FACULTY OF ENGINEERING

Scheme of Instruction & Examination

and

Proposed Scheme and Syllabus

B.E. II Semester

of
Four Year Degree Programme

In
Group – B (Civil, ECE, EEE, EIE)

(With effect from the academic year 2018– 2019)

As approved in the faculty meeting held on ……. 2018

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad

…… 2018

PROPOSED SCHEME OF INSTRUCTION & EXAMINATION
B.E. – II SEMESTER
(Group-B) - Branches (CE, ECE, EEE & EIE)

S. No.	Course Code	Course Title	Scheme of Instructions				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hours/ Week	CIE	SEE	Duration in Hours	
Theory Courses										
1	**BSC101PH**	**Physics-I** (Mechanics for CE)/ (Waves & Optics for ECE, EEE & EIE)	3	1	-	4	30	70	3	4
2	**BSC104MT**	**Mathematics-II** (Differential Equations for CE)/ (Linear Algebra, Transform Calculus and Numerical Methods for ECE, EEE & EIE)	3	1	-	4	30	70	3	4
3	**ESC101EE**	**Basic Electrical Engineering**	3	1	-	4	30	70	3	4
4	**HSMC101EG**	**English**	2	-	-	-	30	70	3	2
Practical/ Laboratory Courses										
5	**BSC151PH**	**Physics Lab** (Mechanics & Mechanics of Solids for CE)/ (Waves & Optics and Introduction to Quantum Mechanics for ECE, EEE & EIE)	-	-	3	3	25	50	3	1.5
6	**ESC152EE**	**Basic Electrical Engineering Lab**	-	-	2	2	25	50	3	1
7	**ESC153CE**	**Engineering Graphics & Design** for CE)/ **Engineering Graphics** for ECE, EEE & EIE)	1	-	4	5	50	50	3	3
8	**HSMC154EG**	**English Lab**	-	-	2	2	25	50	3	1
		Total	**13**	**03**	**11**	**24**	**245**	**480**		**20.5**

BSC: Basic Science Course **ESC**: Engineering Science Course
L: Lectures **T**: Tutorials **Pr** : Practicals **Drg**: Drawing
CIE: Continuous Internal Evaluation **SEE:** Semester End Examination (Univ. Exam)
Note: 1) Each contact hour is a Clock Hour
2) The practical class can be of two and half hour (clock hours) duration as per the requirement of a particular laboratory.

Course Code	Course Title						Core / Elective
BSC101PH	**PHYSICS – I** (Mechanics) Civil Engineering						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
High-school education	3	1	0	0	**30**	**70**	4
Course Objectives **Course Outcomes**							

MODULE - 1: Scalars and Vectors (8 Lectures)

Transformation of scalars and vectors under Rotation transformation

Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates

MODULE - 2: Potential energy function (7 Lectures)

F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;

MODULE - 3: Non-inertial frames of reference (5 Lectures)

Rotating coordinate system: Five-term acceleration formula- Centripetal and Coriolisaccelerations; Applications: Weather systems, Foucault pendulum;

MODULE - 4: Simple harmonic Motion (6 Lectures)

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance

MODULE - 5: Rigid body (5 Lectures)

Definition and motion of a rigid body in the plane; Rotation in the plane;

Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples

MODULE - 6: Three Dimensional Rigid body motion (7 Lectures)

Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two- dimensional formulation fails.

Reference 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) Engineering Mechanics - Dynamics, 7thed. - JL Meriam
7) Mechanical Vibrations — JP Den Hartog
8) Theory of Vibrations with Applications — WT Thomson

Course Code	Course Title						Core / Elective
BSC101PH	**PHYSICS – I** (Waves & Optics) ECE, EEE & EIE						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	0	0	**30**	**70**	4
Course Objectives **Course Outcomes**							

MODULE - 1: Simple harmonic motion, damped and forced simple harmonic oscillator (7 Lectures)

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator

MODULE-2: Non-dispersive transverse and longitudinal waves in one dimension and introductionto dispersion (7 Lectures)

Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their eigenfrequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves. Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.

MODULE - 3: The propagation of light and geometric optics (10 Lectures)

Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evanescent wave. Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method

MODULE - 4: Wave optics (6 Lectures)

Huygens' principle, superposition of waves and interference of light by wavefront splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

MODULE - 5: Lasers (8 Lectures)

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers(ruby,Neodymium), dye lasers; Properties of laser beams: monochromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

Reference books:

1) Ian G. Main, Oscillations and waves in physics
2) H.J. Pain, The physics of vibrations and waves (iii) E. Hecht, Optics (iv) A. Ghatak, Optics (v) O. Svelto, Principles of Lasers

Course Code	Course Title						Core / Elective
BSC104MT	**MATHEMATICS – II (Differential Equations) (Civil Engineering)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	0	0	**30**	**70**	4
Course Objectives							
Course Outcomes							

Module 1: First order ordinary differential equations (6 lectures)

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 (8 hours)

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: Partial Differential Equations (First order) (6 lectures)

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Module-4: Partial Differential Equations (Higher order) (10 lectures)

Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary-value problems for various linear PDEs in various geometries.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. G.F. Simmons and S.G. Krantz, Differential Equations, Tata McGraw Hill, 2007.

7. S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.

8. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.

9. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.

10. Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010.

Course Code	Course Title						Core / Elective
BSC104MT	**MATHEMATICS – II (Linear Algebra, Transform Calculus and Numerical Methods) (ECE, EEE & EIE)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	0	0	**30**	**70**	4
Course Objectives							
Course Outcomes							

Module -1: Matrices (10 Lectures)

Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

Module -2: Numerical Methods-I (10 Lectures)

Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae. Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Module -3: Numerical Methods-II (10 Lectures)

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. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

Module -4: Transform Calculus (10 Lectures)

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method. Fourier transforms**.**

Text / References:

1. Poole, " Linear Algebra: A Modern Introduction", Brooks/Cole, 2005.
2. N.P. Bali and M. Goyal, " A text book of Engineering Mathematics" , Laxmi Publications, 2008.
3. B.S. Grewal, " Higher Engineering Mathematics" , Khanna Publishers, 2010.
4. V. Krishnamurthy, V. P. Mainra and J. L. Arora, " An introduction to Linear Algebra" , Affiliated East-West press, 2005

Course Code	Course Title						Core / Elective
ESC101EE	**BASIC ELECTRICAL ENGINEERING**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	0	0	0	**30**	**70**	3

Course Objectives

Course Outcomes

The student will learn

1. To understand and analyze basic electric and magnetic circuits
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low voltage electrical installations

Module - 1 : DC Circuits (8 hours)

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.

Module - 2: AC Circuits (8 hours)

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.

Module - 3: Transformers (6 hours)

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

Module - 4: Electrical Machines (8 hours)

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.

Module -5: Power Converters (6 hours)

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

Module -6: Electrical Installations (6 hours)

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.

Suggested Text / Reference Books

1. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
2. C. Kulshreshtha, " Basic Electrical Engineering", McGraw Hill, 2009. (iii)L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford
3. University Press, 2011.
4. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Course Code	Course Title						Core / Elective
HSMC101EG	**ENGLISH**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	2	0	0	0	**30**	**70**	2

Course Objectives

Course Outcomes

~~The student will acquire basic proficiency in English including reading and listening~~ comprehension, writing and speaking skills.

1.Vocabulary Building

The concept of Word Formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
Synonyms, antonyms, and standard abbreviations.

2. Basic Writing Skills

Sentence Structures
Use of phrases and clauses in sentences
Importance of proper punctuation Creating coherence
Organizing principles of paragraphs in documents
Techniques for writing precisely

3. Identifying Common Errors in Writing

Subject-verb agreement Noun-pronoun agreement
Misplaced modifiers
Articles Prepositions
Redundancies Clichés

4. Nature and Style of sensible Writing

Describing
Defining
Classifying
Providing examples or evidence

5. Writing introduction and conclusion

6. Writing Practices

Comprehension
Précis Writing
Essay Writing

7. Oral Communication

(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
- Interviews
- Formal Presentations

Suggested Readings:

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

(iv) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) *Communication Skills.* Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Code	Course Title						Core / Elective
BSC151PH	**PHYSICS LAB**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	0	0	0	3	**25**	**50**	1.5
Course Objectives **Course Outcomes**							

Course Code	Course Title						Core / Elective
ESC152EE	**BASIC ELECTRICAL ENGINEERING LAB**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	0	0	0	2	**25**	**50**	1

Course Objectives

- ✓ **Course Outcomes** Get an exposure to common electrical components and their ratings.
- ✓ Make electrical connections by wires of appropriate ratings.
- ✓ Understand the usage of common electrical measuring instruments.
- ✓ Understand the basic characteristics of transformers and electrical machines.
- ✓ Get an exposure to the working of power electronic converters.

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

List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. 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.
3. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).
4. Loading of a
    a. Loading of transformer: measurement of primary and secondary voltages and currents, and power.
5. 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.
6. 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.
7. Torque Speed Characteristic of separately excited dc motor.
8. 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
    a. induction machine driven at super- synchronous speed.
9. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
10. 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.

Course Code	Course Title						Core / Elective
ESC153CE	**ENGINEERING GRAPHICS AND DESIGN for CE ENGINEERING GRAPHICS for ECE, EEE, EIE**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	1	0	4	0	**50**	**50**	3

Course Objectives

Course Outcomes All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- ✓ to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- ✓ to prepare you to communicate effectively
- ✓ to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

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 modeling
- ✓ 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)

Module 1: 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;

Module 2: Orthographic Projections covering,
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

Module 3: 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.

Module 4: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)

Module 5: 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;

Module 6: 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];

Module 7: 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;

Module 8: 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;

Module 9: 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 Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers (Corresponding set of) CAD Software Theory and User Manuals

Course Code	Course Title						Core / Elective
HSMC154EG	**ENGLISH LAB**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	0	0	0	2	**25**	**50**	1
Course Objectives **Course Outcomes**							