



**Annasaheb Dange College of Engineering and  
Technology, Ashta  
An Autonomous Institute**

(Affiliated to Shivaji University, Kolhapur)

**Curriculum**

**F. Y. B. Tech**

**(AERONAUTICAL ENGINEERING)**

**Semester: I and II**

**Revision : 02**





**Annasaheb Dange College of Engineering and Technology Ashta**  
**Department of Aeronautical Engineering**



**Teaching and Evaluation Scheme**

**F. Y. B. Tech Semester I**

Course Code	Course Name	Teaching Scheme				THEORY								PRACTICAL				GRAND TOTAL		
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total		Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min				
2AEBS101	Applied Mathematics - I	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEBS102	Applied Physics	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEES103	Engineering Mechanics	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEPC104	Basic Mechanical Engineering	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEPC105	Engineering Graphics	2	-	2	3	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEES106	Workshop Practices	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEBS107	Applied Physics Labaoratory	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEES108	Design Thinking Laboratory	1	-	2	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEHS109	Value Added Course 1	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
		<b>15</b>	<b>1</b>	<b>10</b>	<b>21</b>															<b>650</b>
	<b>Total Contact Hours/Week</b>					<b>26</b>														

  
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**Course Details:**

Class	F.Y. B. Tech., Sem.- I
Course Code and Course Title	2AEBS101, Applied Mathematics- I
Prerequisite	---
Teaching Scheme: Lecture/Tutorial	03/01
Credits	04
Evaluation Scheme: ISE/MSE/ESE	40/30/30

**Course Outcomes :**

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

2AEBS101_1	Solve the system of linear equations by using matrix methods and numerical techniques.
2AEBS101_2	Calculate Eigenvalues and Eigenvectors and power of matrix by using Cayley-Hamilton theorem.
2AEBS101_3	Fit the curves for bivariate data by applying least square techniques.
2AEBS101_4	Apply Taylor series to find the expansion of functions.
2AEBS101_5	Compute the $n^{\text{th}}$ power and roots of the complex number by using De-Moivre's Theorem.

**Course Contents:**

		Hrs.
Unit 1	<b>Matrices and Solution of Linear System Equations:</b> Rank of a matrix, Normal form of a matrix, echelon form, Consistency of linear system of equations (system of homogeneous and non- homogeneous linear equation).	07
Unit 2	<b>Eigenvalues and EigenVectors:</b> Vectors, Linear dependence and linear independence of vectors, Eigenvalues, Properties of Eigenvalues, Eigen vectors, Properties of Eigenvectors, Cayley-Hamilton Theorem (Inverse and Higher powers of matrix).	08
Unit 3	<b>Numerical Solution of System of Simultaneous Linear Equations:</b> Gauss Elimination Method, Gauss-Jordan Method, Iterative Method – Gauss Jacobi method and Gauss Seidel method, Eigenvalue using Power method.	06
Unit 4	<b>Statistics and Curve Fitting:</b> Method of Least Squares, Fitting of Straight Line, Fitting of Parabola, Fitting of exponential curves, Lines of Regression.	06
Unit 5	<b>Calculus:</b> Taylor's series, Maclaurin's series, Standard expansions, Expansion of function using Standard series, Indeterminate forms.	07
Unit 6	<b>Complex Numbers:</b> De Moivre's theorem, Roots of a complex number, Expansion of $\sin(nx)$ and $\cos(nx)$ in powers of $\sin x$ and/or $\cos x$ , Circular functions of a complex variable, Hyperbolic functions, relation between circular and hyperbolic functions, Inverse Hyperbolic functions.	08

  
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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Numerical Methods in Engineering & Science	Dr. B. S Grewal	Khanna Publishers	9th	2010
02	Advanced Engineering Mathematics	H. K. Das	S. Chand	22nd	2018
03	A Textbook of Applied Mathematics	P.N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan	1st	2008
04	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw Hill Publ.	6th	2010

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers	44th	2018
02	Advanced Engineering Mathematics	N. P. Bali, Manish Goyal	Infinity science press	7th	2010
03	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley Publishers	10th	2017
04	Numerical Methods	Dr. P. Kandasamy, Dr. K. Thilagavathy, Dr. K. Gunavathi	S. Chand	1st	2010



  
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List of Tutorials	
Sr. No.	Title of Tutorials
1	Matrices and Solution of Linear System of Equations
2	Numerical Solution of System of Simultaneous Linear Equations
3	Eigenvalues and EigenVectors
4	Cayley-Hamilton Theorem
5	Curve fitting
6	Statistics
7	Expansion of Functions and Indeterminate Forms
8	Complex number



  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- I
<b>Course Code and Course Title</b>	2AEBS102, Applied Physics
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial</b>	03/00
<b>Credits</b>	03
<b>Evaluation Scheme: ISE/MSE/ESE</b>	40/30/30

**Course Outcomes :**

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

2AEBS102_1	<b>Apply</b> suitable optical theory to determine wavelength and divergence of monochromatic and polychromatic sources of light using relevant optical methods of testing.
2AEBS102_2	<b>Calculate</b> the interplanar spacing, lattice constant and properties of unit cell for a given crystal system based on the crystallographic study using laws of material science.
2AEBS102_3	<b>Use</b> the concept of Nanotechnology to express Production technique and tools of nano material using different synthesis methods and microscopes.
2AEBS102_4	<b>Solve</b> engineering problems based on Architectural acoustics and Ultrasonics using appropriate theories and formulae.
2AEBS102_5	<b>Apply</b> principles of Quantum mechanics to calculate observables on known wave functions using fundamental quantum mechanical processes in nature.

**Course Contents:**

		Hrs.
Unit 1	<p><b>Wave Optics :</b></p> <p><b>Diffraction:-</b>Introduction, construction of plane diffraction grating, Diffraction at multiple slits, Determination of wavelength of particular colour using plane diffraction grating, Resolving power of grating, Numericals.</p> <p><b>Polarization:-</b> Polarization of light, Polarization by double refraction, Positive and Negative crystals, Optical activity, Laurent's half shade Polarimeter, Numericals.</p>	07
Unit 2	<p><b>Laser and Fiber Optics :</b></p> <p><b>Laser:</b> Introduction to laser, Laser and ordinary light, Interaction of radiation with matter- Absorption, Spontaneous emission, Stimulated emission, Pumping( Three level and four level), Population inversion, Metastable state, Laser beam Characteristics, Solid State laser ( Ruby Laser), Industrial and medical applications of laser, Holography- Difference between ordinary photography and Holography, Construction and reconstruction of Hologram.</p> <p><b>Optical fiber:</b> Introduction, Basic principle (total internal reflection), Structure of optical fiber, Propagation of light through optical fiber, Acceptance angle and acceptance cone (no derivation), Fractional refractive index change, Numerical aperture (no derivation), Classification of optical fiber, Advantages and disadvantages of optical fiber, Applications of optical fibers, Numericals.</p>	07

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Course Contents:		Hrs.
Unit 3	<b>Structure of Solids and its Characterization:</b> Crystalline state, Lattice, Space lattice, Basis and crystal structure, Unit cell, lattice parameters, Crystal system in brief, (Cubic, Monoclinic...Triclinic), Fourteen Bravais lattices, Properties of unit cell (number of atoms per unit cell, coordination number, atomic radius, packing fraction), Calculation of lattice constant (Relation between lattice constant and density), Symmetry elements in cubic crystal, Miller indices:- Procedure, Features and Sketches for different planes. <b>X-ray diffraction</b> (Laue method), Bragg's law, Bragg's X-ray diffractometer, Numericals.	07
Unit 4	<b>Nano Physics:</b> Introduction, Concept of nanotechnology, Production techniques:- Top-down (eg. Ball milling) and Bottom-up (eg. Sol-gel process), Tools – Scanning Electron Microscope (SEM) and Atomic Force Microscope (AFM), Applications of nano- materials, Carbon Nano Tube (CNT):- Structure, two types, properties and applications.	07
Unit 5	<b>Architectural acoustics and Ultrasonic :</b> <b>Architectural Acoustics:</b> Introduction, Basic requirements for acoustically good hall, Reverberation, Time of Reverberation, Sabine's formula (no derivation), Absorption coefficient, Factors affecting the architectural acoustics and their remedy, Numericals. <b>Ultrasonic waves:</b> Introduction, Properties of ultrasonic waves, Production of ultrasonic waves by magnetostriction method, Determination of wavelength and velocity of ultrasonic waves by using acoustic diffraction method, Detection of ultrasonic waves, Applications of ultrasonic waves, Numericals. <b>Microwaves-</b> Properties, Advantages, Disadvantages and its applications.	07
Unit 6	<b>Quantum Physics:</b> Introduction to Quantum mechanics, Plank's Quantum Theory, Photoelectric Effect, Compton Effect with theory, Wave Particles Duality, Matter waves, Properties of Matter wave, Heisenberg Uncertainty principle for position and momentum of particle, Problems.	07

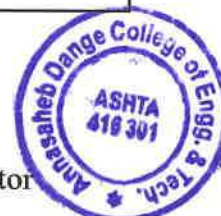
Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering Physics	G Vijayakumari	Vikas Pub. House (P) Ltd	3rd	2009
2	A Text Book of Engineering Physics	M.N.Avadhanulu & P. G. Kshirsagar	S. Chand Publication.	12th	2006
3	Engineering Physics	P. K. Palanisamy	Sci Tech pub. (P) Ltd.	2nd	2009
4	Introduction to Nanoscience and Nanotechnology:	K.K. Chattopadhyay and A.N. Banerjee,	PHI Learning	3rd	2009

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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering Physics	Resnick Halliday, Krane,	John Wiley & Sons Pub.	8th	2008
2	Engineering Physics	R. K. Gaur & Gupta S. L	Dhanpat Rai Publication	8th	2008
3	Solid State Physics:	S. O. Pillai	New Age International Ltd.	6th	2007
4	Introduction to Solid State Physics	Charles Kittel,	Wiley India Pvt. Ltd	7th	2008
5	Materials Science and Engineering –	V. Raghavan	PHI Learning.	5th	2006
6	Engineering Physics:	D.K. Bhattacharya and A.Bhaskaran,	Oxford University Press	6th	2010

#### Useful Links

1	For optics- <a href="https://nptel.ac.in/courses/122/107/122107035/">https://nptel.ac.in/courses/122/107/122107035/</a>
2	For Quantum Physics - <a href="https://nptel.ac.in/courses/122/106/122106034/">https://nptel.ac.in/courses/122/106/122106034/</a>
3	For Ultrasonic -- <a href="https://freevidelectures.com/course/3531/engineering-physics-i/8">https://freevidelectures.com/course/3531/engineering-physics-i/8</a>
4	For Solid State Physics -- <a href="https://nptel.ac.in/courses/115/105/115105099/">https://nptel.ac.in/courses/115/105/115105099/</a>



  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- I
<b>Course Code and Course Title</b>	2AEES103, <b>Engineering Mechanics</b>
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial</b>	03/00
<b>Credits</b>	03
<b>Evaluation Scheme: ISE/MSE/ESE</b>	40/30/30

**Course Outcomes :**

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

2AEES103_1	<b>Define</b> various terminologies associated with dynamics of mechanical systems, Explain the difference between kinematics and kinetics, particle and rigid body.
2AEES103_2	<b>Apply</b> the concepts of equilibrium to find unknown forces acting on rigid bodies, and resolve the composition of forces.
2AEES103_3	<b>Calculate</b> forces in members of truss with their nature, Centroid and Moment of Inertia of a given plane lamina.
2AEES103_4	<b>Calculate</b> the horizontal and vertical components of the displacement of a projectile
2AEES103_5	<b>Solve</b> for various quantities like force, mass and acceleration, work and energy, and impulse and momentum for complex problems in three-dimension.

**Course Contents:**

<b>Course Contents:</b>		<b>Hrs.</b>
Unit 1	<b>Introduction to Engineering Mechanics</b> 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.	06
Unit 2	<b>Equilibrium of Forces</b> 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.	08
Unit 3	<b>Analysis of Truss</b> 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.	06
Unit 4	<b>Centroid and Moment of Inertia</b> Centroid of plain laminae, Moment of Inertia, Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Radius of Gyration.	07

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Course Contents:		Hrs.
Unit 5	<b>Projectile Motion</b> 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	07
Unit 6	<b>Kinetics of Linear and Circular Motion of a Particle</b> 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) <b>Collision</b> - 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	08

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Mechanics	S. Ramamrutham	Dhanpat Rai Publishing Company (P). Ltd	9th	2010
02	Engineering Mechanics	R. K. Bansal and Sanjay Bansal	Laxmi Publications Pvt. Ltd.	6th	2013
03	Engineering Mechanics	K. L. Kumar	Tata McGraw Hill Education	4th	2012
04	Engineering Mechanics	Irving H. Shames	Prentice Hall of India, New Delhi	5th	2011

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Mechanics	Timoshenko and Young	McGraw Hill Publishers	3rd	2006
02	Vector Mechanics for Engineers Vol.-I and II	F. P. Beer and E. R. Johnson	Tata McGraw Hill Education	6th	2011
03	Engineering Mechanics: Statics & Dynamics	Ferdinand Singer	Harper and Row Publications	9th	2009

  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- I
<b>Course Code and Course Title</b>	2AEPC104, <b>Basic Mechanical Engineering</b>
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial</b>	03/00
<b>Credits</b>	03
<b>Evaluation Scheme: ISE/MSE/ESE</b>	40/30/30

**Course Outcomes :**

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

2AEPC104_1	<b>Explain</b> the fluid properties, principles of thermodynamics, thermodynamics laws and <b>Apply</b> them to solve simple engineering problems.
2AEPC104_2	<b>Explain</b> the concepts related to stress and strains in engineering components and <b>Solve</b> simple engineering problems.
2AEPC104_3	<b>Describe</b> the technique of manufacturing different parts of aircraft like Casting, Joining, Machining, Shaping and Forming
2AEPC104_4	<b>Explain</b> the principles of power transmission devices and its types.
2AEPC104_5	<b>Take</b> a decision on manufacturing technique for manufacturing a given component or a product.

**Course Contents:**

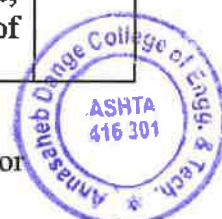
<b>Course Contents:</b>		<b>Hrs.</b>
Unit 1	<b>Fluid Properties</b> A Brief History of Fluid Mechanics, Application Areas of Fluid Mechanics, Dimensions & Units. <b>Properties of Fluids</b> - Density, Specific Volume, Specific Weight, Specific Gravity, Viscosity, Newton's Law of Viscosity, Coefficients of Kinematic & Dynamic Viscosity, Newtonian & Non-Newtonian Fluids, Surface Tension, Capillarity Effect & Vapour Pressure, Compressibility & Speed of Sound	06
Unit 2	<b>Stress and Strain in Materials</b> Concept of stress and strain, Normal stress and strain, Shear stress and strain, Bearing stress, Hooke's Law, Stress-strain diagrams: Elastic Limit, yield strength and ultimate tensile strength, Poisson's Ratio, Elastic constants: Modulus of elasticity, Bulk Modulus, Modulus of Rigidity, Composite Bars, Thermal Stresses, Stresses in thin-walled pressure vessel.	08
Unit 3	<b>Thermodynamics and Thermal Systems</b> Thermodynamics and energy, Applications, Fundamentals units and Derived units, systems and control volume, properties of a system, continuum, state and equilibrium, state postulate, processes and cycles, Zeroth law, First Law of Thermodynamics - Statement and application; Steady flow energy equation-problems- Second law of Thermodynamics - Kelvin - Plank statement and Clausius statement- problems; Limitations; Heat Engine, Refrigerator and Heat Pump, Available energy, Third law of Thermodynamics - Statement.	08

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Unit 4	<b>Introduction to Manufacturing Process</b> Introduction to Manufacturing Process, Working principles of sand casting and its types Die-casting, Centrifugal casting, Investment casting, Shell molding, continuous casting, casting defects. Lathe operations, Shaper machine, Planer Machine, Milling machine, Drilling machine, Grinding machine.	07
Unit 5	<b>Welding and Joining</b> Classification of welding processes - Principles of Oxy-acetylene gas welding, A.C metal arc welding, resistance welding, submerged arc welding, tungsten inert gas welding, metal inert gas welding, plasma arc welding, thermit welding, defects in welding, soldering and brazing.	07
Unit 6	<b>Power Transmission and Energy Conversion Devices</b> Belt drives and gear drives, belt tension, gear ratio, velocity ratio. Pumps, Compressors, Hydraulic turbines - Pelton, Francis and Kaplan Turbine.	06

**Text Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering Thermodynamics	R. K. Rajput	Laxmi Publication, Delhi	8th	2011
2	IC Engines	V. Ganesan	Tata Mc-Graw Hill Publication	4th	2013
3	Manufacturing Process	Rajeev Kumar, Maheshwar Dayal Gupta	PHI Learning Private Limited	-	2014
4	Theory of Machines	Khurmi R.S., and Gupta J.K.,	Eurasia Publishing House	-	2004

**Reference Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Thermodynamics	Yunus A. Cengel and Boles	Tata Mc-Graw Hill Publication	7th	2012
2	Manufacturing Technology	P. N. Rao	Tata Mc-Graw Hill Publication	2nd	1999
3	Theory of Machines	S. S. Ratan	Tata Mc-Graw Hill Publication	3rd	2012

  
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**Course Details:**

Class	F.Y. B. Tech., Sem.- I
Course Code and Course Title	2AEPC105, Engineering Graphics
Prerequisite	---
Teaching Scheme: Lecture/Tutorial/Practical	02/00/02
Credits	03
Evaluation Scheme: ISE	50

**Course Outcomes :**

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

2AEPC105_1	Draw the projections of the different lines, Planes and Solids in different positions, and develop the lateral surface of the object.
2AEPC105_2	Draw orthographic, sectional and isometric views.
2AEPC105_3	Produce drawings with accuracy and proficiency.
2AEPC105_4	Display a high degree of certainty in drawings and projections of complex components.

**Course Contents:**

		Hrs.
Unit 1	<b>Introduction to Engineering Drawing</b> Introduction to Drawing instruments and their uses. Different types of lines used in drawing practice, Dimensioning system as per BSI, Construction of regular Polygons. Ellipse, Parabola, Hyperbola, Involute, Archimedian spiral, Helix on cylinder & cone, Cycloid, Epicycloid and Hypocycloid, Loci of points.	2
Unit 2	<b>Projection of Lines</b> Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary reference planes. Projections of lines on regular and auxiliary reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. Grade and Bearing of a line. Applications of Lines.	2
Unit 3	<b>Projection of Planes and Solids</b> Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes), Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projections of plane figures inclined to both the planes. Projections of Prisms, Pyramids, Cylinder and Cones inclined to both reference planes	2
Unit 4	<b>Orthographic and Isometric Projections</b> Lines used, selection of views, spacing of views, dimensioning and sections. Drawing required views from given pictorial views, including sectional orthographic views. Introduction to isometric. Isometric scale, Isometric projections and Isometric views /drawings. Circles in isometric view. Isometric views of simple solids and objects	2

  
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Course Contents:		Hrs.
Unit 5	<b>Introduction to Computer Aided Drafting</b> Starting AUTOCAD, Various Visualization commands, Documentation Quick tour, Creating and Accessing documentation, Layout and plotting, Concept of hardware & software, AUTOCAD & interface, Setting new drawing, Accessing command, Opening & saving existing file & function keys etc.	2
Unit 6	<b>Introduction to GD&amp;T</b> Need for Dimensioning, Detailed discussion on Dimensioning and tolerance method in AUTOCAD, Editing method, Adding text with various engineering symbols.	2


**List of Experiments:**

01	Types of Lines and Lettering.
02	Engineering Curves
03	Projections of Lines
04	Projections of Planes
05	Projections of Solids
06	Orthographic Projections
07	Isometric Projections
08	Computer Aided Drafting of Line, Planes inclined to the reference planes
09	Computer Aided Drafting of solids upto hexagonal base shape and cylindrical/ Conical shape inclined to the reference planes
10	Computer Aided Drafting of Orthographic views of simple 3d objects
11	Computer Aided Drafting of Isometric View.
12	Plotting of Sectional Views of given solids or small 3D machine components.

  
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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Drawing	N D Batt& V M Panchal	Charotar Publication House, Bombay	50th	2010
02	Engineering Drawing	Dhananjay A Jhole	Tata Mc-Graw Hill	5th	2011
03	Fundamentals of Engineering Drawing	Warren. J. Luzadder	Prentice-Hall of India.	11th	1999
04	Engineering Drawing	P S Gill	Katson books	9th	2012

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Drawing & Graphics	K. Venugopal	New Age Publication	5th	2012
02	Engineering Drawing	M. B. Shah and B. C. Rana	Pearson Education	2nd	2012
03	ABC's of Auto CAD	George Omura	BPB Publication.	-	-
04	Engineering graphic with Auto CAD 2002,	Bethune	Pearson Publication	-	-



  
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**DEPARTMENT OF AERONAUTICAL ENGINEERING**

**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- I
<b>Course Code and Course Title</b>	2AEES106, Workshop Practices
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	00/00/02
<b>Credits</b>	01
<b>Evaluation Scheme: ISE</b>	50

**Course Outcomes :**

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

2AEES106_1	<b>Understand</b> and calculate the least count of measuring devices
2AEES106_2	<b>Understand</b> various production machines , tools and its operations in the workshop
2AEES106_3	<b>Utilize</b> riveting tools and different welding techniques to join different components
2AEES106_4	<b>Make</b> aircraft wing using different cutting and joining techniques
2AEES106_5	<b>Follow</b> professional and ethical principles during laboratory work

**List of Experiments:**

01	Introduction
02	Determination of least count of Vernier Caliper and Screw gauge micrometer.
03	Rivets: Lap joint and Butt joint
04	Electrical Arc welding: Lap joint and Butt joint
05	Gas welding: Lap joint and Butt joint
06	Introduction to Lathe, Milling, and Shaping Machines
07	Introduction to Grinding, Cutting, and Drilling Machines
08	Fabrication of Aircraft Wing Section using Hot wire cutting
09	Fabrication of Wing Structures: Using the core of Styrofoam from a hot wire experiment covered by sheet metal and riveted to the trailing edge.



  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- I
<b>Course Code and Course Title</b>	2AEBS107, Applied Physics Laboratory
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	00/00/02
<b>Credits</b>	01
<b>Evaluation Scheme: ISE</b>	50

**Course Outcomes :**

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

2AEBS107_1	<b>Apply</b> suitable optical theory to calculate wavelength and divergence of monochromatic and polychromatic sources of light using plane diffraction grating.
2AEBS107_2	<b>Calculate</b> band gap energy and Specific rotation for a given semiconductor and sugar solution using appropriate theories and formulae.
2AEBS107_3	<b>Demonstrate</b> Symmetries, planes and properties of unit cell for a given crystal system based on the crystallographic study using laws of material science.
2AEBS107_4	<b>Communicate</b> effectively about laboratory work both orally and writing.
2AEBS107_5	<b>Practice</b> professional and ethical behavior to carry forward in their life.

**List of Experiments:**

01	Plane Diffraction Grating
02	Resolving power of Grating
03	Resolving power of telescope
04	Laurent's Half Shade Polarimeter
05	Kund's tube for determination of velocity of sound
06	Divergence of The LASER Beam and Inverse Square Law
07	Wavelength of LASER
08	Band Gap energy

  
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<b>List of Experiments:</b>	
09	Seven Crystal System
10	Symmetry Element of Cube
11	Numerical aperture of optical fiber
12	Double Refraction
13	Material characterisation using ultrasound.



  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- I
<b>Course Code and Course Title</b>	2AEES108, Design Thinking Laboratory
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	01/00/02
<b>Credits</b>	02
<b>Evaluation Scheme: ISE</b>	50

**Course Outcomes :**

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

2AEES108_1	<b>Apply</b> the design thinking techniques to empathize the customer through arranging survey and/or interviews.
2AEES108_2	<b>Identify</b> and <b>formulate</b> the solution for real world problem using design thinking technique.
2AEES108_3	<b>Create</b> a Prototype for defined problem using design thinking approach.
2AEES108_4	<b>Test</b> developed prototype to meet user's requirements through customer feedback or prototype exhibitions.
2AEES108_5	<b>Adapt</b> ethical practices and professional skills to provide a reliable solution for defined real world problem through participating in team activities.

Unit	Content	Hrs.
1	Introduction to Design Thinking, Design Thinking Process	02
2	Empathize Phase: Empathy and Ethics, User Perspective, Activities – Empathy Map, Planning, Persona building.	02
3	Customer Journey Mapping, Observation of stakeholders, Defining and Conceptualization of problem	02
4	Ideation, Activities – 5 Whys & 1 How, Storyboarding, Brainstorming.	02
5	Prototype – Types, Mindsets, Tools.	02
6	Testing – Scenario, Methods, Refinements & Recommendations.	02

  
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Text Books:					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Understanding Design Thinking, Lean, and Agile	Jonny Schneider	O'Reilly	---	2017
2	Introduction to Design Thinking	S. Salivahanan, S. Suresh Kumar, D. Praveen Sam,	Tata Mc Graw Hill,	---	2019
3	Karmic Design Thinking - A Buddhism-Inspired Method to Help Create Human-Centered Products & Services	Prof. Bala Ramadurai,	Self-Publishe d	--	2020
4	Design: Creation of Artifacts in Society	Prof. Karl Ulrich, U. Penn	University of Pennsylvania	--	2011

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Design for How People Think	John Whalen	O'Reilly	---	2019
2	Change by Design	Tim Brown	HarperCollins	---	2009
3	Creative Confidence: Unleashing the Creative Potential Within Us All	Kelley, D. & Kelley, T	New York: William Collins	---	2014
4	Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days	Jack Knapp and others	Simon & Schuster	---	2009

  
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**Other Books/E-material**

Sr. No	Title	Instructor	Publisher
01	NPTEL Course- Design Thinking A Primer	Prof. Ashwin Mahalingam & Prof. Bala Ramadurai	<a href="https://onlinecourses.nptel.ac.in/noc22_mg32/preview">https://onlinecourses.nptel.ac.in/noc22_mg32/preview</a>
02	NPTEL Course- Innovation by Design	Dr. B.K. Chakravarthy	<a href="https://onlinecourses.nptel.ac.in/noc19_de05/preview">https://onlinecourses.nptel.ac.in/noc19_de05/preview</a>

**List of Experiments**

Expt. No	Title of the Experiment
1	Identification and Selection of Problems
2	Designing of Empathy Map
3	Customer Survey and Analysis
4	Persona Building
5	Customer Journey Map
6	Defining the problem
7	Poster Presentation
8	Ideation
9	Prototype Building
10	Testing



  
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**Teaching and Evaluation Scheme**

**F. Y. B. Tech Semester II**

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL					GRAND TOTAL		
		L	T	P	Credits	ISE		MSE+ ESE			Total	Min	ISE		ESE		Total		Min	
						Max	Min	MSE	ESE	Min			Max	Min	Max	Min				
2AEBS110	Applied Mathematics - II	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEBS111	Applied Chemistry	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEES112	Basic Electrical and Electronics Engineering	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEPC113	Material Science and Engineering	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
2AEHS114	Professional Communication Skills	-	-	4	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEBS115	Applied Chemistry Laboratory	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEES116	Programing for Problem Solving using C/C++	1	-	2	2	-	-	-	-	-	-	-	25	10	25	10	50	20	50	
2AEES117	Basic Electrical and Electronics Engineering Laboratory	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
2AEHS118	Value Added Course 2	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
		<b>12</b>	<b>1</b>	<b>12</b>	<b>19</b>															<b>650</b>
<b>Total Contact Hours/Week</b>		<b>25</b>																		

  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- II
<b>Course Code and Course Title</b>	2AEBS110, Applied Mathematics- II
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial</b>	03/01
<b>Credits</b>	04
<b>Evaluation Scheme: ISE/MSE/ESE</b>	40/30/30

**Course Outcomes :**

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

2AEBS110_1	<b>Solve</b> problems on partial derivatives by using fundamental concepts of derivative and apply it to find Jacobian, Maxima and Minima of functions of several variables.
2AEBS110_2	<b>Solve</b> Ordinary Differential Equations by using analytical methods and numerical techniques.
2AEBS110_3	<b>Use</b> technique of finite difference and interpolation to compute the value of function for given data.
2AEBS110_4	<b>Apply</b> the concept of Special Functions to evaluate improper integrals.
2AEBS110_5	<b>Evaluate</b> proper and improper type of multiple integrals by using fundamental concepts of integration and apply it to find Area and Mass of a given region.

**Course Contents:**

<b>Course Contents:</b>		<b>Hrs.</b>
Unit 1	<b>Partial Differentiation and Its Applications:</b> Function of two or more variables, Partial derivatives, Euler's theorem, Change of variables, Jacobin, Maxima and minima of functions of two variables.	08
Unit 2	<b>Ordinary Differential Equation (First order and First degree):</b> Linear differential equation, Equation reducible to linear differential equation, Exact differential equation, Equation reducible to exact equation, Simple electrical circuits.	07
Unit 3	<b>Numerical Solution of Ordinary Differential Equations (First order and First degree):</b> Picard's method, Taylor's series method, Euler's method, modified Euler's method, Runge-kutta method.	06
Unit 4	<b>Finite Differences and Interpolation:</b> Finite differences, Newton's Interpolation formula, central difference interpolation formulae (stirling formula), interpolation with unequal interval (Lagrange's formula)	06
Unit 5	<b>Special Functions:</b> Gamma function, Properties of Gamma function, Beta function, Properties of Beta function, Relation between Beta and Gamma functions.	07
Unit 6	<b>Multiple Integral and Its Applications:</b> Double Integrals, Triple integral, Change of Order of Integration, Change to polar, Applications to Area and Mass of plane lamina.	08

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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers	44 <sup>th</sup>	2018
02	Advanced Engineering Mathematics	N. P. Bali, Manish Goyal	Infinity science press	7 <sup>th</sup>	2010
03	Advanced Engineering Mathematics	H. K. Das	S. Chand	22 <sup>nd</sup>	2018
04	Numerical Methods in Engineering & Science	Dr. B. S Grewal	Khanna Publishers	9 <sup>th</sup>	2010

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	A textbook of Applied Mathematics	P. N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan	1 <sup>st</sup>	2008
02	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw Hill Publ.	6 <sup>th</sup>	2010
03	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley Publishers	10 <sup>th</sup>	2017
04	Numerical Methods	Dr. P. Kandasamy, Dr.K. Thilagavathy, Dr. K. Gunavathi	S. Chand	1 <sup>st</sup>	2010

  
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**List of Tutorial:**

Sr. No.	Title of tutorials
1	Partial Differentiation and homogeneous function
2	Applications of Partial Differentiation
3	Linear and non-differential equation.
4	Exact and non-differential equation and Simple electrical circuits.
5	Numerical Solution of Ordinary Differential Equation
6	Newton's Interpolation formulae: forward and backward difference formulae
7	Central difference interpolation formulae (stirling formula), and Lagrange's interpolation formula.
8	Special functions



  
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Course Details:

Class	F.Y. B. Tech., Sem.- II
Course Code and Course Title	2AEBS111, Applied Chemistry
Prerequisite	---
Teaching Scheme: Lecture/Tutorial	03/00
Credits	03
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes :

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

2AEBS111_1	Apply principles of water testing to identify water quality parameters and methods of water softening using fundamental laws.
2AEBS111_2	Classify fuels and analytical methods to identify their characteristics using basic principles of chemistry.
2AEBS111_3	Select engineering, ceramic materials on the basis of it's properties and applications using their chemical composition.
2AEBS111_4	Apply the methods of prevention of corrosion to a given metal considering it's types and factors affecting corrosion.
2AEBS111_5	Compute the values of hardness of water and calorific values of fuels using fundamental equations.

Course Contents:

Course Contents:		Hrs.
Unit 1	<b>Water Technology:</b> Introduction, impurities in natural water, Water Testing: acidity, alkalinity and chlorides, hardness of water (definition, causes and significance), Calculations of total hardness, disadvantages of hard water in domestic and industrial applications. Scales and sludges: Formation in boilers and removal, Treatment of hard water by ion- exchange process, Zeolite process, Desalination of brackish water by Reverse Osmosis.	07
Unit 2	<b>Chemical and Instrumental Techniques:</b> Chemical analysis, its types, Different ways to express concentration of solution. Numerical problems. Standards and its types. <b>p<sup>H</sup>-metry:</b> Introduction, pH measurement using glass electrode and applications. <b>Spectrometry:</b> Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law). Instrumentation and applications of UV-Visible spectrophotometer, <b>Chromatography:</b> Introduction, Principle, instrumentation and applications of gas-liquid chromatography (GLC).	07

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Course Contents:		Hrs.
Unit 3	<b>Engineering Materials:</b> <b>A) Polymers:</b> Introduction, plastics, thermo-softening and thermosetting plastics, industrially important plastics like phenol-formaldehyde, urea formaldehyde. Conducting polymers, biodegradable polymers (properties and applications), composites, fibre-reinforced plastics (FRP) and glass reinforced plastics (GRP). <b>B) Lubricants:</b> Introduction, classification of lubricants (solid, semisolid and liquid), lubrication and it's types, characteristics of lubricants: viscosity, viscosity index, flash point, fire point, cloud point and pour point.	07
Unit 4	<b>Fuels and Non-conventional Energy Sources:</b> <b>Fuels:</b> Introduction, classification, characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericals on Bomb and Boy's calorimeter. <b>Batteries:</b> Introduction, Characteristics of a battery, Rechargeable Li- ion batteries (Diagram, charging-discharging reactions, advantages and applications). <b>Fuel Cells:</b> Introduction, H <sub>2</sub> -O <sub>2</sub> Fuel cell (Construction, working and applications), applications of fuel cells.	07
Unit 5	<b>Corrosion &amp; Green Chemistry:</b> <b>Corrosion:</b> Introduction, causes, types, Atmospheric corrosion (oxidation corrosion), Electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection, hot dipping (galvanizing and tinning), cathodic protection method, electroplating, metal cladding. <b>Green Chemistry:</b> Definition, Twelve principles of green chemistry, Research and industrial applications.	07
Unit 6	<b>Metallic &amp; Ceramic Materials:</b> <b>Alloys:</b> Introduction, alloy definition and classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high). Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico). <b>Ceramic Materials:</b> Introduction, types of ceramics, types of cement & their applications, Manufacture of Portland Cement by wet process, Composition of Portland Cement & their functions- a) Chemical composition, b) Compound composition, Setting & hardening of Portland Cement.	07



  
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<b>Text Books:</b>					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	A Text Book of Engineering Chemistry	S. S. Dara	S. Chand & Co. Ltd., New Delhi.	11th	2008
02	A Text book of Engineering Chemistry	Shashi Chawala	Dhanpat Rai Publishing Co. New Delhi.	3rd	2007
03	A Text book of Applied Chemistry	Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratapsingh V. Gaikwad	Wiley Publications	1st	2018

<b>Reference Books:</b>					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Chemistry	Jain & Jain	Dhanpat Rai Publishing Co., New Delhi.	16th	2015
02	Industrial Chemistry	B. K. Sharma	Goel publication (P) Ltd.	10th	1999
03	Fundamentals of Engineering Chemistry	S. K. Singh	New Age International (P) Ltd, New Delhi.	1st	2009
04	Instrumental Methods of Chemical Analysis	Chatwal and Anand	Himalaya Publishing House, Mumbai.	5th	2005

  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- II
<b>Course Code and Course Title</b>	2AEES112, <b>Basic Electrical and Electronics Engineering</b>
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial</b>	03/00
<b>Credits</b>	03
<b>Evaluation Scheme: ISE/MSE/ESE</b>	40/30/30

**Course Outcomes :**

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

2AEES112_1	<b>Describe</b> the definitions & the principles of the basic electrical, electronics & digital electronics engineering & their significant role in the Aircraft Operations.
2AEES112_2	<b>Discuss</b> the Principle of operations of DC & AC Electrical Machines, Transformers and their applications.
2AEES112_3	<b>Explain</b> the role of Communications Systems in the operations & monitoring of aircrafts & artificial satellites.
2AEES112_4	<b>Sketch</b> the Layout of Typical Aircraft Electrical System and the Components along with their functions
2AEES112_5	<b>Describe</b> the various Radio Communication Modulations used for communications and apply them for designing small antennas for simple applications.

**Course Contents:**

<b>Course Contents:</b>		<b>Hrs.</b>
Unit 1	<p><b>Electrical Basics</b> Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, Capacitive networks, Series, Parallel circuits and Star-delta and Delta-star transformations.</p> <p><b>Electronics (Semiconductors) Basics:</b> Diode and its characteristics, Overview of semiconductors - Basic principle, Operation and characteristics of PN diode- Symbol, V-I Characteristics, Zenerdiode, BJT, JFET, Optoelectronic devices, Diode applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple problems)</p> <p><b>Digital Electronics:</b> Number systems – Binary codes - Logic gates - Boolean algebra, Laws and theorems -Simplification of Boolean expression - Implementation of Boolean expressions using logic gates - Standard forms of Boolean expression.</p>	09

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Course Contents:		Hrs.
Unit 2	<b>DC Machines:</b> Principle of operation of DC Generator – EMF equation - Types – DC motor types – Torque equation – Applications – Three point starter. <b>AC Machines:</b> Principle of operation of alternators – Regulation by synchronous impedance method – Principle of operation of induction motor – Slip – Torque characteristics–Applications.	06
Unit 3	<b>Actuators</b> Construction, working principle and applications of DC motor, single phase induction motor, Servo motor, stepper motor, alternator and single phase transformer. <b>Transformers:</b> Principle of operation of single phase transformers – EMF equation – Losses – Efficiency and regulation	07
Unit 4	<b>Communication Systems</b> 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, Noise figure. Introduction to radio wave propagation, Ground wave, Space wave and sky wave.	08
Unit 5	<b>Space Based Communications:</b> History of Satellite communication, Satellite communication in 2000.Orbital effects in communication system performance. Satellite subsystems, Attitude and control systems (AOCS), Telemetry, Tracking, Command and monitoring, Power systems, Communication subsystems, Satellite antennas, Equipment reliability and space qualification. Look angle determination.	07
Unit 6	<b>Aircraft Electrical systems:</b> <b>A.Power Generation:</b> APU, Alternators. <b>B.Power Transmission and Distribution:</b> Transformer Rectifiers Static inverter, RAT, Batteries, AC Circuit DC Circuit, Crimping.	05



  
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<b>Text Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
01	Aircraft Electrical Systems	E.H.J. Pallet	Person	3	2016
02	Aircraft Communication & Navigation System	Mike Tooley & David Wyatt	ELSEVIER Publication	1	2007
03	Aircraft Electrical & Electronic System	Mike Tooley & David Wyatt	ELSEVIER Publication	1	2009

<b>Reference Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
01	Elements of Electrical and Electronics	U.A.Bakshi and A.P.Godse	Technical Publications, Pune	1	1998
02	Basic Electrical Engineering	Kothari and Nagarath	Tata McGraw Hill Publications	1	-



  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- II
<b>Course Code and Course Title</b>	2AEPC113, Material Science and Engineering
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial</b>	02/00
<b>Credits</b>	02
<b>Evaluation Scheme: ISE/MSE/ESE</b>	40/30/30

**Course Outcomes :**

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

2AEPC113_1	<b>Explain</b> different phase diagrams, predict and calculate amount of phases using the phase diagram
2AEPC113_2	<b>Explain</b> composition, properties and use of different materials used in aircraft construction.
2AEPC113_3	<b>Understand</b> the basic structure and loads acting on aircraft components
2AEPC113_4	<b>Apply</b> principles of heat treatments to steels.
2AEPC113_5	<b>Applying</b> the design considerations of aircraft structures

**Course Contents:**

<b>Course Contents:</b>		<b>Hrs.</b>
Unit 1	<b>Introduction to Material Science and Engineering</b> Material classification, Atomic structure and bonding, primary bonding, ionic, covalent, metallic, Secondary bonding- hydrogen bonding, van der Waals, Crystal structure, SC, FCC, BCC, HCP, Bravais lattice, Miller indices, imperfections in crystals, point defects, line defects, surface defects.	04
Unit 2	<b>Phase diagrams</b> Solidification of metals and alloys- mechanism of crystallization, Nucleation and grain growth, solid solution, Hume-Rothery rule of solid solubility, plotting of equilibrium diagram- Gibbs phase rule equilibrium diagram-binary isomorphous alloy system, eutectic system, partially eutectic system and also alloy with a peritectic transformation. Lever rule, Iron carbon equilibrium diagram, phase transformation in the iron carbon diagram.	06



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Course Contents:		Hrs.
Unit 3	<b>Aircraft steel</b> Aircraft steel: classification of steel, effect of alloying element on steel aircraft steel specification, corrosion and heat resistant steels, maraging steels, properties and applications, selection and application of steels alloy to aircraft structure.	04
Unit 4	<b>Light metal alloys in aircrafts</b> Aluminum and its alloys their properties, types and identification, castings- Heat treatment processes- surface treatments, magnesium and its alloys their properties, features, specification, fabrication problems, special treatments, application of these alloys in aircraft structures.	04
Unit 5	<b>High strength and heat resistant alloy in aircraft</b> High strength and heat resistant alloy: Titanium and its alloys: Application, machining, forming, welding and heat treatment, copper alloys- Monel, K Monel, super alloys. Super Alloys: Nickel base- Cobalt base- Iron base, Forging and casting of super alloys, welding, heat treatment.	04
Unit 6	<b>Introduction to aircraft structure</b> Structural components of aircrafts: Fuselage- Monocoque and semi monocoque, Wing , Landing Gears, Empennage- Loads on structural components- Function of structural components- Fabrication of structural components- Connections: Simple Lap joints, Joint Efficiency, Group- Riveted Joints, Eccentrically Loaded Riveted Joints.	06

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year
1	Material Science and Metallurgy For Engineers	V.D.Kodgire	Everest Publishers,Pune	12th	2011
2	Material Science and Engineering	W.D.Callister	Wiley India Pvt. Ltd	05th	2014
3	Aircraft Structures for Engineering Students	T.H.G Megson	Elsevier Ltd.	05th	2012

  
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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year
1	Introduction to Engineering Materials	V. B. John	ELBS.	6th	-
2	Aircraft Materials and Analysis	Tariq Siddiqui	McGraw-Hill Education	1st	2015
3	Airframe structural Design	Michael Niu	CONMILIT Press Ltd	1st	1995



  
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Course Details:

Class	F.Y. B. Tech., Sem.- II
Course Code and Course Title	2AEHS114, Professional Communication Skills
Prerequisite	—
Teaching Scheme: Lecture/Tutorial/Practical	00/00/04
Credits	02
Evaluation Scheme: ISE	50

Course Outcomes :

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

2AEHS114_1	Exhibit the skill of sentence construction considering the frame of English language rules accurately for effective and sound communication.
2AEHS114_2	Present their portfolio confidently considering SWOT analysis by using digital tools convincingly as per the corporate expectations.
2AEHS114_3	Write formal letters proficiently by following required techniques that helps in maintaining professional affairs at workplace.
2AEHS114_4	Produce professional presentations proficiently on assigned topics in convincing manner using necessary tools and techniques.
2AEHS114_5	Justify role in communicative events with balanced zeal, in well-organized manner.

List of Practical's

01	Checking My English Communication
02	Self - Introduction
03	Presenting my Career Choices
04	Preparing my Portfolio
05	Understanding Sentence Pattern
06	Avoiding Common Errors
07	Presenting My Portfolio
08	Note Making
09	Getting Smart with Technical Description of charts/ Images/ Processes

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List of Practical's	
10	Delivering Professional Presentation
11	Application and Resume Writing
12	Email Writing
13	GD (General)
14	Introducing Guest/ Friend
15	Extempore
16	GD (Technical)
17	Mock Interview
18	Organizing Event

Textbook					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	The Professional: Defining the New Standard of Excellence at Work	Subroto Bagchi	Penguin Books India Pvt. Ltd.	Revised Edition	2011
2	Cambridge Guide to IELTS	Pauline Cullen, Amanda French	Cambridge University Press	Reprint	2017
3	A Practical Course in Effective English Speaking Skills	J. K. Gangal	PHI Learning Private Limited, New Delhi	Print	2012
4	Personality Development and Soft Skills	Barun K. Mitra	Oxford University Press, New Delhi, India	Seventh Impression	2012

  
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Reference Books					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	High-school English and Grammar and Composition	Wren and Martin	S. Chand and Co., New Delhi	1 <sup>st</sup>	2015
2	The Ace of Soft Skills	Ajai Chowdry, Bala Balchandran	Pearson Publication, Delhi	8 <sup>th</sup>	2013
3	Effective Technical Communication	M. Ashraf Rizvi	Mc Graw Hill Education, Chennai	Second Edition	2017
4	Business Communication	Hory Sankar Mukerjee	Oxford University Press, New Delhi, India	Second Edition	2013



  
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Course Details:

Class	F.Y. B. Tech., Sem.- II
Course Code and Course Title	2AEBS115, Applied Chemistry Laboratory
Prerequisite	---
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE	50

Course Outcomes :

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

2AEBS115_1	Determine the hardness acidity, alkalinity, chloride content using appropriate methods of titration for given sample of water.
2AEBS115_2	Estimate rate of corrosion in acidic and alkaline medium by depreciation of weight.
2AEBS115_3	Use pH meter to determine pH value of given solution and validate the findings with suitable optical method (photo-colorimeter) and graphical methods.
2AEBS115_4	Analyze coal sample, lubricants and aqueous solutions to get the percentage compositions using appropriate methods.
2AEBS115_5	Communicate effectively about laboratory work both orally and writing.

List of Experiments

1.	Determination of acidity of water sample. (Neutralization Titration)
2.	Determination of alkalinity of water sample. (Acid- Base Titration).
3.	Determination of chloride content of water by Mohr's method. (Precipitation Titration).
4.	Determination of total hardness of water sample by EDTA method.
5.	Determination of moisture, volatile and ash content in a given coal sample. (Proximate analysis)
6.	Preparation of Urea-formaldehyde resin.
7.	Determination of viscosity of lubricating oil.
8.	Estimation of zinc in brass solution (Displacement Titration)
9.	Estimation of copper in brass solution (Displacement Titration)

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**List of Experiments**

10.	Determination of rate of corrosion of aluminum in acidic and basic medium
11.	Determination of pH of sample solution by pH meter
12.	Determination of calorific value of fuel using Bomb calorimeter.
13.	Demonstration of Photo-colorimeter.

**Text Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	A Text Book of Engineering Chemistry	S. S. Dara	S. Chand & Co. Ltd., New Delhi.	11 <sup>th</sup>	2008
2	A Text Book of Engineering Chemistry	Shashi Chawala	Dhanpat Rai Publishing Co. New Delhi.	3 <sup>rd</sup>	2007

**Reference Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Materials Science and Engineering –	V. Raghvan	PHI Learning.	5 <sup>th</sup>	2006
2	Engineering Chemistry	Jain & Jain	Dhanpat Rai Publishing Co., New Delhi.	15 <sup>th</sup>	2010
3	Industrial Chemistry	B. K. Sharma	Goel publication (P) Ltd.	10 <sup>th</sup>	1999

  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- II
<b>Course Code and Course Title</b>	2AEES116, Programming for Problem Solving using C++
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	01/00/02
<b>Credits</b>	02
<b>Evaluation Scheme: ISE/ESE</b>	50/50

**Course Outcomes :**

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

2AEES116_1	Explain the concepts of object-oriented programming concepts using C++
2AEES116_2	Apply their knowledge and programming skills to solve various computing problems. Write a C++ program for the simple cases
2AEES116_3	Execute and debug the C++ Program for the simple cases for the syntax & logical error
2AEES116_4	Follow professional and ethical principles, and standards while writing the C++ codes
2AEES116_5	Recognize the need for programming language for solving complex problems related to Engineering

**Course Contents:**

<b>Unit 1</b>	<b>Computer Fundamentals and Basics of Programming</b> The meaning of algorithms, Flowcharts, Pseudo codes, Writing algorithms and drawing flowcharts for simple exercises, Memory concepts, C++ Program development environment.	<b>02</b>
<b>Unit 2</b>	<b>C++ Fundamentals</b> Importance of 'C++' Language, History, Structure of 'C++' Program, Sample 'C++' Program, Constants, variables and data types. Operators and expressions, Managing input / output operations, Control statements-Decision making, Case control & Looping Constructs.	<b>02</b>
<b>Unit 3</b>	<b>Array</b> The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays. Strings-Declaring and initializing character array, reading and writing string to/from terminal, arithmetic operations on characters, putting strings together, string handling functions, searching and sorting of Array.	<b>02</b>

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<b>Unit 4</b>	<b>Functions</b> Need of user defined functions, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, methods of parameter passing, Scope rule of functions, user defined and library functions.	<b>02</b>
<b>Unit 5</b>	<b>Structure &amp; Pointers</b> Need of Structure, Defining a structure, declaring and accessing structure variables, structure initialization, copying and comparing structure variables, array of structures, structures and functions, Unions, Enumerations, and typedef. Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointer expressions, Pointer arithmetic in c, pointers and arrays, pointer and character strings, pointer and structure.	<b>02</b>
<b>Unit 6</b>	<b>File Handling</b> Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access files, command line arguments, C++ preprocessor.	<b>02</b>

### List of Experiments

1.	Write an algorithm for a given problem statement and Draw a flowchart for a given problem.
2.	Implement a program using different data types and operators in C++.
3.	Implement a program using Dissension making system with Switch case.
4.	Implement a program to demonstrate looping constructs(while, for loops, do while and nested loops)
5.	Write a program to demonstrate one dimensional and two dimensional array.
6.	Implement a program to demonstrate String handling functions.
7.	Implement a program to demonstrate user defined functions.
8.	Write a program to demonstrate concept of recursion
9.	Implement a program to demonstrate the concept of structures in C++.

  
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**List of Experiments**

10.	Implement a program to demonstrate the concept of array of structures in C++.
11.	Write a program to demonstrate pointers in c and demonstrate pointers arithmetic in C++.
12.	Implement a program to demonstrate file handling.

**Text Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	C++ Programming for Beginners	Scott Anderson	-	-	2020
02	The C++ Programming Language	Bjarne Stroustrup	Pearson	4th	2022
03	C++ Programming in Easy Steps	Raman Jha Rasid Raza Ansari Dipankar Chowdury	Pearson	2 <sup>nd</sup>	2009
04	Programming in ANSI C++	E. Balguruswamy	Tata Mc-Graw Hill	4 <sup>th</sup>	2008



  
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**Course Details:**

<b>Class</b>	F.Y. B. Tech., Sem.- II
<b>Course Code and Course Title</b>	2AEES117, <b>Basic Electrical and Electronics Engineering</b>
<b>Prerequisite</b>	---
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	00/00/02
<b>Credits</b>	01
<b>Evaluation Scheme: ISE</b>	50

**Course Outcomes :**

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

2AEES117_1	<b>Identify</b> Electrical and Electronic components & equipment
2AEES117_2	<b>Interpret</b> the measurement of different electrical parameters of Electric circuits and Electronic circuits with appropriate measuring instruments
2AEES117_3	<b>Perform</b> different tests to study the characteristics of different Electrical & Electronic components
2AEES117_4	<b>Correlate</b> the observations and results of experiment with different laws and theorem
2AEES117_5	<b>Practice</b> safety precautions required for electrical engineering practices in Aircraft Applications

**List of Experiments**

1	Wiring Circuits
2	Kirchhoff's Voltage and Current Law
3	Series RLC circuit
4	Direct loading test on single phase transformer
5	Speed control of DC motor
6	Familiarization with Laboratory Instruments (Oscilloscope, Function Generator, Digital Multimeter, DC Power Supply) and electronics components (R, L, C, Diodes, Transistor, LED, Switches)
7	Verify V-I Characteristics of PN junction diode.
8	Design and implement adders and subtractors
9	Design and implement Multiplexer and Demultiplexer

  
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**List of Experiments**

10	Study of displacement measurement using LVDT.
11	Case Study of Airbus A 320 Electrical System using Demonstration Kit
12	Perform the Crimping Activity in a Bread Board using Crimping Tool
13	Demonstration of Cessna 152 Aircraft Electrical System



  
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