ac.in/exp/strings/

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Course Information:

Class, Semester	FY. B.Tech, Semester - I/II					**Category**	**CC**
Course Code, Course Title	3BSCC121, Introduction to Yoga and Mindfulness					**Type**	**L2**
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	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, nadis) 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.

List of Experiments with CO Mapping

S.No.	Title of Tutorial	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

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S.No.	Title of Tutorial	CO Mapped
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** Perform Tratak (candle gazing) for concentration. Understand through demonstration or video.	4,5

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

Text Books

1. YogJeevan . Dr. ChakoteRiya1st Editon2016
2. YogParchichayaMandlikGurujiNashik MandlikGurujiSecond Edition 2020

References:

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

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Course Information:

Class, Semester	FY. B.Tech, Semester - I/II					**Category**	**CC**
Course Code, Course Title	3BSCC122, Physical Fitness and Lifestyle Management					**Type**	**L2**
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 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.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	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

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S.No.	Title / Topic of the Experiment	CO Mapped
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
Total Practical Sessions	**15**	**Total Practical Hours** **30**

Text Books

1. Test, Measurement and Evaluation in Sports and Physical Education*. 5th ed., Friends Publications, 2023.
2. 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/II					**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**	
	-	-	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	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.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	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

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S.No.	Title / Topic of the Experiment	CO Mapped
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 the 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-improvement. Connect life areas (career, personal, social). Track personal growth visually.	5
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	**15**	**Total Practical Hours** **30**

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/II					**Category**	**CC**
Course Code, Course Title	3BSCC124, Creativity through Visual Arts					**Type**	**L2**
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	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.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	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

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S.No.	Title / Topic of the Experiment	CO Mapped
5	**Poster Design** Choose a theme: social message, event, awareness, culture. Develop layout and imagery using watercolour, 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 fundamentals 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
12	**Geometric Pattern Design** Create a detailed design using compass, ruler, or digital drawing. Highlight symmetry, color, and repetition	1,2
Total Practical Sessions	**15**	**Total Practical Hours**	**30**

References:

1. The New Drawing on the Right Side of the Brain.TarcherPerigee, 2012.
2. Digital Illustration: A Master Class in Creative Image-making.Rotovision, 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/II					**Category**	**CC**
Course Code, Course Title	3BSCC125, Community Engagement through NSS					**Type**	**L2**
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	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.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Cleanliness Drive (Swachh Bharat Abhiyan) Conduct campus and neighbourhood 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

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S.No.	Title / Topic of the Experiment	CO Mapped
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-Defence Training for Girls Organize practical training on basic self-defence 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 productive use of digital tools	2,3,5
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.

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Member Secretary-BoS Chairman -BoS Member Secretary-AC Chairman-AC

Established:1999	**Annasaheb Dange College of Engineering and Technology** **Ashta - 416301, Dist. : Sangli, Maharashtra** **(An Empowered Autonomous Institute)** **Department of Aeronautical Engineering**	ADCET

Course Information:

Class, Semester	FY. B.Tech, Semester - I/II					**Category**	**CC**
Course Code, Course Title	3BSCC126, Cultural Exploration & Heritage					**Type**	**L2**
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	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.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	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 shapes 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

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S.No.	Title / Topic of the Experiment	CO Mapped
5	**Traditional Music** Dholki ,Tabala, Dhol ,LezimListen 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
Total Practical Sessions	**15**	**Total Practical Hours** **30**

Text Books

1. Nrutasaurabha ManjiriShriramDev XII 2015
2. Indian Art and Culture , NitinSinghania 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. Jokilehto, Jukka. A History of Architectural Conservation. 2nd ed., Routledge, 2017.

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