ASSAM UNIVERSITY, SILCHAR

1ST YEAR TO ONWARD UG COURSE STRUCTURE & SYLLABUS

OF DEPARTMENT OF APPLIED SCIENCE & HUMANITIES

UNDER TRIGUNA SEN SCHOOL OF TECHNOLOGY

Semester-wise structure of curriculum

A. Definition of Credit:

A. definition of Credit:	
1 Hour Lecture (L) per week	1 Credit
1 Hour Tutorial (T) per week	1 Credit
2 HoursPractical/ Lab (L) per week	1 Credit

Semester-I

(First Year) Curriculum (Common for AE, CSE and ECE)

Sl. No	Type of Course	Course Code	Course Title	Hours per week			Credits	Remarks (adopted existing exam pattern)
				L	T	P		
1.	Basic Science Course	ASH 101	Engineering Physics	3	1	0	4	Theory paper
2.	Basic Science Course	ASH 102	Mathematics –I	3	1	0	4	Theory paper
3.	Humanities & Social Sciences including Management courses	ASH 103	English-I	1	0	2	2	Theory paper
4.	Basic Science Course	ASH 104	Engineering Physics Lab	0	0	4	2	Practical paper
5.	Engineering Science Course	ASH 105	Workshop/manufacturing Practices	1	0	4	3	Practical paper
6.	Engineering Science Course	ASH 106	Engineering Graphics & Design	1	0	4	3	Practical paper
				Total Credits			**18**	

Semester-II
(First Year) Curriculum

Sl. No	Type of Course	Course Code	Course Title	Hours per week			Credits	Remarks (adopted existing exam pattern)
				L	T	P		
1.	Basic Science Course	ASH 201	Engineering Chemistry	3	1	0	4	Theory paper
2.	Basic Science Course	ASH 202	Mathematics -II	3	1	0	4	Theory paper
3.	Engineering Science Course	ASH 203	Programming for problem Solving	3	0	0	3	Theory paper
4.	Engineering Science Course	ASH 204	Basic Electrical Engineering	3	1	0	4	Theory paper
5.	Humanities & Social Sciences including Management courses	ASH 205	English-II	1	0	2	2	Theory paper
6.	Basic Science Course	ASH 206	Engineering Chemistry Lab	0	0	4	2	Practical paper
7.	Engineering Science Course	ASH 207	Programming for problem Solving Lab	0	0	4	2	Practical paper
8.	Engineering Science Course	ASH 208	Basic Electrical Engineering Lab	0	0	2	1	Practical paper
				Total Credits			**22**	

Semester-III

(Second Year) Curriculum offered from ASH Dept

Sl. No	Type of Course	Course Code	Course Title	Hours per week			Credits	Remarks Theory paper
				L	T	P		
1.	Basic Science Course	ASH 301 A	Mathematics -III	2	0	0	2	CSE, ECE
		ASH 301 B	Mathematics –III	2	0	0	2	AE
2.	Humanities & Social Sciences including Management courses	ASH 302	Effective Technical Communication	3	0	0	3	All 3 Dept
3.	Engineering Science Course	ASH 303	Basic Electronics Engineering	3	1	0	4	AE
4.	Engineering Science Course	ASH 304	Engineering Mechanics	3	1	0	4	AE
5.	Engineering Science Course	ASH 305	Basic Electronics	2	0	0	2	ECE

Semester-IV

(Second Year) Curriculum offered from ASH Dept.

Sl. No	Type of Course	Course Code	Course Title	Hours per week			Credits	Remarks Theory paper
				L	T	P		
1.	Humanities & Social Sciences including Management courses	ASH 401	Management-I (Organizational Behaviour)	3	0	0	3	All 3 Dept
2.	Mandatory courses	ASH 402	Environmental Science	2	-	-	0 Non-credit	All 3 Dept

Semester-V

(Third Year) Curriculum from ASH Dept

Sl. No	Type of Course	Course Code	Course Title	Hours per week			Credits	Remarks Theory paper
				L	T	P		
1.	Basic Science Course	ASH 501	Mathematics-IV Numerical Analysis	2	0	0	2	CSE
2.	Humanities & Social Sciences including Management courses	ASH 502	Management II (Operations Research and Industrial Management)	3	0	0	3	AE & ECE
3.	Mandatory courses	ASH 503	Constitution of India	2	-	-	0 Non-credit	ALL 3 dept

Semester-VI

(Third Year) Curriculum

Sl. No	Type of Course	Course Code	Course Title	Hours per week			Credits	Remarks Theory paper
				L	T	P		
1.	OEC Open Elective – I (Humanities)	ASH 601	Understanding Culture and Society through Literature	3	0	0	3	ALL 3 dept

Annexure:

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SYLLABUS
Semester-I
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 101- Engineering Physics **ASH-104- Engineering Physics Lab**	**Engineering Physics (Theory & Lab.)** **Contents** (i) Theory (ii) Physics Laboratory				
Category of course: Basic Science Course		**3**	**1**	**4**	**6**
Course Outcomes: Technology is being increasingly based on the electronic and atomic level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels. At the end of the course the students will be able to learn the basics of physics and apply them to solve engineering problems.					

UNIT I:
Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Solving Newton's equations of motion in polar coordinates; Potential energy function; F = - Grad V; Conservative and non-conservative forces; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Application: Satellite manoeuvres; Harmonic oscillator; Damped harmonic motion; Forced oscillations and resonance;.

UNIT II:
Crystal structure: Seven systems of crystals, Bravais space lattice, crystal structure (bce, fee and sc) lattice dimensions, lattice planes, and miller indices and their significance, X-rays-absorption of X-rays diffraction, Bragg's law. Bragg's X-ray spectrometer.

UNIT III:
Wave particle duality, Uncertainty principle, Free-particle wave function and wave-packets, probability current, Expectation values, Schrodinger equation and its application to particle in a box and harmonic oscillator.

UNIT-IV:
Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT V:
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

Suggested Books

1. Engineering Mechanics, 2nd ed. — MK Harbola
2. Introduction to Mechanics — MK Verma
3. An Introduction to Mechanics — D Kleppner & R Kolenkow
4. Principles of Mechanics — JL Synge & BA Griffiths
5. Mechanics — JP Den Hartog
6. Introduction to Quantum Physics D. J. Griffiths,
7. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
8. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
9. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
10. Charks Kittle, Introduction to Solid State Physics, John Wiley & Sons

11. Chottopadhyay and Rakshit, Quantum Mechanics, Statistical Mechanics and Solid State Physics

ASH-104 -- Engineering Physics Lab

Physics Laboratory [L : 0; T:0 ; P : 4 (2 credits)]

Experiments from the following:

Introduction to Electromagnetic Theory
1. Magnetic field from Helmholtz coil
2. Measurement of Lorentz force in a vacuum tube.

Introduction to Mechanics
1. Coupled oscillators
2. Experiments on an air-track
3. Experiment on moment of inertia measurement
4. Experiments with gyroscope
5. Resonance phenomena in mechanical oscillators.

Quantum Mechanics for Engineers
1. Frank-Hertz experiment
2. Photoelectric effect experiment
3. Recording hydrogen atom Spectrum

Oscillations, waves and optics
1. Diffraction and interference experiments (from ordinary light or laser pointers)
2. Measurement of speed of light on a table top using modulation
3. Minimum deviation from a prism.

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SYLLABUS
Semester-I
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE: ASH 102	COURSE NAME: Mathematics-I (Calculus and Linear Algebra)	L	T	P	C
Category of course: Basisc Science Courses		3	1	0	4

PURPOSE: The purpose of this course is to introduce the concepts of Calculus and Linear Algebra and to give an overview about the wide scope of applications of the same to the different fields of engineering.

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

1. To introduce the idea of applying differential and integral calculus to notions of Curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
2. To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. To develop the tool of matrices to solve systems of linear equations arising in many engineering problems by different methods.
4. To familiarize the students with the concepts of vector spaces that is essential in most branches of engineering.

Course Outcomes:

At the end of the course the students should be able to

- 1. understand the basic knowledge of Calculus and its applications
- 2. be familiar with the concept of Matrices and solution of system of linear equations
- 3. be thorough with the concept of Linear Algebra and its applications in engineering

Module – 1: Calculus:

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Module – 2: Calculus:

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

Module – 3: Matrices:

Matrices, vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

Module – 4: Vector Spaces:

Vector Space, linear dependence and independence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank-nullity theorem, composition of linear maps, Matrix associated with a linear map.

Module – 5: Vector Spaces:

Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Text books/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

6. N.P. Bali and M. Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

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SYLLABUS
Semester-I
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE: ASH 103	COURSE NAME: English-I	L	T	P	C
Category of course: Humanities & Social Science including Management		**1**	**0**	**2**	**2**
Pre-requisites: Students should be able to understand the English used by the teachers.					

Detailed Contents

1. Vocabulary Building
   1.1 The concept of Word Formation
   1.2 Root words from foreign languages and their use in English
   1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
   1.4 Synonyms, antonyms, and standard abbreviations.
   1.5 Parts of Speech

2. Sentence Structure
   2.1 Interchange of Sentences
   2.2 Narration
   2.3 Voice change
   2.4 Proverbs & Idioms
   2.5 Framing Questions

3 Speaking Skill
   3.1 Classification of speech sounds
   3.2 vowels, pure vowels, diphthongs, consonants
   3.3 Pronunciation
   3.4 Stress, word-stress and sentence-stress
   3.5 Intonation, falling & rising tone

4 Writing Skill
   4.1 vocabulary extension
   4.2 word order and structure of words
   4.3 The fundamentals of grammar
   4.4 Use of phrases and clauses in sentences
   4.5 Importance of proper punctuation

Suggested Readings:

   (i) Practical English Usage. Michael Swan. OUP. 1995.
   (ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
   (iii)On Writing Well. William Zinsser. Harper Resource Book. 2001

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Undergraduate Degree courses

COURSE CODE: ASH 105	COURSE NAME: Workshop/Manufacturing Practices Lab.	L	T	P	C
Category of course: Engineering Science Courses		1	0	4	3

Course Outcomes:
- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Lectures & videos:

Detailed contents

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding, glass cutting
7. Metal casting
8. Welding (arc welding & gas welding), brazing

(ii) Workshop Practice:
1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical & Electronics
5. Welding shop (Arc welding + gas welding)
6. Casting
7. Smithy
8. Plastic moulding& Glass Cutting

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above

Suggested Text/Reference Books:
(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
(iii) Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
(v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

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SYLLABUS
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Undergraduate Degree courses

COURSE CODE: ASH 106	COURSE NAME: Engineering Graphics & Design	L	T	P	C
Category of course: Engineering Science Courses		1	0	4	3

Course Outcomes: The student will learn :

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

Traditional Engineering Graphics:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)

UNIT I: Introduction to Engineering Drawing Covering

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;.

UNIT II: Orthographic Projections Covering

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes.

UNIT III: Projections of Regular Solids Covering

those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT-IV: Sections and Sectional Views of Right Angular Solids Covering

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).

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Unit-V: Isometric Projections Covering,

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit-VI: Overview of Computer Graphics Covering

listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids].

Unit-VII: Customisation & CAD Drawing

consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Unit-VIII: Annotations, layering & other Functions Covering

applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

Unit-IX: Demonstration of a Simple Team Design Project that Illustrates

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Books

(i) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(ii) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
(iii) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(v) (Corresponding set of) CAD Software Theory and User Manuals

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SYLLABUS
Semester-II
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 201: Engineering Chemistry **ASH 206: Engineering Chemistry Lab**	**Engineering Chemistry (Theory & Lab.)** **Contents** (i) Chemistry-I (Concepts in chemistry for engineering) (ii) Chemistry Laboratory				
Category of course: Basic Science Course		**3**	**1**	**4**	**6**

Course Outcomes: The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

UNIT I:

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT II:

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

UNIT III:

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

UNIT-IV:

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

Unit-V:

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and

electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

Unit-VI:

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

Unit-VII:

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Suggested Text Books

(i) University chemistry, by B. H. Mahan
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(iv)Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(v) Physical Chemistry, by P. W. Atkins
(vi) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition

ASH 206: Engineering Chemistry Lab

Chemistry Laboratory [L : 0; T:0 ; P : 4 (2 credits)]

Experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg .

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SYLLABUS
Semester-II
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 202	Mathematics-II (Probability and Statistics)				
Category of course: Basic Science Course		3	1	0	4

PURPOSE: The purpose of this course is to familiarize the students to the fundamentals of Probability and Statistics.

Course Objectives:

1. To make the students familiar with the basics of probability theory.
2. To explain the use of continuous and bivariate probability distributions in all branches of engineering.
3. To develop the tools of basic statistics, applied statistics and small samples in connection with engineering purpose.

Course Outcome:

At the end of the course the students will be able to learn the basics of Probability and Statistics and apply them to solve engineering problems.

Module – I: Basic Probability:
Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Module – II: Continuous Probability Distributions:
Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.

Module – III: Bivariate Distributions:
Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

Module – IV: Basic Statistics:
Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

Module – V: Applied Statistics:
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Module – 6: Small Samples:
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text books/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

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SYLLABUS
Semester-II
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE: ASH 203: Programming for problem Solving ASH 207: Programming for problem Solving Lab	COURSE NAME: Programming for Problem Solving (Theory & Lab.)	L	T	P	C
Category of course: Engineering Science Courses		3	0	4	5

Course Outcomes: The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

UNIT I: Introduction to Programming

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.).

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

UNIT II:

Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops

UNIT III: Arrays

Arrays (1-D, 2-D), Character arrays and Strings.

UNIT IV: Basic Algorithms

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

UNIT V: Function

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference.

UNIT VI: Recursion

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT VII: Structure

Structures, Defining structures and Array of Structures

UNIT VIII: Pointers

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

UNIT IX:

File handling (only if time is available, otherwise should be done as part of the lab)

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ASH 207 Programming for problem Solving Lab

Laboratory - Programming for Problem Solving [L : 0; T:0 ; P : 4 (2credits)]

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

Suggested Text/ Reference Books
(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
(iii) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Annexure:

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DEPARTMENT OF APPLIED SCIENCE AND HUMANITIES
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SYLLABUS
Semester-II
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE: ASH 204: Basic Electrical Engineering ASH 208: Basic Electrical Engineering Lab	COURSE NAME: Basic Electrical Engineering (Theory & Lab.)	L	T	P	C
Category of course: Engineering Science Courses		3	1	2	5
Course Outcomes: ➢ To understand and analyze basic electric and magnetic circuits. ➢ To study the working principles of electrical machines and power converters. ➢ To introduce the components of low voltage electrical installations.					

UNIT I:
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT II:
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III:
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT IV:
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT V:
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

UNIT VI:
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

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ASH 208: Basic Electrical Engineering Lab

Basic Electrical Engineering Laboratory [L : 0; T:0 ; P : 2 (1 credit)]

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments–voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
- Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Suggested Text / Reference Books

(i) D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
(ii) D.C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
(iii) L.S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
(iv) E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
(v) V.D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

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SYLLABUS
Semester-II
(First Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE: ASH 205: English-II	COURSE NAME: English-II	L	T	P	C
Category of course: Humanities & Social Science including Management		1	0	2	2
Pre-requisites: Students should be able to understand the English used by the teachers.					

Detailed Contents

1 Comprehension & Composition
- 1.1 Common Errors
- 1.2 Techniques for writing precisely
- 1.3 Organizing principles of paragraphs in documents
- 1.4 Creating Coherence
- 1.5 Skimming and scanning

2 Speaking Skill
- 2.1 Basic techniques of conversation: how to begin, interrupt, hesitate and end
- 2.2 Talking about oneself, others; attending an interview; addressing an audience
- 2.3 Introducing yourself, Introducing Others
- 2.4 Describing events,
- 2.5 Using language in various contexts/situations

3 Writing Skill
- 3.1 Writing Short Passages
- 3.2 Writing Reports based on Visuals
- 3.3 Writing Short Argumentative Essays; Writing introduction and conclusion
- 3.4 Watch an Audio-Visual clip & respond
- 3.5 Giving instructions with clarity

4. Oral Communication
- 4.1 Initiating and closing conversations
- 4.2 Politeness expressions and their use
- 4.3 Giving opinions; giving feedback
- 4.4 Asking for clarification; Requests; Offers; Complaining & Dealing with complaints
- 4.5 Discussing advantages and disadvantages of a product

(This unit involves interactive practice sessions in Language Lab)
Listening Comprehension
Pronunciation, Intonation, Stress and Rhythm
Common Everyday Situations: Conversations and Dialogues
Communication at Workplace

Suggested Reading:
1. Jones, Daniel. English Pronouncing Dictionary. 17th Edn. CUP.
2. Marks, Jonathan. English Pronunciation in Use: Elementary. CUP, 2008.
3. K. Mohan and M. Raman, Effective English Communication, Tata McGraw Hill , 2000.
4. Wren and Martin, English Grammar and Compositions, S. Chand & Co. Ltd., 2001.
5. A. K. Mishra, Avoid Errors, L Bharathi Prakashan, 1998.

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SYLLABUS
Semester-III
(Second Year) Curriculum offered for CSE, ECE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 301 A	Mathematics-III (Differential Equations and Algebraic Structures)				
		2	0	0	2

PURPOSE: The purpose of this course is to introduce the concepts of Ordinary Differential Equations and Algebraic Structures and to give an overview about the wide scope of applications of the same to the different fields of technology.

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equations and different algebraic structures. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

1. The effective mathematical tools for the solutions of differential equations that model physical processes.
2. The tools of different algebraic structures that are used in the modelling of various engineering problems

Course Outcome:

At the end of the course the students should be able to

1. understand the basics of ordinary differential equations and their applications in engineering
2. be familiar with the concept of algebraic structures and their applications

Module – 1: First order ordinary differential equations

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module – 2: Ordinary differential equations of higher orders

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module – 3: Algebraic Structures

Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations- ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).

Text books/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
8. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.9. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

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SYLLABUS
Semester-III
(Second Year) Curriculum offered for AE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 301 B	Mathematics-III (Ordinary Differential Equation and Complex Variable)				
		2	0	0	2

PURPOSE: The purpose of this course is to introduce the concepts of Ordinary Differential Equations and Complex Variables and to give an overview about the wide scope of applications of the same to the different fields of technology.

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.
The students will learn:

- The effective mathematical tools for the solutions of differential equations that model physical processes.

2. The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems

Course Outcome:

At the end of the course the students should be able to

1. understand the basics of ordinary differential equations and their applications in engineering
2. be familiar with the concept of complex variable and its applications

Module – 1: First order ordinary differential equations
Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module – 2: Ordinary differential equations of higher orders
Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module – 3: Complex Variable – Differentiation and Integration
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Contour integrals, Taylor's series, zeros of analytic functions, singularities, Evaluation of definite integral involving sine and cosine.

Text books/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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SYLLABUS
Semester-III
(Second Year) Curriculum offered for AE, CSE and ECE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 302	Effective Technical Communication				
Category: Humanities & Social Science including Management		**3**	**0**	**0**	**3**
Pre-requisites: Students should be able to understand the English used by the teachers.					

Module – 1: Information Design and Development
Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Module – 2: Technical Writing, Grammar and Editing-
Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Module – 3: Self Development and Assessment
Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Module 4: Communication and Technical Writing-
Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Module 5: Ethics
Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Text/Reference Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

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SYLLABUS
Semester-III
(Second Year) Curriculum offered for AE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 303	Basic Electronics Engineering				
Category: Engineering Science Course		**3**	**1**	**0**	**4**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the principles of semiconductor devices and their applications.
2. Design an application using Operational amplifier.
3. Understand the working of timing circuits and oscillators.
4. Understand logic gates, flip flop as a building block of digital systems.
5. Learn the basics of Electronic communication system.

Unit – 1: Semiconductor Devices and Applications

Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator. Regulated power supply IC based on 78XX and 79XX series, Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frequency response and bandwidth.

Unit – 2: Operational amplifier and its applications

Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

Unit– 3: Timing Circuits and Oscillators

RC-timing circuits, IC 555 and its applications as astable and mono-stable multi-vibrators, positive feedback, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator.

Unit--4: Digital Electronics Fundamentals

Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using Kmap, Logic ICs, half and full adder/subtractor, multiplexers, de-multiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.

Unit– 5: Electronic Communication Systems

The elements of communication system, IEEE frequency spectrum,Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and block diagram of GSM system.

Text/Reference Books:

1. Floyd ," Electronic Devices" Pearson Education 9th edition, 2012.
2. R.P. Jain , "Modern Digital Electronics", Tata Mc Graw Hill, 3rd Edition, 2007.
3. Frenzel, "Communication Electronics: Principles and Applications", Tata Mc Graw Hill, 3rd Edition, 2001

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SYLLABUS
Semester-III
(Second Year) Curriculum offered for AE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 304	Engineering Mechanics				
Category: Engineering Science Course		**3**	**1**	**0**	**4**

Objective:
The objective of this Course is to provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters. A working knowledge of statics with emphasis on force equilibrium and free body diagrams. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems, and an understanding of the mechanical behavior of materials under various load conditions.

Unit – 1: Introduction to Engineering Mechanics:
Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of
Coplanar Systems and Spatial Systems; Static Indeterminacy

Unit – 2: Friction:
Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack

Unit– 3: Basic Structural Analysis:
Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.

Unit--4: Centroid and Centre of Gravity
Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertiaDefinition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

Unit– 5: Virtual Work and Energy Method
Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

Unit– 6: Review of particle dynamics
Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2^{nd} law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy.Impulse-momentum (linear, angular); Impact (Direct and oblique)

Unit– 7: Introduction to Kinetics of Rigid Bodies
Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation;

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Unit– 8: Mechanical Vibrations

Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums

Text/Reference Books:

1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall.
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, –Dynamics, 9th Ed, Tata McGraw Hill.
3. R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
4. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
5. Shanes and Rao (2006), Engineering Mechanics, Pearson Education,
6. Hibler and Gupta (2010),Engineering Mechanics (Statics, Dynamics) by Pearson Education
7. Reddy Vijaykumar K. and K. Suresh Kumar(2010), Singer's Engineering Mechanics
8. Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
9. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
10. Tayal A.K. (2010), Engineering Mechanics, Umesh Publications

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Triguna Sen School of Technology

SYLLABUS
Semester-III
(Second Year) Curriculum offered for ECE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 305	Basic Electronics				
Category: Engineering Science Course		**2**	**0**	**0**	**2**

Objective:
The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the devices, instruments and sensors applications.

Unit – 1: Diodes and Applications:
Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR) – Operation, Construction, Characteristics, Ratings, Applications;

Unit – 2: Transistor Characteristics:
Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs, Introduction to CMOS circuits

Unit– 3: Transistor Amplifiers and Oscillators:
Classification, Small Signal Amplifiers – Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion, AC Equivalent Circuit; Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers; Oscillators – Classification, RC Phase Shift, Wien Bridge, High Frequency LC and Non-Sinusoidal type Oscillators.

Unit--4: Operational Amplifiers and Applications
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 OpAmp, Characteristics of Ideal OpAmp, Concept of Virtual Ground.

Text/Reference Books:

1. David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
2. Santiram Kal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
3. Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
4. Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
5. R.T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version,Pearson

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SYLLABUS
Semester-IV
(Second Year) Curriculum (Common for AE, CSE and ECE)
Undergraduate Degree courses

COURSE CODE: ASH 401	COURSE NAME: Organizational Behaviour	L	T	P	C
Category of course: Humanities & Social Science including Management Courses		3	0	0	3

Objectives are:
The objective of the course is to orient the engineering students with the concepts and practical implications of Behavior, personality and attitude of individuals and groups in organization.
COURSE OUTCOMES
•The students will acquire the skills of understanding individual and group behavior, culture, attitude and personality.
•The students will gain the knowledge of organizational behavior.

Module – 1:
OrganisationalBehaviour- Concept and Emergence of OB Concept; Historical Background- Hawthorne Studies, Psychological foundations; Models of OrganisationalBehaviour, Challenges and Opportunities for Organisational Behavior; Ethics and OrganisationalBehaviour.

Module – 2:
Individual Behaviour: Personality, Learning, Values and Attitudes, Perception, Learning Behaviourist, cognitive and social learning; Stress at work. Management's assumptions about people- McGregor's Theory X and Theory Y;

Module – 3:
Motivation - Maslow's Need Hierarchy, Herzberg's Two Factors Theory, Vroom's Expectancy Theory; Theory of Intrinsic Motivation by Ken Thomas; Work –Designing for creating motivating Jobs.

Module – 4:
Inter-personal Behaviour: Interpersonal communication and Feedback, Feedback utilisation; Transactional Analysis (TA); Johari Window. Group Behaviour: Group Dynamics, Cohesiveness and Productivity; Group Decision Making; Organisational Politics.

Module – 5:
Leadership- Concept and Styles; Fielder's Contingency Model; Leadership Effectiveness; Sources, patterns, levels, and types of conflict; Traditional and modern approaches to conflict; Functional and dysfunctional conflicts; Resolution of conflict. Organisational change- resistance and management

Text books/References:

Text Books:

1. Robbins, Stephen P. and Timothy A. Judge: OrganisationalBehaviour. Prentice -Hall, New Delhi.
2. Aswathappa, K: OrganisationBehaviour. Himalaya Publishing House, New Delhi.

Reference books:

1. Singh, K: Organizational Behaviour: Text and Cases. Pearson.
2. Pareek, U. and Khanna, S: Understanding Organizational Behaviour. Oxford University Press.
3. Sharma, R. A: Organisational Theory and Behaviour. Tata McGraw -Hill Publishing Co. Ltd.
4. Sekaran, Uma: OrganisationalBehaviour: Text and Cases. Tata McGraw-Hill Publishing Co. Ltd.
5. Singh, B. P. and T. N. Chhabra: Organisation Theory and Behaviour. DhanpatRai and Co. P. Ltd., New Delhi; 2000.

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SYLLABUS
Semester-IV
(Second Year) Curriculum offered for AE, CSE and ECE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 402	Environmental Science				
Category: Mandatory non-credit courses		**2**	**0**	**0**	**0 (non-credit)**

We as human being are not an entity separate from the environment around us rather we are a constituent seamlessly integrated and co-exist with the environment around us. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa. Ancient wisdom drawn from Vedas about environment and its sustenance reflects these ethos. There is a direct application of this wisdom even in modern times. Idea of an activity based course on environment protection is to sensitize the students on the above issues through following two type of activities.

(a) Awareness Activities:

i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste
ii) Slogan making event
iii) Poster making event
iv) Cycle rally
v) Lectures from experts

(b) Actual Activities:

i) Plantation
ii) Gifting a tree to see its full growth
iii) Cleanliness drive
iv) Drive for segregation of waste
v) To live some big environmentalist for a week or so to understand his work
vi) To work in kitchen garden for mess
vii) To know about the different varieties of plants
viii) Shutting down the fans and ACs of the campus for an hour or so

Unit 1:
Multidisciplinary nature of environmental studies Definition, scope and importance need for public awareness.
Unit 2:
Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil

erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resoureces for sustainable lifestyles.

Unit 3:

Ecosystems • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of the following ecosystem: - a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4:

Biodiversity and its conservation • Introduction – Definition: genetic, species and ecosystem diversity. • Biogeographical classification of India • Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values • Biodiversity at global, National and local levels. • Inida as a mega-diversity nation • Hot-sports of biodiversity. • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. • Endangered and endemic species of India • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5:

Environmental Pollution Definition • Cause, effects and control measures of :- a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards • Solid waste Management : Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. • Pollution case studies. • Diaster management: floods, earthquake, cyclone and landslides.

Unit 6:

Social Issues and the Environment • From Unsustainable to Sustainable development • Urban problems related to energy • Water conservation, rain water harvesting, watershed management • Resettlement and rahabilitation of people; its problems and concerns. Case Studies • Environmental ethics: Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. • Wasteland reclamation. • Consumerism and waste products. • Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act • Issues involved in enforcement of environmental legislation. • Public awareness.

Text/Reference Books:

1. A Textbook of Environmental Studies, D K Asthana, S Chand Publishing
2. Fundamental Concepts in Environmental Studies, D. D. Mishra S Chand Publishing
3. Environmental, R.Rajagopalan, OUP India
4. Introduction to Environmental Engineering and Science, Gilbert M. Masters, Wendell P. Ela 3rd Edition Pearson
5. Principles of Environmental Science: Inquiry & Applications - Inquiry and Applications Cunningham William, Mcgrawhill

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SYLLABUS
Semester-V
(Third Year) Curriculum for CSE
Undergraduate Degree courses

COURSE CODE: ASH 501	COURSE NAME: Mathematics-IV (Numerical Analysis)	L	T	P	C
Category of course: Basics Science Courses		**2**	**0**	**0**	**2**

PURPOSE: The purpose of this course is to introduce the concepts of Numerical Methods and to give an overview about the wide scope of applications of the same to the different fields of technology.

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in Numerical Methods.
The students will learn:
1. The effective mathematical tools for the solutions of nonlinear equations and the methods of interpolation.
2. The tools of numerical differentiation and integration.

Course Outcomes:

At the end of the course the students should be able to
1. solve nonlinear equations and ordinary differential equations by numerical methods.
2. learn interpolation and solve several problems through numerical integration.

Module – 1: Solution of algebraic and transcendental equations
Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method.

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Module – 2: Finite differences and interpolation
Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae

Module – 3: Numerical Differentiation
Numerical Differentiation, Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations

Module – 4: Numerical Integration
Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Milne's and Adam's predicator-corrector methods.

Text books/References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S. S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.

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SYLLABUS
Semester-V
(Third Year) Curriculum for AE and ECE
Undergraduate Degree courses

COURSE CODE: ASH 502	COURSE NAME: Operations Research and Industrial Management	L	T	P	C
Category of course: Humanities & Social Science including Management Courses		3	0	0	3

Unit I:
System concepts, system approach, Linear programming problems, Mathematical formulation, Graphical solution, Simplex method; Degeneracy and Duality in linear programming;

Unit II:
Transportation problems, Assignment problems, Decision analysis.

Unit III:
Waiting line problems, Project Management by PERT/CPM; Inventory control.

Unit IV:
Mathematical models of physical systems. Modeling of systems and Computer Simulation.

Unit V:
Advanced Computer Programming Techniques: Integer Programming, Dynamic Programming

Textbooks:
1. L.C. Jhamb, Industrial Management, Vol.1, EPH
2. Sinha, Industrial Relations, Trade Unions & Labour Legislation, Pearson Education Asia
3. S.P. Robbins, Organizational Behaviour, Prentice Hall
4. S. N. Chary, Productions and Operations Management, TMH

References:
1. Phillip Kotler, Marketing Management, Prentice Hall/Pearson Education.
2. Joseph Monks, Productions and Operations Management, TMH

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SYLLABUS
Semester-IV
(Third Year) Curriculum offered for AE, CSE and ECE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 503	Constitution of India				
Category: Mandatory non-credit courses		**2**	**0**	**0**	**0 (non-credit)**

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world"

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

Suggested Books

ii. Madhav Khosla, The Indian Constitution, Oxford University Press. New Delhi, 2012.
iii. Brij Kishore Sharma, Introduction to the Indian Constitution, PHI, New Delhi, latest edition.

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SYLLABUS
Semester-VI
(Third Year) Curriculum offered for AE, CSE and ECE
Undergraduate Degree courses

COURSE CODE:	COURSE NAME:	L	T	P	C
ASH 601	Understanding Culture and Society through Literature				
Category: Open Elective courses		**3**	**0**	**0**	**3**

OBJECTIVE:
The ultimate aim of the teaching-learning process should not only be about acquiring skills necessary for one's "trade", but to acquire knowledge and become a better human being, as a means towards the end of creating a better society. Understanding a society, its people, their mind, prevalent traditions and culture is imperative in developing a holistic worldview, which is essential for a sustainable society. In this course we shall pick up literary works of various countries/ regions / societies (referred to as "traditions" hereafter); and as it has been quoted often by many that - "Literature is the mirror of the society" – to the extent that it has almost become a saying – we shall read these works and attempt to understand the respective traditions to which the works belong.

OUTCOME OF THE COURSE:
1 Awareness of various traditions.
2 Ability to not just understand the diversity found between various traditions but to celebrate them.
3 Strengthening of the analytical capability.
4 Improvement in language skills and ability of expressing complex ideas.

COURSE TOPICS:
Literary works of various traditions would be the primary study material in this course. Through these works we will attempt to understand various aspects of the society. The course may be divided into the following units.
1 Introduction
Knowledge tradition, what is Literature, Significance of studying literature, how to study society and culture through literature
2 Morality
Various literary pieces will be picked up that would help us to understand morality.
3 Dilemma
Various literary pieces will be picked up that would force us to think about situations where one is faced with a dilemma; where such ethical questions arise that differentiating between right and wrong becomes very difficult. This forces us to re-think our notions of right and wrong and helps us in understanding the various realities of life.
4 Gender
Various literary pieces will be picked up that questions the current notions of gender, and raises un-comfortable questions, challenging the status-quo, forcing us to think the real meaning of equality and emancipation.

READINGS:
Literary works – Will be provided by the teacher.
Author's Background, Historical and Social Background which are significant for a better understanding of the work – Will be provided by the teacher.
Any other significant study material as required for an overall understanding of the literary work.

OTHER SESSIONS:
The study of each literary piece would be divided into the following sessions.
Reading – The literary piece will be given to students beforehand and they are required to read it before coming to the class so that they are not totally unaware of the text. In the class the text will be read once again, where doubts if any will be cleared.
First Discussion – The reading will be followed by a discussion where the text will be analyzed in detail. The students will be encouraged to share their interpretation of the text.

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Presentation – Having read and analyzed the text by now, the students will present their analysis of the text in front of the class. The students will keep in mind the author's background and the socio-historical and cultural backgrounds while preparing this presentation.

Q&A Session – Each presentation will be followed by a Q&A session wherein the students will be encouraged to ask questions to their respective classmates regarding the presentation/ analysis initiating a second discussion on the text.

Second Discussion – Having made their presentation, and heard the presentations made by their classmates, the students would now have a fairly good idea of the various nuances of the text, making it a ripe moment to have the second detailed discussion on the text. Here the teacher may refer to those points which may have been missed by the students.

Submission of a report – Having faced questions from their classmates, and after having a second discussion on the text, the student would come across new ideas which will be incorporated into the analysis and submitted in the form of a report.