

# **II B.TECH III SEMESTER SYLLABUS**

**INTRODUCTION TO AEROSPACE ENGINEERING**

<b>III Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours / Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>A5AE04</b>	<b>PCC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		3	-	-	3	30	70	100
<b>COURSE OBJECTIVES:</b>								
The course should enable the students to:								
<ol style="list-style-type: none"> <li>1. Describe the History of aeronautical engineering.</li> <li>2. Apply the Basic aerodynamics</li> <li>3. Examine the Structures and materials</li> <li>4. Explain the Elements of airplane performance</li> <li>5. Explain the Space flight (Astronautics) dynamics</li> </ol>								
<b>UNIT-I</b>	<b>HISTORY OF FLIGHT- THE AEROSPACE ENVIRONMENT</b>						<b>Classes: 12</b>	
Balloons and dirigibles, heavier than air aircraft, commercial air transport, introduction of jet aircraft, helicopters, missiles, conquest of space, commercial use of space, exploring solar system and beyond. Earth's atmosphere, the temperature extremes of space, laws of gravitation, low earth orbit, microgravity, benefits of microgravity. The near-earth radiative environment. The magnetosphere. Environmental impact on spacecraft. Meteoroids and micrometeoroids, space debris. Planetary environments								
<b>UNIT-II</b>	<b>AERODYNAMICS AND FLIGHT VEHICLE PROPULSION</b>						<b>Classes: 13</b>	
Anatomy of the airplane, helicopter, launch vehicles and missiles, space vehicles. Static forces and moments on the vehicle. Understanding engineering models. Aerodynamics of wings and bodies. Generation of lift. Sources of drag. Force and moment coefficients, centre of pressure. Thrust for flight, the propeller, the jet engine.								
<b>UNIT-III</b>	<b>FLIGHT VEHICLE PERFORMANCE AND STABILITY</b>						<b>Classes: 12</b>	
Performance parameters. Performance in steady flight, cruise, climb, range, endurance; accelerated flight- symmetric manoeuvres, turns, sideslips, take off and landing. Flight vehicle stability- longitudinal, lateral and directional- static, dynamic; trim, control. Handling qualities of airplanes.								
<b>UNIT-IV</b>	<b>FUNDAMENTALS OF ROCKET PROPULSION</b>						<b>Classes: 10</b>	
Introduction to rocket propulsion-description, principle of operation, Rocket equation, fundamentals of solid propellant rockets-types of grain structures, Fundamentals of liquid propellant rockets-types of feed systems.								
<b>UNIT-V</b>	<b>SATELLITE SYSTEMS ENGINEERING- HUMAN SPACE EXPLORATION</b>						<b>Classes: 13</b>	
Satellite missions, an operational satellite system, elements of satellite, satellite subsystems. Satellite structures, mechanisms and materials. Power systems. Communication and telemetry. Thermal								

control. Attitude determination and control. Propulsion and station keeping. Space missions. Mission objectives. Case studies. Human space flight missions- goals, historical background. The Soviet and US missions. The Mercury, Gemini, Apollo (manned flight to the moon), Skylab, Apollo-Soyuz, Space Shuttle. International Space Station, extravehicular activity.

#### Text Books:

1. Newman, D., Interactive Aerospace Engineering and Design, (with software and reference material on CD), McGraw-Hill, 2002, ISBN 0-07-112254-0.
2. Anderson, J.D., Introduction to Flight, fifth edition, Tata McGraw-Hill, 2007, ISBN: 0-07-006082-
3. Sutton, G.P., et al., —Rocket Propulsion ElementsII, John Wiley & Sons Inc., New York
4. Martin J.L Turner, Rocket &space craft propulsion, Springers –oraxis publishing, 2001.

#### Reference Books:

1. Numerous references cited in Newman 's book.
2. Barnard, R. H. and Philpot, D.R., Aircraft Flight, 3rd edition, Pearson, 2004, ISBN: 81-297-0783- 7.
3. Hirst, M., The Air Transport System, Woodhead Publishing Ltd, Cambridge, England, 2008
4. Swatton, P.J., Flight Planning, Blackwell Publisher.
5. Mathur, M., and Sharma, R.P., —Gas Turbines and Jet and Rocket PropulsionII, Standard Publishers, New Delhi 1998.

#### Web References:

<https://www.grc.nasa.gov/www/k-12/airplane/index.html>

#### E-TextBooks:

[https://www.researchgate.net/publication/259576416\\_Fundamentals\\_of\\_Aerospace\\_Engineering](https://www.researchgate.net/publication/259576416_Fundamentals_of_Aerospace_Engineering)  
[http://www.adl.gatech.edu/extrovert/Ebooks/ebook\\_Intro.pdf](http://www.adl.gatech.edu/extrovert/Ebooks/ebook_Intro.pdf)

#### MOOC Course

[https://onlinecourses.nptel.ac.in/noc18\\_ae07/](https://onlinecourses.nptel.ac.in/noc18_ae07/)

#### COURSE OUTCOMES:

At the end of the course the student should be able to:

1. Compare the atmosphere conditions of different altitudes for spacecraft system
2. Analyze how lift, drag and thrust are generated and understand which components constitute them
3. Analyze the flight performance parameters with respective stability condition
4. Compare the working of solid and liquid propellant rockets
5. Distinguish the different systems used in a satellite mission

## MECHANICS OF SOLIDS

<b>III Semester:</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5AE05	PCC	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
<b>COURSE OBJECTIVES:</b>								
The course should enable the students to:								
<ol style="list-style-type: none"> <li>1. Apply the concept of stress and strain to analyze and design structural members</li> <li>2. Develop the shear force and bending moment diagrams for different beams subjected to various loads.</li> <li>3. Determine the bending stress and develop the shear stress distribution across various beam sections.</li> <li>4. Determine the principal stresses and deflection of beams.</li> <li>5. Design the circular shafts and analyze the thin cylinders.</li> </ol>								
<b>UNIT-I</b>	<b>SIMPLE STRESSES AND STRAINS</b>						<b>Classes: 12</b>	
<b>SIMPLE STRESSES AND STRAINS:</b> Elasticity and plasticity, Types of stresses and strains, Hooke's law stress, strain diagram for mild steel, Working stress, Factor of safety, Lateral strain, Poisson's ratio and volumetric strain, Elastic module and the relationship between them, Bars of varying section, composite bars, Temperature stresses. Strain energy, Resilience - Gradual, Sudden, Impact loading.								
<b>UNIT-II</b>	<b>SHEAR FORCE AND BENDING MOMENT</b>						<b>Classes: 11</b>	
<b>SHEAR FORCE AND BENDING MOMENT:</b> Definition of beam, Types of beams, Concept of shear force and bending moment, Relation between Shear Force and Bending Moment. and rate of loading at a section of a beam. Shear Force and Bending Moment diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads, Point of contra flexure.								
<b>UNIT-III</b>	<b>FLEXURAL STRESSES &amp; SHEAR STRESSES</b>						<b>Classes: 12</b>	
<b>FLEXURAL STRESSES:</b> Theory of simple bending, Assumptions, Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis, Determination bending stresses, section modulus of rectangular and circular sections (Solid and Hollow), I, T, and Channel sections								
<b>SHEAR STRESSES:</b> Derivation of formula, Shear stress distribution across various beams sections like rectangular, circular, I, T.								
<b>UNIT-IV</b>	<b>PRINCIPAL STRESSES AND STRAINS &amp; DEFLECTION OF BEAMS</b>						<b>Classes: 13</b>	
<b>PRINCIPAL STRESSES AND STRAINS:</b> Introduction - Stresses on an inclined section of a bar under axial loading - compound stresses - Normal and tangential stresses on an inclined plane for biaxial stresses - Two perpendicular normal stresses accompanied by a state of simple shear - Mohr's circle of stresses - Principle stresses and strains - Analytical and graphical solutions.								
<b>DEFLECTION OF BEAMS:</b> Bending into a circular arc slope, deflection and radius of curvature, Differential equation for the elastic line of a beam, Double integration and Macaulay's methods, Determination of slope and deflection for cantilever and simply supported beams subjected to point								

loads		
<b>UNIT-V</b>	<b>TORSION OF CIRCULAR SHAFTS &amp; THIN CYLINDERS</b>	<b>Classes: 12</b>
<p><b>TORSION OF CIRCULAR SHAFTS:</b> Theory of pure torsion - derivation of Torsion equations: <math>T/J = q/r = N/L</math> - Assumptions made in the theory of pure torsion - Torsional moment of resistance - Polar section modulus - Power transmitted by shafts</p> <p><b>THIN CYLINDERS:</b> Thin seamless cylindrical shells, Derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and volumetric strains, changes in dia, and volume of thin cylinders, Riveted boiler shells, Thin spherical shells.</p>		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Ramamrutham. S (2012), Strength of materials, 17<sup>th</sup> edition, Dhanpat Rai Publications, Engineering Mechanics/Timoshenko and D.H. Young, Mc Graw Hill Book Company New Delhi, India.</li> <li>2. Dr.Bansal R.K(2007), Strength of materials, 10<sup>th</sup> edition,Laxmi Publications,Hyderabad</li> <li>3. Timoshenko. S (2004), Strength of materials, 3<sup>rd</sup> edition, CBS Publishers, New Delhi, India.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Ryder G. H (2007), Strength of materials, 3<sup>rd</sup> edition, Macmillan, New Delhi, India.</li> <li>2. Bhavikathi S. S (2008), Strength of materials, 3<sup>rd</sup> edition, Vikas Publishing House, New Delhi, India</li> </ol>		
<b>Web References:</b>		
<ol style="list-style-type: none"> <li>1. <a href="http://nptel.ac.in/courses/112107146/">http://nptel.ac.in/courses/112107146/</a></li> <li>2. <a href="http://nptel.ac.in/courses/112107147/">http://nptel.ac.in/courses/112107147/</a></li> </ol>		
<b>E-Text Books:</b>		
<a href="http://www.engineering108.com/Data/Engineering/Mechanical/SM/Strength_Of_Materials_parts_I_andII-Timoshenko.pdf">http://www.engineering108.com/Data/Engineering/Mechanical/SM/Strength_Of_Materials_parts_I_andII-Timoshenko.pdf</a>		
<b>MOOC Course</b>		
<a href="https://www.class-central.com/tag/solid%20mechanics">https://www.class-central.com/tag/solid%20mechanics</a>		
<b>COURSE OUTCOMES:</b>		
At the end of the course the student should be able to:		
<ol style="list-style-type: none"> <li>1. Understand basic concepts of stress, strain and their relations based on linear elasticity and material behaviors due to axial loading will be discussed.</li> <li>2. Develop the shear force and bending moment diagrams for different beams subjected to various loads and find the maximum moment/shear and their locations.</li> <li>3. Determine the bending stress and develop the shear stress distribution across various beam sections.</li> <li>4. Determine the principal stresses and deflection of beams.</li> <li>5. Design the circular shafts and analyze the thin cylinders.</li> </ol>		

## MECHANICS OF FLUIDS

<b>III Semester:</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5AE06	PCC	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
<p><b>COURSE OBJECTIVES:</b> The objectives of the course are to enable the student:</p> <ol style="list-style-type: none"> <li>1. To understand the basic principles of fluid mechanics</li> <li>2. To identify various types of flows</li> <li>3. To understand concepts of flow measuring and calculate the energy losses</li> <li>4. To understand type of flow such as laminar and turbulent flows</li> <li>5. To understand the difference between compressible and incompressible flow</li> </ol>								
<b>UNIT-I</b>	<b>FLUID PROPERTIES AND FLUID STATICS</b>						<b>Classes: 12</b>	
Density, Specific weight, Specific gravity, viscosity, Vapour pressure, compressibility, Surface tension Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydro static law, Piezometer, Simple and differential manometers, pressure gauges, total pressure and center of pressure plane, vertical and inclined surfaces. Buoyancy and stability of floating bodies.								
<b>UNIT-II</b>	<b>FLUID KINEMATICS, FLUID DYNAMICS</b>						<b>Classes: 12</b>	
Stream line, path line, streak line, stream tube, classification of flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrotational flows, one, two and three dimensional flows, Continuity equation in 3D flow, stream function, velocity potential function. Surface and Body forces, Euler's and Bernoulli's equation derivation, Navier stokes equation (explanation only), Momentum equation - applications, Vortex Free and Forced. Forced vortex with free surface.								
<b>UNIT-III</b>	<b>SIMILITUDE AND FLOW MEASUREMENT, REYNOLDS EXPERIMENT</b>						<b>Classes: 13</b>	
Flow through venturimeter and orifice meter, flow through notches and weirs Viscometers hot weir anemometers, pitot tube flow through nozzles, Characteristics of real fluids. Darcy's equation, Minor losses - pipes in series, pipes in parallel, total energy line and hydraulic gradient line, numerical problems, Dimensional analysis								
<b>UNIT-IV</b>	<b>BOUNDARY LAYER CONCEPTS</b>						<b>Classes: 15</b>	
Flow through pipes-laminar & turbulent flows, Definition, thicknesses, characteristics along thin plate, laminar and turbulent layers (No Derivation) boundary layer in transition, separation of boundary layer submerged objects drag and lift, von-Karman momentum equation, shockwaves (explanation)								
<b>UNIT-V</b>	<b>FLOW OF COMPRESSIBLE FLUID</b>						<b>Classes: 12</b>	
Introduction, Thermodynamic relations, basic equations of compressible flow, Velocity of sound wave in a fluid for isothermal and adiabatic process, Mach number and its applications, Mac angle propagation of pressure waves and stagnation properties.								

**Text Books:**

1. P. N. Modi, S. M. Seth (2011), Hydraulics and fluid mechanics including hydraulic machines, 18<sup>th</sup> revised edition Standard Book House, India.
2. Yumus A. Cengel, John M. Cimbala (2010), Fluid Mechanics (SI Units), 2<sup>nd</sup> edition, Tata McGraw hill education (P) Ltd, New Delhi, India.

**Reference Books:**

1. R. K. Bansal (2011), A Textbook of Fluid Mechanics and Hydraulic Machines, 10<sup>th</sup> edition, Laxmi Publications, New Delhi, India.
2. Frank M. White (2011), Fluid Mechanics, 7<sup>th</sup> edition, Tata McGraw Hill, New Delhi, India.
3. John F. Dauglas (2005), Fluid Mechanics, 5<sup>th</sup> edition, Pearson Education Limited, New Delhi, India.
4. Mechanics of Fluids by pijush K Kundu B. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3<sup>rd</sup> Edition, 2014.

**Web References:**

<http://mechanicsoffluids.blogspot.com/2008/11/fluid-mechanics.html>  
<http://www.engineerblogs.net/course-categories/physics/fluid-mechanics/>

**E-Text Books:**

<http://varunkamboj.typepad.com/files/engineering-fluid-mechanics-1.pdf>

**MOOC Course**

[https://onlinecourses.nptel.ac.in/noc18\\_me47/announcements?force=true](https://onlinecourses.nptel.ac.in/noc18_me47/announcements?force=true)

**COURSE OUTCOMES:**

Student is able to

1. Determine the fluid properties for different types of fluids
2. Evaluate the flow depends upon it's flow property
3. Choose the appropriate notch for the real-time applications
4. Estimate the type of flow such as laminar and turbulent flows
5. Choose the type of flows such as compressible or in compressible to determine the effect of compressibility on flow properties

## ENGINEERING THERMODYNAMICS

<b>III Semester:</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
<b>A5AE07</b>	<b>PC</b>	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
<p><b>COURSE OBJECTIVES:</b>            The course should enable the students to:</p> <ol style="list-style-type: none"> <li>1. Analyze laws of thermodynamics.</li> <li>2. Analyze changes in entropy in various thermodynamic processes.</li> <li>3. Analyze the thermodynamic properties of pure substances undergoing various thermodynamic processes.</li> <li>4. Evaluate the thermodynamic properties of gases and mixture of gases.</li> </ol> <p>Realize the working of different power cycles</p>								
<b>UNIT-I</b>	<b>FIRST LAW OF THERMODYNAMICS</b>						<b>Classes: 13</b>	
<p><b>Basic Concepts:</b> Macroscopic and Microscopic viewpoints, Quasi static Process, various flow and non-flow process, energy in State and in Transition, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics, First law of Thermodynamics, PMM-I, Corollaries, First law applied to a Process, applied to a flow system.</p>								
<b>UNIT-II</b>	<b>SECOND LAW OF THERMODYNAMICS AND ENTROPY PRINCIPLES</b>						<b>Classes: 11</b>	
<p><b>LIMITATIONS OF THE FIRST LAW:</b> Thermal Reservoir, Heat Engine, Heat pump Refrigerator. Parameters of performance, Second Law of Thermodynamics-Kelvin Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clausius Inequality, Entropy, Principle of Entropy Increase, Elementary Treatment of the Third Law of Thermodynamics</p>								
<b>UNIT-III</b>	<b>AIR STANDARD CYCLES</b>						<b>Classes: 8</b>	
<p><b>POWER CYCLES:</b> Otto, Diesel, Dual Combustion cycles, Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis, comparison of Cycles.</p>								



<b>UNIT-IV</b>	<b>VAPOR POWER CYCLE</b>	<b>Classes: 11</b>
<b>PURE SUBSTANCES:</b> P-V-T surfaces, T-S and h-s diagrams, Mollier Charts, Phase transformations, Triple point at critical state properties during change of phase, Dryness Fraction. Various thermodynamic processes and energy transfer, Steam calorimetry. Simple Rankine cycle and Reheat		
<b>UNIT-V</b>	<b>BASICS OF JET PROPULSION AND HEAT TRANSFER</b>	<b>Classes: 9</b>
Basics of Jet propulsion: Brayton cycle for gas turbine engines and its actual process, P-V and T-S diagram and its performance characteristics-Thrust equation		
Basics of Heat transfer: conduction, convection and radiation basic concept and equations.		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Engineering Thermodynamics, P.K. Nag, 6<sup>th</sup> Edition, Mc Graw Hill Education.</li> <li>2. Thermodynamics an engineering approach, Yunus A. Cengel &amp; Michael A. Boles, 8<sup>th</sup> Edition, Mc Graw Hill Companies.</li> <li>3. Fundamentals of Thermodynamics, Richard E. Sonntag Claus Borgnakke, 7<sup>th</sup> Edition, Wiley</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Fundamentals of engineering thermodynamics, Rathakrishnan. E, 2<sup>nd</sup> Edition, Prentice hall of India Pvt Ltd., 2006.</li> <li>2. Thermodynamics, Arora.C.P, Tata Mc Graw Hill, New Delhi.</li> <li>3. Applied Thermodynamics, Onkar Singh, 3<sup>rd</sup> Edition, New Age, India</li> <li>4. Gas turbines , V Ganesan, 3<sup>rd</sup> Edition, Tata Mc Graw Hill, New Delhi</li> </ol>		
<b>Web References:</b>		
<ol style="list-style-type: none"> <li>1. <a href="http://nptel.ac.in/courses/112104113/">http://nptel.ac.in/courses/112104113/</a></li> <li>2. <a href="http://nptel.ac.in/courses/112105123/">http://nptel.ac.in/courses/112105123/</a></li> <li>3. <a href="https://www.udemy.com/fundamentals-of-engineering-thermodynamics/">https://www.udemy.com/fundamentals-of-engineering-thermodynamics/</a></li> </ol>		
<b>E-Text Books:</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.pdfdrive.net/engineering-thermodynamics-e18770201.html">https://www.pdfdrive.net/engineering-thermodynamics-e18770201.html</a></li> <li>2. <a href="https://www.pdfdrive.net/fundamentals-of-thermodynamics-e18762062.html">https://www.pdfdrive.net/fundamentals-of-thermodynamics-e18762062.html</a></li> <li>3. <a href="https://www.pdfdrive.net/thermodynamics-e15057935.html">https://www.pdfdrive.net/thermodynamics-e15057935.html</a></li> </ol>		
<b>MOOC Course</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a></li> <li>2. <a href="https://www.coursera.org/learn/thermodynamics-intro">https://www.coursera.org/learn/thermodynamics-intro</a></li> <li>3. <a href="https://swayam.gov.in/courses/4642-july-2018-engineering-thermodynamics">https://swayam.gov.in/courses/4642-july-2018-engineering-thermodynamics</a></li> </ol>		
<b>COURSE OUTCOMES:</b>		
Students should able to		
<ol style="list-style-type: none"> <li>1. Apply first law of thermodynamics to real time applications</li> <li>2. Evaluate the performance parameters of energy transfers</li> <li>3. Evaluate the properties of gases during phase changes</li> <li>4. Compare the process parameters in mixture of gases</li> <li>5. Distinguish the processes of various power cycles</li> </ol>		

## BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

III Semester								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5EE01	ESC	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
<b>COURSE OBJECTIVES:</b>								
<ol style="list-style-type: none"> <li>1. Describe basic fundamentals of Electric Circuits, their components and the mathematical tools used to represent and analyze Electrical circuits.</li> <li>2. Develop fundamentals, including Ohm's law, Kirchoff's laws and be able to solve for currents, voltages and power in complex circuits.</li> <li>3. Demonstrate to write and solve loop current and node voltage equations for arbitrary DC, AC networks including resistors, capacitors, inductors, dependent and independent sources.</li> <li>4. Extrapolate the concept of magnetic circuit, Faraday's laws and analyze the series and parallel magnetic circuits.</li> <li>5. Summarize various two port network parameters and their relations and develop the design and analysis of basic DC and AC circuits with network topologies.</li> </ol>								
<b>UNIT-I</b>	<b>ELECTRICAL CIRCUITS</b>						<b>Classes: 12</b>	
Basic definitions-Ohm's Law – Kirchoff's Laws – simple problems. types of elements, types of sources, resistive networks, inductive networks, capacitive networks, series & parallel circuits, star to delta and delta to star transformations.								
<b>UNIT-II</b>	<b>DC MACHINES</b>						<b>Classes: 12</b>	
Principle of Operation of DC Motor, types of DC motor, Losses and Torque equation, DC Generator construction and working Principle, EMF Equation, working principle and Construction of transformer.								
<b>UNIT-III</b>	<b>AC MACHINES &amp; INSTRUMENTS</b>						<b>Classes: 12</b>	
Principle of operation of 3-phase induction motor, slip and torque Equation, principle of operation of 3-phase Alternator. Basic principle of indicating instruments, permanent magnet moving coil and moving iron instruments.								
<b>UNIT-IV</b>	<b>SEMICONDUCTOR DEVICES</b>						<b>Classes: 12</b>	
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Rectifiers, Half wave, Full wave and bridge Rectifiers – filters capacitor, inductor-Voltage Regulation.								
<b>UNIT-V</b>	<b>TRANSISTOR</b>						<b>Classes: 12</b>	
Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Transistor Amplifier.								
<b>Text Books:</b>								
<ol style="list-style-type: none"> <li>1. Basic Electrical Engineering by <i>M.S.Naidu and S.Kamakshai</i> TMH</li> <li>2. Electronic Devices and circuits by <i>J.Millman, C.C.Halkias and Satyabrata Jit</i> 2ed.,</li> </ol>								
<b>Reference Books:</b>								

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, (1994).
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).
1. B. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3<sup>rd</sup> Edition, 2014.

**Web References:**

1. [https://www.electronics-tutorials.ws/diode/diode\\_3.html](https://www.electronics-tutorials.ws/diode/diode_3.html)
2. <https://www.youtube.com/watch?v=i8HG-n1e724>
3. [jntuh-elsdm.in/](http://jntuh-elsdm.in/)

**E-Text Books:**

S K Bhattacharya, Basic Electrical and Electronics Engineering, 2011, Pearson, Kindle Edition

**MOOC Course**

- <https://nptel.ac.in/courses/108108076/>  
<https://nptel.ac.in/courses/108102097/>

**COURSE OUTCOMES:**

Student should able to

- 1 Understand basic electrical concepts, including electric charge, current, electrical potential, electrical Power and energy.
- 2 Distinguish the relationship of voltage and current in resistors, capacitors, inductors, and mutual Inductors.
- 3 Differentiate circuits with ideal, independent, and controlled voltage and current sources and able to apply Kirchhoff's voltage and current laws to the analysis of electric circuits.
- 4 Apply concepts of electric network topology, nodes, branches, and loops to solve circuit problems, including the use of computer simulation.
- 5 Emphasize on basic laws and techniques to develop a working knowledge of the methods of analysis used in electric circuits.
- 6 Interpret to solve series and parallel magnetic circuits
- 7 Design various two port network parameters and relations between mutual and self inductances.

**MECHANICS OF SOLIDS AND FLUIDS LAB**

<b>III Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours / Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>A5AE08</b>	<b>PCC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		-	-	3	2	30	70	100
<b>COURSE OBJECTIVES:</b>								
<ol style="list-style-type: none"> <li>1. Analyze the behavior of the solid bodies subjected to various types of loading</li> <li>2. Apply knowledge of materials and structural elements to the analysis of simple structures</li> <li>3. Evaluate the problem identification, formulation and solution using a range of analytical methods.</li> <li>4. Analyze and interpret laboratory data relating to behavior of structures and the materials</li> <li>5. Develop the expectation and capacity to undertake lifelong learning.</li> <li>6. Determine the coefficient of discharge and coefficient of contraction for loss of head in a sudden contraction, orifice, venturimeter, small orifice, external mouthpiece by variable head method.</li> <li>7. Determine coefficient of discharge for flow through different notches</li> <li>8. Justify the Bernoulli equation by calculating the total head and also calculate the impact force on different types of vanes</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<b>MOS LAB</b>								
<ol style="list-style-type: none"> <li>1. Direct Tension Test</li> <li>2. Deflection test on Simple supported Beam &amp; Cantilever Beam</li> <li>3. Torsion Test</li> <li>4. Brinell hardness test</li> <li>5. Compression test on cube</li> <li>6. Test on springs</li> <li>7. Impact Strength Test</li> </ol>								
<b>MOF LAB</b>								
<ol style="list-style-type: none"> <li>1. Calibration of Venturi meter</li> <li>2. Calibration of Orifice meter</li> <li>3. Determination of Coefficient of discharge for a small orifice by a constant head method.</li> <li>4. Determination of Coefficient of discharge for an external mouthpiece by variable head method.</li> <li>5. Calibration of contracted Triangular Notch</li> <li>6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.</li> <li>7. Verification of Bernoulli's equation.</li> <li>8. Reynolds Experiment</li> </ol>								
Note: Total 10 experiments should be done. At least 4 from each lab.								
<b>Reference Books:</b>								
<ol style="list-style-type: none"> <li>1. R. K. Bansal (2011), A Textbook of Fluid Mechanics and Hydraulic Machines, 10th edition, Laxmi Publications, New Delhi, India.</li> <li>2. Ramamrutham. S (2012), Strength of materials, 17th edition, Dhanpat Rai Publications,</li> <li>3. Timoshenko and D.H. Young, Engineering Mechanics, Mc Graw Hill Book Company New Delhi, India</li> </ol>								

**Web References:**

<https://nptel.ac.in/courses/105104160/>

**COURSE OUTCOMES:**

The students should be able to:

1. Recognise the concept of one and two dimensional simple and compound stress and strain
2. Determine the torsion in circular members
3. Estimate impact load on materials under different loading conditions.
4. Determine stiffness of the linear springs.
5. Understand the properties of fluid along with pressure measurement techniques
6. Analyse flows through pipes and open channels.
7. Recognise the concept of laminar and turbulent flow

**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

<b>III Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours / Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>A5EE02</b>	<b>ESC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		-	-	3	2	30	70	100
<b>COURSE OBJECTIVES</b>								
<ol style="list-style-type: none"> <li>1. The theoretical concepts of KVL and KCL, Diode, Transistor are verified experimentally</li> <li>2. The performance of A.C and D.C machines are studied practically</li> <li>3. The efficiency and regulation of Transformer are determined experimentally</li> <li>4. The fundamentals of A.C. and D.C supply are studied practically.</li> <li>5. The characteristics of P-N junction diode, Zener diode, transistors and rectifiers.</li> <li>6. Working principles of CRO.</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<b>SECTION A: ELECTRICAL ENGINEERING:</b>								
<ol style="list-style-type: none"> <li>1. Verification of KCL and KVL.</li> <li>2. Magnetization characteristics of D.C. Shunt generator.</li> <li>3. Speed control of DC motor.</li> <li>4. Swinburne's Test on DC shunt machine.</li> <li>5. Brake test on DC shunt motor.</li> <li>6. OC and SC tests on Single-phase transformer.</li> <li>7. Brake test on 3-phase Induction motor.</li> <li>8. Regulation by an alternator by synchronous impedance method.</li> </ol>								
<b>SECTION B: ELECTRONICS ENGINEERING:</b>								
<ol style="list-style-type: none"> <li>1. PN Junction Diode Characteristics (Forward bias, Reverse bias)</li> <li>2. Transistor CE Characteristics (Input and Output)</li> <li>3. Study of CRO.</li> <li>4. Class A Power Amplifier</li> <li>5. Zener Diode Characteristics</li> <li>6. Transistor CE Characteristics</li> <li>7. Rectifier without Filters (Full wave &amp; Half wave)</li> <li>8. Rectifier with Filters (Full wave &amp; half wave).</li> </ol> <p><b>Note:</b> Total 10 experiments are to be conducted. (Six experiments from PART-A, Six experiments from PART-B)</p>								
<b>Reference Books:</b>								
<ol style="list-style-type: none"> <li>1. Basic Electrical Engineering by <i>M.S.Naidu and S.Kamakshaiah</i> TMH</li> <li>2. Electronic Devices and circuits by <i>J.Millman, C.C.Halkias and Satyabrata Jit</i> 2ed.,</li> </ol>								
<b>Web References:</b>								
<a href="https://nptel.ac.in/courses/108108076/">https://nptel.ac.in/courses/108108076/</a> <a href="https://nptel.ac.in/courses/108102097/">https://nptel.ac.in/courses/108102097/</a>								

### **COURSE OUTCOMES**

Student should able to

- 1 To analyze basic concepts to electric circuits
- 2 To apply electrical fundamentals to real time applications.
- 3 To apply electronics components to electronics circuits.
- 4 To create circuits containing basic electrical elements.

To apply electrical and electronics engineering concepts to real time applications

**COMPUTER AIDED AIRCRAFT MODELLING LAB**

<b>III Semester</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5AE09	ESC	-	-	3	2	30	70	100
<b>COURSE OBJECTIVES:</b>								
Students Should able to								
<ol style="list-style-type: none"> <li>1. Draw various machine components in drawing lab.</li> <li>2. Draw various individual components, sub-assemblies and main assemblies in drawing lab.</li> <li>3. Discuss the importance of design process and studying the different phases of designing process involved in the design.</li> <li>4. Understand the Integrated product development and principles of baseline design cost</li> <li>5. Understand the design of aircraft concepts.</li> </ol> Design various aircraft components by using Auto-Cad software								
<b>UNIT-I</b>								
Machine Drawing conventions Need for Drawings conventions – Introduction to ISI - conventions.								
<ol style="list-style-type: none"> <li>1 Conventional representation of material, common machine elements and parts such as screws, nuts, bolts, keys, gears and welding.</li> <li>2 Types of sections – Selection planes and drawing of section and auxiliary sectional views. Parts not usually sectioned.</li> </ol>								
<b>UNIT-II</b>								
Drawing of Machine Elements and simple parts. Section of views, additional views for the following machine elements and parts with every drawing proportions.								
<ol style="list-style-type: none"> <li>1 Popular forms of screw threads, bolts, set screws and bolted joints.</li> <li>2 Keys, cottered joint and knuckle joint</li> <li>3 Riveted joints for plates</li> <li>4 Shaft couplings - spigot and socket joint</li> </ol>								
<b>UNIT-III</b>								
Introduction to Autocad –Advantages, Features and merits over manual drawing.								
<ol style="list-style-type: none"> <li>1 Object snap commands – Function keys.</li> <li>2 Practice on Draw commands</li> <li>3 Practice on Modify commands</li> <li>4 Practice on View and other commands</li> <li>5 Practice on Simple excersies</li> </ol>								
<b>Reference Books:</b>								
K. L. Narayana, P. Kannaiah, Venkata Reddy, Machine Drawing, New Age publication.								
<b>Web References:</b>								
<a href="https://www.slideshare.net/umeshchikhale/assembly-and-details-machine-drawing-pdf">https://www.slideshare.net/umeshchikhale/assembly-and-details-machine-drawing-pdf</a>								
Note: 40% Course Work should be done on Drawing Board & 60% Course Work should be done by computer								



**COURSE OUTCOMES:**

1. Understand the importance of drawing and design process and phases involved in the design process.
2. Ability to draw various individual components, sub-assemblies and main assemblies in drawing lab.
3. Ability to draw various orthographic and isometric projections in drawing sheets.
4. Ability to develop and understand Basic Concepts of aircraft
5. Ability to draw various orthographic and isometric projections of an aircraft components by using auto-cad software.

## ENVIRONMENTAL STUDIES

<b>III Semester</b>								
Course Code:	Category	Hours / Week			Credits	Maximum Marks		
A5MC03	MC	L	T	P	C	CIE	SEE	Total
		2	0	0	0	0	30	70
<b>Contact Classes: 45</b>	<b>Tutorial Classes: 0</b>	<b>Practical Classes:--0</b>			<b>Total Classes: 45</b>			
<b>COURSE OBJECTIVES:</b>								
<b>The course should enable the students to:</b>								
<ol style="list-style-type: none"> <li>1. Understanding the importance of ecological balance for sustainable development.</li> <li>2. Understanding the impacts of developmental activities and mitigation measures.</li> <li>3. Understanding the environmental policies and regulations.</li> <li>4. Determine the Natural resources on which the structure of development is raised for sustainability of the society through equitable maintenance of natural resources.</li> <li>5. Illustrate about biodiversity that raises an appreciation and deeper understanding of species, ecosystems and also the interconnectedness of the living world and thereby avoids the mismanagement, misuse and destruction of biodiversity.</li> <li>6. Summarize a methodology for identification, assessment and quantification of global environmental issues in order to create awareness about the international conventions for mitigating global environmental problems.</li> <li>7. Sustainable development that aims to meet raising human needs of the present and future generations through preserving the environment.</li> <li>8. Outline green environmental issue provides an opportunity to overcome the current global environmental issues by implementing modern techniques like CDM, green building, green computing etc.</li> </ol>								
<b>UNIT-I</b>	<b>ECOSYSTEMS</b>						<b>Classes: 7</b>	
Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food web and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity.								
<b>UNIT-II</b>	<b>NATURAL RESOURCES &amp; MINERAL RESOURCES</b>						<b>Classes: 10</b>	
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.								
<b>UNIT-III</b>	<b>BIODIVERSITY AND BIOTIC RESOURCES</b>						<b>Classes: 08</b>	

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.		
<b>UNIT-IV</b>	<b>ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES</b>	<b>Classes: 10</b>
Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture,. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS).. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.		
<b>UNIT-V</b>	<b>ENVIRONMENTAL POLICY, LEGISLATION &amp; EIA</b>	<b>Classes: 10</b>
Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.		
<b>Text Books:</b>		
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.		
2. Environmental Studies by R. Rajagopalan, Oxford University Press.		
<b>Reference Books:</b>		
1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.		
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.		
3. Environmental Science by Daniel B. Botkin & Edward A.Keller, Wiley INDIA edition.		
4.Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications		
<b>Web references:</b>		
1. <a href="https://www.youtube.com/watch?v=M0mx8S05v60&amp;list=PLBlnK6fEyqRjMH3mWf6kwqiTbT798eAom">https://www.youtube.com/watch?v=M0mx8S05v60&amp;list=PLBlnK6fEyqRjMH3mWf6kwqiTbT798eAom</a>		
2. <a href="https://www.youtube.com/watch?v=CeD2L6KbtVM&amp;list=PL018B3BB2E6FE781D">https://www.youtube.com/watch?v=CeD2L6KbtVM&amp;list=PL018B3BB2E6FE781D</a>		
3. <a href="https://www.youtube.com/watch?v=CeD2L6KbtVM&amp;list=PL803563859BF7ED8C">https://www.youtube.com/watch?v=CeD2L6KbtVM&amp;list=PL803563859BF7ED8C</a>		

E -Text Books:

1. <http://www.cl.cam.ac.uk/teaching/1011/SysOnChip/socdam-notes1011.pdf>

2. <https://www.doc.ic.ac.uk/~wl/teachlocal/cuscomp/notes/cc11.pdf>

MOOCS Course:

[https://onlinecourses.nptel.ac.in/noc18\\_ee33/preview](https://onlinecourses.nptel.ac.in/noc18_ee33/preview)

[https://onlinecourses.nptel.ac.in/noc18\\_ee34/preview](https://onlinecourses.nptel.ac.in/noc18_ee34/preview)

**COURSE OUTCOMES:**

On Successful completion of this course, Students will be able to

1. Demonstrate an understanding of the Significance of environmental education.
2. Outline the context of environmentalism.
3. Comprehend the multidisciplinary nature of the course environmental Studies.
4. Illustrate the components of the environment and its interactions.
5. outline the causes, effects and management options for various environmental problems related to Air, Water and land.