PUNE VIDYARTHI GRIHA'S

COLLEGE OF ENGINEERING AND TECHNOLOGY, PUNE-9

(AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE)

DEPARTMENT OF APPLIED SCIENCE AND MATHEMATICS

CURRICULUM BOOK

FIRST YEAR ENGINEERING

(SEM I &II)

ACADEMIC YEAR: 2019-20

PUNE VIDYARTHI GRIHA'S

COLLEGE OF ENGINEERING AND TECHNOLOGY

VISION

TO ACHIEVE EXCELLENCE IN ENGINEERING EDUCATION

MISSION

- **To satisfy all stakeholders**
- **To develop ethical, highly motivated engineering professionals with good human values, requisite skills and competencies**
- **To adopt innovative teaching mechanisms**
- **To promote research culture**
- **To contribute to country's economic development**
- **To be responsive to changes in technology, socio-economic and environmental conditions**

FE Syllabus Structure of Savitribai Phule Pune University, Pune

TABLE -1 First Engineering _Structure for Semester-I

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credits			
		Theory	Practical	Tutorial	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
107001	Engineering Mathematics-I	03	--	01	30	70	25	--	--	125	03	--	01	04
107002/ 107009	Engineering Physics / Engineering Chemistry	04	02	--	30	70	--	25	--	125	04	01	--	05
102003	Systems in Mechanical Engineering	03	02	--	30	70	--	25	--	125	03	01	--	04
103004 / 104010	Basic Electrical Engineering / Basic Electronics Engineering	03	02	--	30	70	--	25	--	125	03	01	--	04
110005/ 101011	Programming and Problem Solving / Engineering Mechanics	03	02	--	30	70	--	25	--	125	03	01	--	04
111006	Workshop[@]	--	02	--	--	--	--	25	--	25	--	01	--	01
	Total	16	10	01	150	350	25	125	--	650	16	05	01	22
101007	Audit Course 1[&]	02	Environmental Studies-I											
Induction Program : 2 weeks at the beginning of semester-I and 1 week at the beginning of semester-II														

TABLE -2 First Engineering_ Structure for Semester-II

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credits			
		Theory	Practical	Tutorial	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
107008	Engineering Mathematics-II	04	--	01	30	70	25	--	--	125	04	--	01	05
107002/ 107009	Engineering Physics/ Engineering Chemistry	04	02	--	30	70	--	25	--	125	04	01	--	05
103004 / 104010	Basic Electrical Engineering / Basic Electronics Engineering	03	02	--	30	70	--	25	--	125	03	01	--	04
110005/ 101011	Programming and Problem Solving / Engineering Mechanics	03	02	--	30	70	--	25	--	125	03	01	--	04
102012	Engineering Graphics [Ω]	01	02	01	--	50	25		--	75	01	01		02
110013	Project Based Learning[§]	--	04	--	--	--	25	50	--	75	--	02	--	02
	Total	15	12	02	120	330	75	125	--	650	15	05	02	22
101014	Audit Course 2[&]	02	Environmental Studies-II											
107015		--	Physical Education-Exercise and Field Activities											

Engineering Mathematics-I Sem-I

Course Title:FE All Branches **Engineering Mathematics - I**		**Course Number:** 107001	
Year:FE(ALL) AC.YR 2019-20		**Semester: I**	
Type of Course	Basic		
Teaching Scheme:3 Hrs/Week		**Tutorials:** 1 Hr/Week	
Course Assessment Method Examples	**Direct methods**	InsemExamination: 30Marks	Theory Examination: 70 Marks
		Term-work 25 Marks	Practical/Oral: ----
	Indirect Methods	Tutorials,Assignments, Test, MCQs	
Course Prerequisites	Differentiation, Integration, Maxima and Minima, Determinants and Matrices		
Course Objectives	To make the students familiarize with concepts and techniques in Calculus, Fourier series and Matrices. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.		
Course Outcomes			
C101.1	Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.		
C101.2	the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.		
C101.3	to deal with derivative of functions of several variables that are essential in various branches of Engineering.		
C101.4	to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.		
C101.5	the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems		
Course Contents			
Unit-I	**Differential Calculus: (08 Hrs.)**		
	Rolle's Theorem, Mean Value Theorems, Taylor's Series and Maclaurin's Series, Expansion of functions using standard expansions, Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits and Applications.		
Unit-II	**Fourier Series (08 Hrs.)**		
	Definition, Dirichlet's conditions, Full range Fourier series, Half range Fourier series, Harmonic analysis, Parseval's identity and Applications to problems in Engineerin		

Unit-III	**Partial Differentiation (08Hrs.)**		
	Introduction to functions of several variables, Partial Derivatives, Euler's Theorem on Homogeneous functions, Partial derivative of Composite Function, Total Derivative, Change of Independent variables		
Unit-IV	**Applications of Partial Differentiation (08 Hrs.)**		
	Jacobian and its applications, Errors and Approximations, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers		
Unit- V	**Linear Algebra-Matrices, System of Linear Equations (08 Hrs.)**		
	Rank of a Matrix, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Application to problems in Engineering.		
Unit-VI	**Linear Algebra-Eigen Values and Eigen Vectors, Diagonaliztion (08 Hrs.)**		
	Eigen Values and Eigen Vectors, Cayley Hamilton theorem, Diagonaliztion of a matrix, Reduction of Quadratic forms to Canonical form by Linear and Orthogonal transformations.		
Text Books	**Author**	**Title of Book**	**Publication & Edition**
T1	B. V. Ramana	Higher Engineering Mathematics	Tata McGraw Hill
T2	B. S. Grewal	Higher Engineering Mathematics	Khanna Publication, Delhi
Reference Books			
R1	P.N.Wartikar	Applied Mathematics (Volumes I& II)	Pune VidyarthiGrihaPrakashan ,Pune
R2	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley Eastern Ltd.
R3	M. D. Greenberg	Advanced Engineering Mathematics	Pearson Education
R4	Peter V. O'Neil	Advanced Engineering Mathematics	Thomson Learning
R5	Addison-Wesley, Pearson	Thomas' Calculus	Addison-Wesley, Pearson
R6	Ron Larson, David C. Falvo	Linear Algebra –An Introduction,	Cenage Learning, Indian edition
Self-Learning Material	Handouts related to important formulas based on algebra ,trigonometric functions ,identities are provided into the(Pearson Educationinitial lectures.		
Contents beyond Syllabus	❖ Students are encouraged to do in home assignments under the guidance of faculty. ❖ Special classes for students who are below average are arranged after the class hours.		
Additional Experiments (If any)	NIL		

Bridging Courses	Before the commencement of regular classes ,respective teachers conducts 20 minutes session on everyday basis for the first 15 days which focuses on class 12level basic maths.
Assignments	
Assignment No.1 to 6	Numericals on each units.
Tutorials	1. Numericals on Unit I
	2. Numericals on Unit I
	3. Numericals on Unit II
	4. Numericals on Unit II
	5. Numericals on Unit III
	6. Numericals on Unit IV

SYSTEMS IN MECHANICAL ENGINEERING Sem-I

Course Title: Systems in Mechanical Engineering		**Course Number: 2019 COURSE**	**Course Code: 102003**
Year: FE 2019-20		**Semester: I**	
Designation of Course		Professional Core	
Teaching Scheme: 3 Hrs/Week		**Practical:** 2 Hrs/Week	
Course Assessment Methods	**External**	In-SemExamination (30 marks)	End Semester Examination (70 Marks)
		PR (25 Marks)	
	Internal	Class Tests	Assignments
Prerequisites	Basic terms like heat, work and energy etc		
Course Objectives			
1	To identify the sources of energy and their conversions		
2	To explain the basic concept of engineering thermodynamics and its application		
3	To understanding the specifications of vehicles		
4	To get acquainted with vehicle systems		
5	To introduce manufacturing processes applying proper method to produce components		
6	To be able to select and compare domestic appliances		
Course Outcomes			
CO1	Describe and compare the conversion of energy from renewable and non-renewable energy sources		
CO2	Explain basic laws of thermodynamics, heat transfer and their applications		
CO3	List down the types of road vehicles and their specifications		
CO4	Illustrate various basic parts and transmission system of a road vehicle		
CO5	Discuss several manufacturing processes and identify the suitable process		
CO6	Explain various types of mechanism and its application		
Course Contents			
Unit-I			
Introduction of energy sources & its conversion (6 Hrs.)	**Energy sources**: Thermal energy, Hydropower energy, Nuclear energy, Solar energy, Geothermal energy, Wind energy, Hydrogen energy, Biomass energy and Tidal energy. Grades of Energy. (*Numerical on efficiency calculation of thermal power plant*) **Energy conversion devices**: Introduction of pump, compressor, turbines, wind mills etc (*Simple numerical on power and efficiency calculations)*		

Assignment:	Energy sources (Minimum one assignment on Conventional and one on Non-conventional sources)
Experiment:	Demonstration of energy conversion devices
Unit-II	
Introduction to Thermal Engineering (06Hrs)	Laws of thermodynamics, heat engine, heat pump, refrigerator *(simple numerical)* Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. *(Simple numerical)* Two stroke and Four stroke engines (Petrol, Diesel and CNG engines). Steam generators
Assignment:	Course Teachers have to decide assignment if necessary as per SPPU syllabus
Experiment:	-
Unit-III	
Vehicles and their Specifications (04 Hrs)	Classification of automobile. Vehicle specifications of two/three wheeler, light motor vehicles, trucks, buses and multi-axle vehicles. Engine components (Introduction). Study of engine specifications, comparison of specifications of vehicles. Introduction of Electric and Hybrid Vehicles. Cost analysis of the Vehicle.
Assignment	Vehicle specifications and systems in passenger car
Experiment:	-
Unit-IV	
Vehicle systems (08 Hrs)	Introduction of chassis layouts, steering system, suspension system, braking system, cooling system and fuel injection system and fuel supply system. Study of Electric and Hybrid Vehicle systems. Study of power transmission system, clutch, gear box (Simple Numerical), propeller shaft, universal joint, differential gearbox and axles. Vehicle active and passive safety arrangements: seat, seat belts, airbags and antilock brake system.
Assignment:	Electric vehicle specifications and its systems
Experiment:	1.Demonstration of power train system in the vehicle 2.Demonstration of vehicle systems (automobile chassis, steering system, suspension system, braking system - Any Two)
Unit- V	
Introduction to Manufacturing (06 Hrs)	**Conventional Manufacturing Processes:** Casting, Forging, Metal forming (Drawing, Extrusion, etc.), Sheet metal working, Metal joining, etc. Metal cutting processes and machining operations- Turning, Milling and Drilling, etc. Micromachining. Additive manufacturing and 3D Printing. Reconfigurable manufacturing system and IOT, Basic CNC programming**:** Concept of Computer Numerical Controlled machines
Assignment:	Course Teachers have to decide assignment if necessary as per SPPU syllabus

Experiment:	1.Demonstration of additive manufacturing / rapid prototyping techniques 2.Demonstration of CNC
Unit-VI	
Engineering Mechanisms and their application in Domestic Appliances (6Hrs.)	**Introduction to Basic mechanisms and equipment**: Pumps, blowers, compressors, springs, gears, Belt-Pulley, Chain-Sprocket, valves, levers, etc. Introduction to terms: Specifications, Input, output, efficiency, etc. **Applications of**: Compressors - Refrigerator, Water cooler, Split AC unit; Pumps - Water pump for overhead tanks, Water filter/Purifier units; Blower - Vacuum cleaner, Kitchen Chimney; Motor - Fans, Exhaust fans, Washing machines; Springs - Door closure, door locks, etc.; Gears - Wall clocks, watches, Printers, etc.; Application of Belt-Pulley/Chain-Sprocket - Photocopier, bicycle, etc.; Valves - Water tap, etc.; Application of levers - Door latch, Brake pedals, etc.; Electric/Solar energy - Geyser, Water heater, Electric iron, etc. (simple numerical on efficiency calculation)
Assignment:	Domestic appliances viz. refrigerator, air-conditioner, washing machine, cold storage
Experiment:	-

Text Books	**Author**	**Title of Book**	**Publication**
T1	Nag, P. K.	Engineering Thermodynamics	Tata McGraw
T2	Moran, M. J., Shapiro, H. N., Boettner, D. D., and Bailey, M	Fundamentals of Engineering Thermodynamics	Wiley
T3	Chaudhari and Hajra	Elements of Workshop Technology Volume I and II	Media Promoters and Publishers, Mumbai
T4	Rajput, R.K	Basic Mechanical Engineering	Laxmi Publications Pvt. Ltd.
Reference Books			
R1	Khan, B. H	Non-Conventional Energy Sources	Tata McGraw-Hill
R2	Groover,Mikell P.	Fundamentals of Modern Manufacturing: Materials, Processes, and Systems	Prentice Hall, USA
R3	Norton, Robert L.	Kinematics and Dynamics of Machinery	Tata McGrawHill

R4	Ganeshan, V.	Internal Combustion Engines	McGraw Hill
R5	Anderson, Curtis Darrel and Anderson,Judy	Electric and Hybrid Cars: A History	McFarland
R6	Khurmi, R.S. ,and Gupta, J. K.	A Textbook of Thermal Engineering	S. Chand & Sons
Self-Learning Facilities, Web Resources, Research papers for reference	Video Lecture on Thermodynamics, Heat transfer and Manufacturing Processes from IIT		
Contents beyond Syllabus	Presentation of Different types of boiler working, manufacturing processes		
Additional Experiments	-		
Bridging Courses	-		
Presentations	• Unit wise presentation of subtopics to be displayed on projector • Videos on working of Pump, IC engine, Boiler and Manufacturing Processes • Images of some Basic mechanisms and equipment		

Workshop Sem-I

Course Title: Workshop Practice		**Course Number: 2019 COURSE**	**Course Code: 111006**
Year: FE 2019-20		**Semester: I**	
Designation of Course		Professional Core	
Teaching Scheme:Nil		**Practical:** 2 Hrs/Week	
Course Assessment Methods	**External**		
		PR (25 Marks)	----
	Internal	---	--
Prerequisites	Basic terms like heat, work and energy etc		

Guidelines for Laboratory Conduction

i. 1st on importance of workshop practical and shop floor safety norms
ii. 2nd to 6th Sessions are about demonstration of machine tools (Any 4)
iii. 7th to 9th on making utility job (Any 2)
iv. 10th& 11th session on preparation of workshop layout and safety norms.

Course Objectives	
1	To understand the construction and working of machine tools and functions of itsparts.
2	To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes.
3	To understand workshop layout and safety norms.

Course Outcomes	
CO1	Familiar with safety norms to prevent any mishap in workshop
CO2	Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job
CO3	Able to understand the construction, working and functions of machine tools and their parts
CO4	Able to know simple operations (Turning and Facing) on a centre lathe

Course Contents	
Experiment:1	Mandatory briefing on shop-floor safety
Experiment:2	Demonstration and working of centre lathe

Experiment:3	Demonstration of Lathe operations:		
Experiment:4	Demonstration of Drilling machine		
Experiment:5	Demonstration on Milling machine		
Experiment:6	Demonstration of Shaper/Grinding machine (Any one)		
Experiment:7	Term work includes one job of Carpentry		
Experiment:8	Term work to include one job involving fitting		
Experiment:9	Term work to include one utility job preferably using sheet metal		
Experiment:10	Prepare a Layout of Workshop		
Experiment:11	Collection of information about safety norms		
Text Books	**Author**	**Title of Book**	**Publication**
T1	John, K. C., (2010)	Mechanical Workshop Practice	Prentice Hall Publication, NewDelhi
T3	Chaudhari and Hajra	Elements of Workshop Technology Volume I and II	Media Promoters and Publishers, Mumbai
Self-Learning Facilities, Web Resources, Research papers for reference	Basic Mechanisms and Machine Elements		
Contents beyond Syllabus	Radial Drilling Machine/ Manufacture of Drill bits		
Additional Experiments	-----		
Bridging Courses	------		
Presentations	• Images of some Basic mechanisms and equipment		

Engineering Physics Sem-I/II

Course Title: Engg. Physics		**Course Number: 2/9**	**Course Code:** 107002
Year: 2019-20		**Semester: 1&2**	
Designation of Course		Professional Core	
Teaching Scheme: 4 Hrs/Week		**Tutorial:**	
Course Assessment Methods	**Direct methods-External**	In-semester Examination: 30 Marks	End Semester Examination: 70Marks
			Practical/Oral/Term Work
	Direct methods: Internal	Assignments, Presentations	
Prerequisites			
Course Objectives			
1	To teach students basic concepts and principles of physics, relate them to laboratory experiments and their applications		
2	In addition to all above, To provide the platform to the students to organise and participate in various events and basic science and Maths through "Science Forum". To instigate the "environmental concern" in a student so that he could be an innovator or inventor of tomorrow through Avery Dennison Scholarship Program.		
Course Outcomes			
On completion of the course, learner will be able to:			
C102.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications		
C102.2	Learn basics of lasers and optical fibers and their use in some applications.		
C102.3	Understand concepts and principles in quantum mechanics. Relate them to some applications.		
C102.4	Understand theory of semiconductors and their applications in some semiconductor devices.		
C102.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.		
C102.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.		
Course Contents			
Unit-I	. **Wave Optics**		
	Interference: - • Introduction to electromagnetic waves and electromagnetic spectrum • Interference in thin film of uniform thickness (with derivation) • Interference in thin film wedge shape (qualitative) • Applications of interference: testing optical flatness, anti-reflection coating **Diffraction : -** • Diffraction of light • Diffraction at a single slit, conditions for principal maxima and minima		

<table>
<tr><td></td><td colspan="2">diffraction pattern
• Diffraction grating, conditions for principal maxima and minima starting from resultant amplitude equations, diffraction pattern
• Rayleigh's criterion for resolution, resolving power of telescope and grating
Polarization: -
• Polarization of light, Malus law
• Double refraction, Huygen's theory of double refraction
• Applications of polarization: LCD</td></tr>
<tr><td></td><td colspan="2">Practical/Tutorial</td></tr>
<tr><td rowspan="4"></td><td>Interference</td><td>• Newton's Rings (Determination of wavelength/radius of curvature /refractive index of a liquid).</td></tr>
<tr><td>Diffraction</td><td>• Determination of wavelength by using Plane diffraction grating.</td></tr>
<tr><td rowspan="2">Polarisation</td><td>• Brewster's law</td></tr>
<tr><td>• Double refraction(Determination of refractive indices of double refracting crystal)</td></tr>
<tr><td>Unit-II</td><td colspan="2">Laser and Optic Fibre</td></tr>
<tr><td></td><td colspan="2">Laser - Basics of laser and its mechanism, characteristics of laser - Semiconductor laser:
Single Hetro-junction laser - Gas laser: CO2 laser - Applications of lasers: Holography, IT, industrial, medical
Optic Fiber - Introduction, parameters: Acceptance Angle, Acceptance Cone, Numerical
Aperture - Types of optical fiber- step index and graded index –
Attenuation and reasons for losses in optic fibers (qualitative) –
Communication system: basic building blocks Advantages of optical fiber communication over conventional methods.</td></tr>
<tr><td></td><td colspan="2">Practical/Tutorial</td></tr>
<tr><td></td><td>Laser</td><td>• Laser based experiment
(determination of no. of lines /cm of grating)
• Laser divergence</td></tr>
<tr><td>Unit-III</td><td colspan="2">Quantum Mechanics</td></tr>
<tr><td></td><td colspan="2">De-Broglie hypothesis - Concept of phase velocity and group velocity (qualitative) - Heisenberg Uncertainty Principle - Wave-function and its physical significance - Schrodinger's equations: time independent and time dependent - Application of Schrodinger's time independent wave equation - Particle enclosed in infinitely deep potential well (Particle in RigidBox) - Particle in Finite potential well (Particle in Non Rigid box) (qualitative) - Tunneling effect, Tunneling effect examples (principle only): Alpha Decay, Scanning Tunneling Microscope, Tunnel diode - Introduction to quantum computing</td></tr>
<tr><td></td><td colspan="2">Practical/Tutorial : No practical for this Unit</td></tr>
<tr><td></td><td colspan="2"></td></tr>
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Unit-IV	**Solid state Physics**	
	Free electron theory (Qualitative) - Opening of band gap due to internal electron diffraction due to lattice Band theory of solids - Effective mass of electron Density of states - Conductivity of conductors and semiconductors Fermi Dirac distribution function - - Position of Fermi level in intrinsic and extrinsic semiconductors (with derivations based on carrier concentration) - Working of PN junction on the basis of band diagram - Expression for barrier potential (derivation) - Ideal diode equation - Applications of PN junction diode: Solar cell (basic principle with band diagram) IV Characteristics and Parameters, ways of improving efficiency of solar cell - Hall effect: Derivation for Hall voltage, Hall coefficient, applications of Hall effect	
	Practical/Tutorial	
	Solid state Physics	• Determination of band gap of given semiconductor
		• Solar cell characteristics, measurement of V_{oc}, I_{sc}, fill factor
Unit- V	**Magnetism and Superconductivity**	
	Magnetism - Origin of magnetism - Classification of magnetism on the basis of permeability (qualitative) - Applications of magnetic devices: transformer cores, magnetic storage, magneto-optical recording **Superconductivity** - Introduction to superconductivity; Properties of superconductors: zero electrical - resistance, critical magnetic field, persistent current, Meissner effect - Type I and Type II superconductors - Low and high temperature superconductors (introduction and qualitative) - AC/DC Josephson effect; SQUID: basic construction and principle of working; Applications of SQUID - Applications of superconductors	
	Practical/Tutorial : No practical for this Unit	
Unit-VI	**Non Destructive Testing and Nanotechnology**	
	Non Destructive Testing - Classification of Non-destructive testing methods - Principles of physics in Non-destructive Testing - Advantages of Non-destructive testing methods - Acoustic Emission Testing - Ultrasonic (thickness measurement, flaw detection) - Radiography testing **Nanotechnology -** Introduction to nanotechnology - Quantum confinement and surface to volume ratio - Properties of nanoparticles: optical, electrical, mechanical Applications of nanoparticles: Medical (targeted drug delivery), electronics, space and defense, automobile	
	Practical/Tutorial: No Practical for Nanotechnology	
	Ultrasonic	Ultrasonic interferometer for determination of compressibility of liquid.

Text Books	**Author**	**Title of Book**	**Publication**
T1	Dr. K.C. Nandi	Engineering Physics	Tech- Neo Publication
T2	Dr. I. A. Shaikh	Engineering Physics	Tech Knowledge

			Publications
T3	H.J.Sawant, Dr. S.K. Babur,V.P.Waghe, S.N.Shukla, S.V.Arlikar,S.S.Joshi	Engineering Physics	Technical Publications
T4	Dr.S.G.Kandalkar, Dr.U. P.Moharil, I.A.Shaikh	Engineering Physics	Nirali Publications
Reference Books			
R1	Beiser	Concepts of Modern Physics	Tata Mcgraw Hill
R2	Resnick and Halliday	Fundamentals of Physics	John Wiley and Sons
R3	Brijlal and Subramanyam	Text Book of Optics	S. Chand and Company
R4	Jenkins and White	Optics	(Tata Mcgraw Hill)
R5	Dr. M.N. Avadhanulu and Dr. P. G. Khirsagar	Engineering Physics	S. Chand and Company
	Gaur, Gupta	Engineering Physics	Dhanpat Rai and Sons Publications

Self-Learning Facilities, Web Resources, Research papers for reference	NPTELLecture Series	
	Vlabs experiments:	
	Web resources: • **Electromagnetic spectrum**: https://www.khanacademy.org/science/physics/light-waves/introduction-to-light-waves/v/electromagnetic-waves-and-the-electromagnetic-spectrum • Polarisation of light https://www.khanacademy.org/science/physics/light-waves/introduction-to-light-waves/v/polarization-of-light-linear-and-circular • https://www.youtube.com/watch?v=IWVPJSoJDzA Accelerating Charges Emit Electromagnetic Waves - "Light" - Radio Antennas! • **Resolving power of telescope:** https://www.youtube.com/watch?v=6rOibOFj3Ng • **CO_2 Laser:** • https://engineeringinsider.org/co2-laser-principle-construction-working/https://www.daenotes.com/electronics/microwave-radar/co2-gas-laser • **Semiconductor Laser :**www.google.com/url?sa=t&source=web&rct=j&url=https://en.m.wikipedia.org/wiki/Laser_diode&ved=2ahUKEEwiM1Jb7w9_kAhX_6nMBHYI3DsgQFjABegQIAhAB&usg=AOvVaw2pYDOpWYHCgMai86TBfCa https://encyclopedia2.thefreedictionary.com/Semiconductor%20Laser	
Contents beyond Syllabus	Unit-I	a) Interference ❖ Stokes law of Optics ❖ Newton's Rings

		❖ GPD & OPD b) Diffraction ❖ Diffraction grating : Derivation of resultant amplitude ❖ Phasor introduction c)**Polarisation** ❖ Brewster Law ❖ Concept of Retardation plates
	Unit-II	**Laser and Optic Fibre** ❖ Special features of Holography ❖
	Uniy-III	**Quantum Mechanics** ❖ Photoelectric effect: Characteristics proving particle nature of light. ❖ Alpha decay
	Unir-IV	**Solid state physics** ❖ Fermi-Dirac Distribution function ❖ Band diagram of PNP Transistor
	Unit-V	**Magnetism and Superconductivity:** ❖ .
	Unit-VI	**Non Destructive Testing and Nanotechnology** ❖ Factors responsible for the variation in the properties of nanoparticle
Additional Experiments	**Experiments** ❖ To determine the refractive index of the o-ray and e-ray of quartz crystal. ❖ To determine Planck constant (VLab) ❖ Hall Effect	
Bridging Courses	❖ Stokes law in optics ❖ Introduction to concept of Phasor ❖ Semi-conductor homo junction laser ❖ Introduction to Fermion & boson and explanation of Fermi-dirac distribution Function. ❖ Introduction of Bragg's Law ❖ Indirect statement for the proof of De-Broglie's Hypothesis ❖ Relativistic mass Liquid Crystals &nematic phase	

Engineering Chemistry Sem - I/II

Course Title: FE Engineering Chemistry		**Course Number: 2019 COURSE**	**Course Code: 107009**
Year: 2019-20		**Semester: I/II**	
Designation of Course		Professional Core	
Teaching Scheme: 4 Hrs/Week		**Tutorial:** Nil	
Course Assessment Methods	**Direct External methods**	In-semester Examination: 30 Marks	End Semester Examination: 70 Marks
			PR : 25 Marks
	Direct Internal Methods	Assignments, Tutorials, Subjective Test	Presentations
Prerequisites:	Types of titrations, volumetric analysis, structure property relationship, types of crystals, periodic table, classification and properties of polymers, electromagnetic radiation, electrochemical series.		
Course Objectives			
1	To understand technology in analysis and improving quality of water as commodity.		
2	To acquire the knowledge of electroanalytical techniques that facilitates rapid and precise understanding of material.		
3	To understand structure, properties and applications of speciality polymers and nanomaterial.		
4	To study conventional and alternative fuels with respect to their properties and applications.		
5	To study spectroscopic techniques for chemical analysis.		
6	To understand corrosion mechanism and prevention methods for corrosion control.		
Course Outcomes: On completion of the course, learner will be able to…			
CO1	Apply the different methodologies for analysis of water and technique involved in softening of water as commodity.		
CO2	Select appropriate electro-technique and method of material analysis.		
CO3	Demonstrate the knowledge of engineering materials for various engineering applications.		
CO4	Analyze fuel and suggest use of alternate fuels.		
CO5	Identify chemical compound based on their structure.		
CO6	Explain causes of corrosion and methods for minimizing corrosion.		
Course Contents			
Unit-I	**Water Technology(08Hrs)**		
	Impurities in water, Hardness of water: types, units and numericals, determination of hardness (by EDTA method using Molarity concept) and Alkalinity, Numericals. Ill effects of hard water in boilers- Priming and foaming, Boiler corrosion, caustic embrittlement, Scale and sludge. Water treatment: i) Zeolite method &numericals. ii) Demineralization. Purification of water: Reverse Osmosis and Electrodialysis.		
	Practical		

	▪ To determine hardness of water by EDTA method.
	▪ To determine alkalinity of water.
Unit-II	**Instrumental Methods of Analysis (08Hrs)**
	Introduction: Types of reference electrode (calomel electrode), indicator electrode (glass electrode), ion selective electrode: ion selective membranes such as solid membrane, enzyme based membrane and gas sensing membrane. [A] Conductometry: Introduction, conductivity cell, conductometric titrations of acid versus base with titration curve. [B] pHmetry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve.
	Practical
	▪ To determine strength of strong acid using pH meter
	▪ Titration of a mixture of weak acid and strong acid with strong base using conductometer
Unit-III	**Engineering Materials (08Hrs)**
	A] Speciality polymers: Introduction, preparation, properties and applications of the following polymers: 1. Engineering Thermoplastic: Polycarbonate, 2. Bio-degradable polymers: Poly (hydroxybutyrate-hydroxyvalanate), 3. Conducting Polymer: Polyacetylene, 4. Electroluminescent polymer: Polyphenylenevinylene, 5. Polymer composites: Fiber reinforced plastic (FRP)- Glass reinforced and Carbon reinforced polymer composite [B] Nanomaterials: Introduction, classification of nanomaterials based on dimensions (zero dimensional, one-dimensional, two-dimensional and three-dimensional), structure, properties and applications of graphene and carbon nanotubes, quantum dots (semiconductor nanoparticles).
	Practical
	▪ Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin
	▪ To determine molecular weight/radius of macromolecule polystyrene/ polyvinyl alcohol by viscosity measurement.
	▪ Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles
Unit- IV	**Fuels (08Hrs)**
	Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel), Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), Determination of Calorific value: Principle, construction and working of Bomb calorimeter and Boy's gas calorimeter and numericals, Solid fuel: Coal: Analysis of Coal-Proximate and Ultimate analysis, numericals, Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition,

	boiling range and uses of various fractions, Gaseous fuel: Composition, properties and applications of CNG. Hydrogen gas as a future fuel Alternative fuels: Power alcohol and biodiesel.
	Practical
	▪ Proximate analysis of coal
	▪ Preparation of biodiesel from oil.
Unit- V	**Spectroscopic Techniques (08Hrs)**
	[A]UV-Visible Spectroscopy: Introduction, interaction of electromagnetic radiation with matter, statement of Beer's law and Lambert's law, absorption of UV radiation by organic molecule leading to different electronic transitions, terms involved in UV-visible Spectroscopy- chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic shift and hypochromic shift, Instrumentation and basic principle of single beam spectrophotometer, applications of UV-visible spectroscopy. **[B] Infra red Spectroscopy:** Introduction, Principle of IR Spectroscopy, types of vibrations: Stretching (symmetric and asymmetric) and bending (scissoring, rocking, wagging and twisting), conditions of absorption of IR radiations, vibration of diatomic and polyatomic molecules. Instrumentation with block diagram. Parts of IR spectrum, fundamental group region, fingerprint region, applications of IR spectroscopy.
	Practical
	▪ To determine maximum wavelength of absorption of CuSO4/FeSO4/ KMnO4, verify Beer's law and find unknown concentration of given sample.
Unit-VI	**Corrosion Science(08Hrs)**
	Introduction, Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films and Pilling-Bedworth's rule, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, galvanic cell corrosion, concentration cell corrosion, Factors influencing rate of corrosion. Methods of corrosion control and prevention: cathodic and anodic protection, metallic coatings and its types, surface preparation, methods to apply metallic coatings-hot dipping, cladding, electroplating, cementation.
	Practical
	▪ To coat copper and zinc on iron plate using electroplating.

Text Books	**Author**	**Title of Book**	**Publication**
T1	O.G.Palanna	Engineering Chemistry	TataMcGraw Hill Education Pvt.LLtd..
T2	Dr.S.S.Dara, Dr.S.S.Umare	A Textbook of Engineering Chemistry	S.Chand& Company Ltd
T3	Dr.Sunita Rattan	Textbook of Engineering Chemistry	S. K. Kataria& Sons
Reference Books			
R1		Engineering Chemistry	Wiley India Pvt., First edition 2011
R2	Shriver and Atkins,	Inorganic Chemistry,5e	Oxford University Press
R3	S.M.Khopkar	Basic Concepts of Analytical Chemistry,2e	New Age International Publishers.
R4	G. R. Chatwal& S. K. Anand	Instrumental Methods of Chemical Analysis	Himalaya Publishing House
R5	P. S. Kalsi	Spectroscopy of organic compounds, 2 ed,	New Age-International Ltd., Publisher
R6	V. R. Gowarikar, N. V. Viswanathan, jayadevSreedhar,	Polymer Science,	Wiley Eastern Limited
Self-Learning Facilities, Web Resources, Research papers for reference	V lab Amrita University		
Contents beyond Syllabus	• Demonstration practical: Preparation of Soap, Gel And Cream • Generation of Surprising chemicals in Human Body. • SF Factor of Sunscreen.		
Additional Experiments	❖ Preparation of different concentration solutions.		
Bridging Courses	▪ Molecular electronics & Nanomaterials. ▪ Molecular Orbital Theory. ▪ Trends in the Periodic Table. ▪ Speciality Polymers.		
Tutorials	▪ Numerical based on Hardness of water.		
	▪ Numerical based on Alkalinity of water and Zeolite method.		
	▪ Numerical based on Proximate and Ultimate Analysis of Coal.		
	▪ Numerical based on Bomb & Boy's Gas Calorimeter.		
Presentations	▪ Zeolite, ▪ Biodiesel, ▪ Biodegradable polymer, ▪ Carbon nanomaterials.		

BASIC ELECTRICAL ENGINEERING Sem-I/II

Course Name : Basic Electrical Engineering
Course Number : 103004

Teaching Scheme	**Credits**	**Examination Scheme [Marks]**
Theory : 3 Hrs. / week	**Th : 03**	**In Sem: 30 Marks**
Practical : 2 Hrs. / week	**PR : 01**	**End Sem : 70 Marks**
		Practical : 25 Marks

Designation of the Course : Professional-Core

Prerequisites :

1. Basic knowledge of electrical parameters.
2. Basic knowledge of electrical sources.
3. Ohms law & Faradays law
4. Engineering physics, electron theory, electricity, potential and kinetic energy

Course Objectives :

1.	To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2.	To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3.	To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4.	To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes :
At the end of the course, a graduate will be able to –

CO1.	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
CO2.	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic.
CO3.	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
CO4.	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions.
CO5.	Apply and analyze the resistive circuits using star-delta conversion, KVL, KCL and different network theorems under DC supply.
CO6.	Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.

Course Contents :

Unit 1 :	**Electromagnetism:**	**[6 Hrs]**

Review: resistance, emf, current, potential, potential difference and Ohm's law.
Electromagnetism: Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule, nature of magnetic field of long straight conductor, solenoid and toroid. Concept of mmf, flux, flux density, reluctance, permeability and field strength, their units and relationships. Simple series magnetic circuit, Introduction to parallel magnetic circuit(Only theoretical treatment), comparison of electric and magnetic circuit, force on current carrying conductor placed in magnetic field, Fleming's left hand rule. Faradays laws of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced e.m.f., self and mutual inductance, coefficient of couplings. Energy stored in magnetic field.

Unit 2 :	**Electrostatics and AC Fundamentals**	**[6 Hrs]**

A) Electrostatics: Electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance. Capacitor, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors (no derivation) and time constant. **(2Hrs)**
B) AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak(maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasor. **(4Hrs)**

Practical:-

- To calculate and measure of charging and discharging of capacitor and observe the response on storage oscilloscope.

Unit 3 :	**Single Phase AC Circuits**	**[6 Hrs]**

Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, resonance in series RLC circuits, concept of impedance, concept of active, reactive, apparent, complex power and power factor, Parallel AC circuits (No numericals), concept of admittance

Practical:-

- To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current waveforms on storage oscilloscope.
- To derive resonance frequency and analyze resonance in series RLC circuit.

Unit 4 :	**Polyphase A.C. Circuits and Single phase Transformers**	**[6 Hrs]**

A) Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. Balanced and unbalanced load, Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phase or diagrams. **(3Hrs)**
B) Single phase transformers: principle of working, construction and types, emf equation, voltage and current ratios. Losses, definition of regulation and efficiency, determination of these by direct loading method. Descriptive treatment of autotransformers. **(3Hrs)**

Practical:-

- To verify the relation between phase and line quantities in three phase balanced star and delta connections of load.

- To determine efficiency and regulation of transformer by direct loading test of a single phase transformer.

Unit 5 :	**DC circuits**	**[6 Hrs]**

Classification of electrical networks, Energy sources – ideal and practical voltage and current sources, Simplifications of networks using series and parallel combinations and star-delta conversions, Kirchhoff's laws and their applications for network solutions using loop analysis, Superposition theorem, Thevenin's theorem.

Practical:-

- To verify KVL and Superposition theorem.
- To verify Thevenin's theorem in a DC network

Unit 6 :	**Work, Power, Energy and Batteries**	**[6 Hrs]**

A) Work, Power, Energy: Effect of temperature on resistance, resistance temperature coefficient, insulation resistance, conversion of energy from one form to another in electrical, mechanical and thermal systems. **(4Hrs)**

B) Batteries :Different types of batteries (Lead Acid and Lithium Ion), construction, working principle, applications, ratings, charging and discharging, concept of depth of charging, maintenance of batteries, series - parallel connection of batteries. **(2Hrs)**

Study Experiment:

1. To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors.
2. To measure insulation resistance of electrical equipment's/cable using Megger
3. To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, and ELCB.
4. To measure of earth resistance at substation earthing using fall of potential method with IS 3043 standard.
5. To study of LT and HT electricity bills.

(Any two experiment from Sr. No. 2 to 5)

Text Books :

[T1]	V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989
[T2]	D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication
[T3]	V.K. Mehta, Rohit Mehta Basic Electrical Engineering, S Chand Publications
[T4]	B.L. Theraja, A text book on electrical technology Vol-I, S Chand Publications

Reference Books :

[R1]	H Cotton, Electrical technology, CBS Publications
[R2]	L. S. Bobrow, ―Fundamentals of Electrical Engineering‖, Oxford University Press, 2011.
[R3]	E. Hughes, ―Electrical and Electronics Technology‖, Pearson, 2010.
[R4]	D. C. Kulshreshtha, ―Basic Electrical Engineering‖, McGraw Hill, 2009.

Guidelines for Student's Lab Journal :
The Student's Lab Journal should contain following related to every experiment – • Theory related to the experiment. • Apparatus with their detailed specifications. • Connection diagram /circuit diagram. • Observation table • Sample calculations for one/two reading. • Result table. • Graph and Conclusions. • Few short questions related to the experiment.
Assignment Topics :
Assignment should include questions on theory & numerical.

BASIC ELECTRONICS ENGINEERING Sem-I/II

<table>
<tr><td colspan="2">Course Title</td><td colspan="2">Basic Electronics Engineering</td><td>University Course Code:</td><td>104010</td></tr>
<tr><td colspan="2">Designation of Course</td><td colspan="2">Professional Core</td><td>Course Number:</td><td>C110</td></tr>
<tr><td colspan="2">Teaching Scheme</td><td colspan="2">Theory : 3Hrs/Week</td><td colspan="2">Laboratories: 2 Hrs/Week</td></tr>
<tr><td colspan="2" rowspan="5">Course Outcome Assessment Tools</td><td rowspan="4">External Assessment (University Level)</td><td rowspan="4">Direct Tools</td><td>In-Semester Theory Examination: 30 Marks</td></tr>
<tr><td>End-Semester TheoryExamination: 70 Marks</td></tr>
<tr><td>Practical : 25 Mark</td></tr>
<tr><td>Oral :00 Marks</td></tr>
<tr><td rowspan="2">Internal Assessment (Department Level)</td><td>Mid Sem. Test, Home Assignments, Laboratory Assignments, Presentations, Q&A session, Tutorials etc</td></tr>
<tr><td>Indirect Tools</td><td>Course Exit Survey</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="4">Fundamentals in basic sciences viz. physics, chemistry and mathematics</td></tr>
<tr><td colspan="6">Introduction of the Course
This course introduces evolution of electronics engineering and its applications in various sectors of life. Electronics has facilitated the social life through modernization. Now days, electronic gadgets like mobile, television, radio etc became an integral part of human life. Therefore, this course is focused to create awareness of electronics engineering among the aspiring engineers in various branches. This course also helps to know and understand fundamental components and their use to build an electronic system.</td></tr>
<tr><td colspan="6">Course Objectives</td></tr>
<tr><td>COBJ110.1</td><td colspan="5">To understand evolution of electronics and their impact on social life</td></tr>
<tr><td>COBJ110.2</td><td colspan="5">To know and understand working principle of various electronic components</td></tr>
<tr><td>COBJ110.3</td><td colspan="5">To understand fundamentals of analog and digital electronics</td></tr>
<tr><td>COBJ110.4</td><td colspan="5">To understand working principle of electronic instruments, sensors based electronic system and electronic communication systems.</td></tr>
<tr><td colspan="6">Course Outcomes
(On completion of the course, learner will be able to –)</td></tr>
<tr><td>CO110.1</td><td colspan="5">Identify, compare and understand the use of various active and passive components</td></tr>
<tr><td>CO110.2</td><td colspan="5">Identify various types of diodes, plot their characteristics, and explain the working of P-N junction diode, BJT, MOSFET and their use and compare BJT with MOSFET.</td></tr>
<tr><td>CO110.3</td><td colspan="5">Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.</td></tr>
<tr><td>CO110.4</td><td colspan="5">Use different electronics measuring instruments to measure various electrical parameters.</td></tr>
<tr><td>CO110.5</td><td colspan="5">Select sensors for specific applications.</td></tr>
<tr><td>CO110.6</td><td colspan="5">Describe basic principles of communication systems.</td></tr>
<tr><td colspan="6">Course Contents as per the University Syllabus</td></tr>
</table>

Unit-I	**Introduction to Electronics**
	Evolution of Electronics, Impact of Electronics in industry and in society. Introduction to active and passive components, P-type Semiconductor, N-type Semiconductor. Current in semiconductors(Diffusion and Drift Current), P-N Junction diode construction and its working in forward and reverse bias condition, V-I characteristics of P-N junction Diode, Diode as a switch, Half Wave Rectifier, Full wave and Bridge Rectifier. Zener diode, Light Emitting Diode (LED) and photo diode along with VI characteristics and their applications.
	Practical
	1. Study of Active and Passive components such as a) Resistors (Fixed & Variable), Calculation of resistor value using color code. b) Capacitors (Fixed & Variable) c) Inductors, Calculation of inductor value using color code. d) Devices such Diode, BJT, MOSFETs, various IC packages e) Switches & Relays 2. V-I characteristics of: a) P-N Junction Diode (Study the datasheet of typical PN junction diode 1N 400X) b) Zener Diode (Study the datasheet of typical Zener diode 1N 4148) 3. Rectifier circuits: a) Implement half wave, full wave and bridge rectifier using diodes b) Observe the effect of capacitor filter on rectifier output
Unit-II	**Transistor and OPAMP**
	Bipolar Junction Transistor : Construction, type, Operation, V-I Characteristics, region of operation, BJT as switch and CE amplifier, Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation, V-I characteristics, Regions of operation, MOSFET as switch & amplifier. Operational amplifier:Functional block diagram of operational amplifier, ideal operational amplifier, Op-amp as Inverting and Non inverting amplifier
	Practical
	1. Frequency response of MOSFET: a) To plot frequency response of BJT amplifier.(Simulation) b) To plot frequency response of MOSFET amplifier.(Simulation) 2. Linear applications of Op-amp: Build inverting and non-inverting amplifier using op-amp (Study the datasheet of typical Op-Amp 741)
Unit-III	**Number System and Logic Gates**
	Number System:- Binary, BCD, Octal, Decimal, Hexadecimal their conversion and arithmetic, De-Morgan's theorem, Basic Gates:- AND, OR, NOT, Universal Gate- XOR, XNOR, Half adder, Full adder Flip Flop's SR, JK, T and D, Introduction to Microprocessor and Microcontroller (Only block diagram and explanation)
	Practical
	1. Test and verify the truth tables of:a) Basic and Universal Gates (Study the data sheet of respective IC's)b) Half / Full Adderc) RS/JK/T/D flip flop
Unit-IV	**Electronic Instrumentation**
	Principles and block diagram of digital multimeter, Function Generator, Digital Storage Oscilloscope (DSO) Power scope, AC/DC power supply, Auto transformer, Analog ammeter and voltmeter.
	Practical
	1. Measurements using various measuring equipments:

	a) Set up CRO and function generator for measurement of voltage, frequency, b) Obtain the phase shift between to signals using CRO with the help of Lissagous pattern, c) Measure voltage, resistance using digital multimeter. Also use multimeter to check diode, BJT		
Unit- V	**Sensors**		
	Classification of a sensors, Active /Passive Sensors, Analog/Digital Sensors, Motion Sensors (LVDT, Accelerometer), Temperature Sensors (Thermocouple, Thermistor, RTD), Semiconductor Sensors(Gas Sensors), Optical Sensors (LDR), Mechanical Sensors (Strain Gauge, Load Cell, Pressure sensors), Biosensors. (Working Principle and one application).		
	Practical		
	1. Study of any three transducers		
	2. Build and test any circuit using BJT/MOSFET/Op-Amp/Logic Gates using any one sensor.		
Unit-VI	**Communication Systems**		
	Basic Communication System: Block Diagram, Modes of Transmission, Communication Media:Wired and Wireless, Electromagnetic Spectrum, Allotment of frequency band for differentapplications, Block Diagram of AM and FM Transmitter and receiver,Mobile Communication System: Cellular concept, Simple block diagram of GSM system.		
	Practical		
	1. Case Study of any one electronics appliances such as mobile, microwave oven, public address system etc with block diagram, specification etc.		
Text Books	**Author**	**Title of Book**	**Publication**
T1	Thomas. L. Floyd	Electronics Devices	Pearson, 9th Edition
T2	R.P. Jain	Modern Digital Electronics	TMH, 4th Edition
T3	H.S. Kalsi	Electronic Instrumentation	TMH, 3rd Edition
T4	D. Patrnabis	Sensors and Transducers	PHI 2nd Edition
T5	Kennedy & Davis	Electronic Communication Systems	TMH, 4th Edition
T6	M. Schwartz	Mobile Wireless communication	Cambridge University Press
Reference Books	**Author**	**Title of Book**	**Publication**
R1	Bhargava, Kulshreshtha and Gupta	Basic Electronics and Linear Circuits	TMH, 2nd Edition
R2	Boylstad, Nashlesky	Electronic Devices and Circuits Theory	PHI, 2006. 9th Edition
R3	Coughlin and Driscoll	Operational Amplifiers and Linear Integrated Ckts	PHI 6th Edition
R4	Thomas. L. Floyd	Digital Fundamentals	Pearson, 11th Edition
R5	J. Schiller	Mobile Communication	Pearson,2nd Edition
R6	S. Soloman	Sensors Handbook	Pearson,2nd Edition
Self-Learning Facilities			

1.	NPTELLecture Series / Virtual Laboratory-IIT, Powai http://www.sciencedaily.com/releases/2016/02/160203134504.htm http://physics.usask.ca/~chang/homepage/Organic/Organic.html http://www.organicsemiconductors.com		
Web Resources			
1	http://www.electronics-tutorials.ws/transistor/tran_1.html		
2	http://www.allaboutcircuits.com/textbook/semiconductors/chpt-1/active-versus-passive-devices/		
Research papers for reference	**Author**	**Title of Paper**	**Journal/Transaction**
1	Natalie Hull, Dr. Karl Linden	Sequential LED and excimer lamp exposures for viral UV Disinfection	IEEE 2018
2	ChalamkuruSarath ; P. Syamala Devi	Object Sorting System Using Wireless Media and Sensor Technology	IJSR 2018-19
Contents beyond Syllabus			
Additional Experiments			
Bridging Courses			
	No bridging course is required since all the prerequisite courses have been learnt by the students.		
Assignments			
	1. Assignments on Theory will be given to map all the course outcomes.		
Tutorials			
Presentations			
	Preparation of presentation on case study of any one electronic gadget		

Course Title: Basic Electronics Engineering

Justifications for the course Objectives

Serial Number	Course Objectives	Justifications
COBJ110.1	To understand evolution of electronics and their impact on social life	This helps to know the fundamental theory of important devices for their use in various applications.
COBJ110.2	To know and understand working principle of various electronic components	This helps the learner to know construction of various converters and AC voltage controller using power

		devices. Learner can evaluate their performance of various control circuits and learn its safe use for given applications.
COBJ110.3	To understand fundamentals of analog and digital electronics	This enables the learner to select a drive for the motor for given application.
COBJ110.4	To understand working principle of electronic instruments, sensors based electronic system and electronic communication systems.	Learner will know block diagram of UPS and SMPS and understand their need and can evaluate the performance of both.

Justifications of the Assessment Tools Used

Serial Number	Course Outcomes	Assessment Tools used	Justifications
CO110.1	Identify, compare and understand the use of various active and passive components.	**INTERNAL ASSESSMENT TOOLS USED**	
		Assignments PPT Presesntation	Improves data collection, technical understanding, presentationetc skills
		EXTERNAL ASSESSMENT TOOLS USED	
		In-Sem.and End-Sem. Theory Exam.	Improves analytical skills
		End-SemPracticalOral exam.	Improvestechnical communication. andexperimentation skills
CO110.2	Identify various types of diodes, plot their characteristics, and explain the working of P-N junction diode, BJT, MOSFET and their use and compare BJT with MOSFET.	**INTERNAL ASSESSMENT TOOLS USED**	
		LaboratoryExperimentation	Improves data collection, presentation, design and analysis skills and helps for long term knowledge transfer. Also, interface theoretical or virtual world to real time world to build confidence in theory and practical
		Objective Test	Inherit focused or targeted approach
		Assignments	Improves data collection, technical understanding, presentation etc skills
		EXTERNAL ASSESSMENT TOOLS USED	
		In-Sem. and End-Sem. Theory Exam.	Improves analytical skills
		End-Sem Practical Oral exam.	Improvestechnical communication. and experimentation skills
CO110.3	Build and test analog circuits using	**INTERNAL ASSESSMENT TOOLS USED**	
		LaboratoryExperi	Improves data collection,

	OPAMP and digital circuits using universal/basic gates and flip flops.	mentation	presentation, design and analysis skills and helps for long term knowledge transfer. Also, interface theoretical or virtual world to real time world to build confidence in theory and practical
		Objective Test	Inherit focused or targeted approach
		Assignments	Improves data collection, technical understanding, presentation etc skills
		EXTERNAL ASSESSMENT TOOLS USED	
		In-Sem. and End-Sem. Theory Exam.	Improves analytical skills
		End-Sem Practical Oral exam.	Improvestechnical communication. and experimentation skills
CO110.4	Use different electronics measuring instruments to measure various electrical parameters.	**INTERNAL ASSESSMENT TOOLS USED**	
		LaboratoryExperimentation	Improves data collection, presentation, design and analysis skills and helps for long term knowledge transfer. Also, interface theoretical or virtual world to real time world to build confidence in theory and practical
		Objective Test	Inherit focused or targeted approach
		Assignments	Improves data collection, technical understanding, presentation etc skills
		EXTERNAL ASSESSMENT TOOLS USED	
		In-Sem. and End-Sem. Theory Exam.	Improves analytical skills
		End-Sem Practical Oral exam.	Improvestechnical communication. and experimentation skills
CO110.5	Select sensors for specific applications.	**INTERNAL ASSESSMENT TOOLS USED**	
		Laboratory Experimentation	Improves data collection, presentation, design and analysis skills and helps for long term knowledge transfer. Also, interface theoretical or virtual world to real time world

			to build confidence in theory and practical
		Objective Test	Inherit focused or targeted approach
		Assignments	Improves data collection, technical understanding, presentation etc skills
		EXTERNAL ASSESSMENT TOOLS USED	
		In-Sem. and End-Sem. Theory Exam.	Improves analytical skills
		End-Sem Practical Oral exam.	Improvestechnical communication. and experimentation skills
CO110.6	Describe basic principles of communication systems.	**INTERNAL ASSESSMENT TOOLS USED**	
		LaboratoryExperimentation	Improves understanding and applications of microwaves
		Objective Test	Inherit focused or targeted approach
		Assignments	Understand advantages and disadvantages of microwaves
		EXTERNAL ASSESSMENT TOOLS USED	
		In-Sem. and End - Sem. Theory Exam.	Improves analytical skills
		End-Sem Practical/ Oral exam.	Improvestechnical communication skills about the subject

Engineering Mechanics Sem-I/II

CourseTitle : ENGINEERING MECHANICS		**CourseCode :101011**	
Year:FirstYearEngg. (FE)		**Semester: I &II**	
DesignationofCourse		**Basic Subject for all Branches**	
Teaching Scheme:3Hrs/Week		**Practical :**2Hrs/Week per batch	
Course Assessment Methods	**Directmethods**	In-semesterExam: 30 Marks	EndSemesterExam: 70 Marks
		TW: 25Marks	
	IndirectMethods	Class Tests	
Prerequisite	**12thPhysics, 12thMaths**		
CourseObjectives			
1	To impart knowledge about forcesystems and methods to determine resultant centroid andmomentofinertia		
2	To teach methods to calculate forceof friction		
3	To impart knowledgetodeterminereaction ofbeams, calculate member forces in trusses, cables andframes using principles of equilibrium		
4	To teach space forcesystems		
5	To train students to solveproblems related to particlemechanics usingprinciples of kinematics, kinetics andwork powerenergy		
CourseOutcomes: On completion ofthe course, learner will beable to -			
CO1	Determineresultant of various force systems		
CO2	Determinecentroid, moment ofinertia andsolve problems related tofriction		
CO3	Determinereactions of beams, calculate forces in cables usingprinciples of equilibrium		
CO4	Solvetrusses,framesforfindingmemberforcesandapplyprinciplesof Equilibriumto forces in space		
CO5	Calculate position, velocityand acceleration of particleusingprinciples ofkinematics		
CO6	Calculate position, velocityand acceleration of particleusingprinciples ofkinetics and Work, Power, Energy		
CourseContents			
Unit-I	**Resolution andCompositionofForces**		
	Principleofstatics,Forcesystem, Resolutionandcompositionofforces, Resultantofconcurrentforces. Moment of a force,Varignon'stheorem, Resultant of parallel force system, Couple, Equivalent force couple system, Resultant of parallel generalforcesystem		
	Practicals		
	• Verification of law of parallelogram of forces/polygon of forces • Graphical Solution to determineunknown forces of concurrentforce system • To determinethe resultant ofgeneral force system		

Unit-II	**DistributedForcesandFriction**
	Moment of area, Centroid of planelaminaandwirebends, Moment ofInertia. Friction-Lawsoffriction, Applicationoffrictiononinclinedplanes,Wedgesandladdersfriction Application to flat belt
	Practicals
	• Determination of coefficient friction of belt/inclined plane
Unit-III	**Equilibrium**
	Free body diagram, Equilibrium of concurrent, parallel forces in a plane Equilibrium of generalforces in a plane Equilibrium of three forces in a plane, and compound beams, Type of supports and reaction, Forces in space, Resultant of concurrent and parallel forces in a space, Equilibrium of concurrent and parallel forces in a space.
	Practicals
	• To determinesupportreaction ofsimple/compound beams. • To determine forces inthe members of space force system.
Unit-IV	**Analysisof Structures**
	Two force member, Analysis of plane trusses by Method of joints, Analysis of plane trusses bymethod of section, Analysis of plane frames, Cables subjected to point load multi force member.
	Practicals
	• Graphical Solution to determinetheforces in thememberoftheplanetruss
Unit-V	**Kinematics of Particle**
	Kinematics of linear motion- Basic concepts Equation of motion for constant acceleration Motionunder gravity Variable acceleration motion curves Kinematics of curvilinear motion- Basic Concepts Equation of motion in Cartesian coordinates Equation of motion in path coordinates Equation of motion in polar coordinates Motion of projectile.
	Practicals
	• To studythecurvilinear motion • Graphical Solution to determine velocity and acceleration ofparticlefrom given s-t diagram
Unit-VI	**Kinetics ofParticle**

	Kinetics- Newton's Second Law of motion Application of Newton's Second Law. Work, power, energy, conservative and non-conservative forces Conservation of energy for motion of particle, Impulse, Momentum, Direct central impact. Coefficient of restitution, Impulse Momentum principle of particle.
	Practicals
	• Determination of coefficient of restitution

TextBooks	**Author**	**Title ofBook**	**Publication**
T1	Beer &Johnston	Vector	McGraw-
T2	R. C. Hibbeler	EngineeringMechanics	Pearson Education
ReferenceBooks			
R1	Timoshenko & Young	EngineeringMechanics	McGraw- Hill Pub.
R2	Meriam &Craige	EngineeringMechanics	John Willey Pub.
R3	F. L. Singer	EngineeringMechanics	Harper & row Pub.
R4	Boresi& Schmidt	EngineeringMechanics	Brooks/Cole Pub.
Self-Learning Facilities, WebResources, Research papers for reference	www.nptel.ac.in www. Howstuffworks.com		
Contents beyond Syllabus	Nil		
Additional Experiments	Nil		
Bridging Courses	Nil		
Tutorials	Nil		
Presentations	Nil		

Programming and Problem SolvingSem-I/II

Course Title:	Programming and Problem Solving	**Course Number:**	110005
Designation of Course	Professional Core		
Teaching Scheme: 3Hrs/Week		**Laboratories:** 02Hrs/Week	
Course Assessment Methods	**Direct methods**	**In-Semester Examination:** 30 Marks	**Theory/End Semester Examination:** 70 Marks
		Term-work Marks	Practical/Oral 25 Marks
	Indirect Methods		
Prerequisites	1. Students are expected to have a good understanding of basic computer principles.		
Introduction of Course			
Course Objectives			
	Prime objective is to give students a basic introduction to programming and problem solving with computer language Python. And to introduce students not merely to the coding of computer programs, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation.		
1.	To understand problem solving, problem solving aspects, programming and to know about various program design tools.		
2.	To learn problem solving with computers		
3.	To learn basics, features and future of Python programming.		
4.	To acquaint with data types, input output statements, decision making, looping and functions in Python.		
5.	To learn features of Object Oriented Programming using Python		
6.	To acquaint with the use and benefits of files handling in Python.		
Course Outcomes	By the end of the course, students should be able to		
CO1	Inculcate and apply various skills in problem solving.		
CO2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.		
CO3	Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python.		
CO4	Demonstrate significant experience with the Python program development environment.		
Course Contents			
Unit-I	**Problem Solving, Programming and Python Programming**		
	General Problem Solving Concepts- Problem solving in everyday life, types of problems, problem solving with computers, difficulties with problem solving, problem solving aspects, top down design. Problem Solving Strategies **Program Design Tools**: Algorithms, Flowcharts and Pseudo-codes,		

	implementation of algorithms. **Basics of Python Programming**: Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types, Input operation, Comments, Reserved words, Indentation, Operators and expressions, Expressions in Python.
	Practical
	To calculate salary of an employee given his basic pay (take as input from user).Calculate gross salary of employee. Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employee pay professional tax as 2% of total salary. Calculate net salary payable after deductions.
	To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc 2 where m is the mass of the object and c is its velocity.
Unit-II	**Decision Control Statements**
	Decision Control Statements: Decision control statements, **Selection/conditional branching Statements**: if, if-else, nested if, if-elif-else statements. **Basic loop Structures/Iterative statements**: while loop, for loop, selecting appropriate loop. Nested loops, The break, continue, pass, else statement used with loops. Other data types- Tuples, Lists and Dictionary.
	Practical
	To accept N numbers from user. Compute and display maximum in list, minimum in list, sum and average of numbers.
	To accept student's five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.
	To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself
Unit-III	**Functions and Modules**
	Need for functions, **Function**: definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.
	Practical
	To accept a number from user and print digits of number in a reverse order.
	To input binary number from user and convert it into decimal number.
Unit-IV	**Strings**
	Strings and Operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module.
	Practical

	Write a python program that accepts a string from user and perform following string operations- i. Calculate length of string ii. String reversal iii. Equality check of two strings iii. Check palindrome ii. Check substring		
Unit- V	**Object Oriented Programming**		
	Programming Paradigms-monolithic, procedural, structured and object oriented, Features of **Object oriented programming-**classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. **Classes and Objects**: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods.		
	Practical		
	Create class STORE to keep track of Products (Product Code, Name and price). Display menu of all products to user. Generate bill as per order.		
Unit-VI	**File Handling and Dictionaries**		
	Files: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files. Dictionary method. **Dictionaries-** creating, assessing, adding and updating values. Case Study: Study design, features, and use of any recent, popular and efficient system developed using Python. (This topic is to be excluded for theory examination).		
	Practical		
	To copy contents of one file to other. While copying a) all full stops are to be replaced with commas b) lower case are to be replaced with upper case c) upper case are to be replaced with lower case.		
	To count total characters in file, total words in file, total lines in file and frequency of given word in file.		
Text Books	**Author**	**Title of Book**	**Publication**
T1	ReemaThareja	Python Programming Using Problem Solving Approach	Oxford University Press, ISBN 13: 978-0-19-948017-6
T2	R. Nageswara Rao	Core Python Programming	Dreamtech Press; Second edition ISBN-10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL
Reference Books			
R1	R. G. Dromey	How to Solve it by Computer	Pearson Education India; 1st edition,

2	2. Maureen Spankle	"Problem SolvingandProgramming Concepts"	Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645

Engineering Mathematics-II

Course Title: FE Engineering Mathematics		**Course Number:**	**Course Code: 107008**
Year: 2019-20		**Semester: II**	
Designation of Course		Professional Core	
Teaching Scheme: 4 Hrs/Week		**Tutorial:**1 Hr/week	
Course Assessment Methods	**Direct External methods**	In-semester Examination: 30 Marks	End Semester Examination: 70 Marks
		TW : 25 Marks	
	Direct Internal Methods	Assignments, Tutorials, Subjective Test	Presentations
Prerequisites:	Integration,Differential Equation, Three dimensional Coordiantion system		

Course Objectives

To make a student familiarize with mathematical modelling of physical system using differential equations , advanced techniques of integration, tracing of curves, multiple integral and there applications.The aim is to equip them with the techniques to understand advance level mathematics and its applications that would enhance thinking power useful in their disciplines

Course Outcomes: On completion of the course, learner will be able to…

CO1	The effective mathematical tools for solutions of the first order differential equation that model physical processes such as Newton's law of cooling,electriccircutis , rectilinear motion, mass spring systems,heat transfer etc.
CO2	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and error functions needed in evaluating multiple integrals and their applications.
CO3	To trace the curve for a given equation and measure arc length of various curves
CO4	The concepts of solid geometry using equations of sphere, cone and cylinder in comprehensive manner.
CO5	Evaluation of multiple integralsand its complication to find area bounded by curves, volume bounded by surfaces, centre of gravity and moment of inertia.

Course Contents

Unit-I	**First Order Ordinary differential equations (09Hrs)**
	Definition, Order and Degree of DE, Formation of DE. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types
Unit-II	**Applications of Differential Equations (09Hrs)**
	Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical problems.
Unit-III	**Integral Calculus (09Hrs)**

	Reduction formulae, Beta and Gamma functions, Differentiation Under the Integral Sign, Error functions.		
Unit- IV	**Curve Tracing(09Hrs)**		
	Tracing of Curves, Cartesian, Polar and Parametric Curves. Rectification of Curves		
Unit- V	**Solid Geometry(08Hrs)**		
	Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder		
Unit-VI	**Multiple Integrals and their Applications (09Hrs)**		
	Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values, Mass, Center of Gravity and Moment of Inertia.		
Text Books	**Author**	**Title of Book**	**Publication**
T1	Peter V. O'Neil	Advanced Engineering Mathematics, 7e	Thomson Learning
T2	B. S. Grewal	Higher Engineering Mathematics	Khanna Publication, Delhi
Reference Books			
R1	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley Eastern Ltd
R2	M.D Greenberg	Advanced Engineering Mathematics	Pearson Education
R3	Peter V. O'Neil	Advanced Engineering Mathematics	Thomas Learning
R4	George B. Thomas	Thomas Calculus	Addison –Wesley
R5	P.N Wartikar and J.N Wartikar	Applied Mathematics (Vol I &Vol II)	Pune VidyarthiGrihaPrakashan Pune
R6	S.L Ross	Differential Equations	John Wiley and Sons

Self-Learning Facilities, Web Resources, Research papers for reference	Hand-outs related to important formulas based on algebra ,trigonometric functions ,identities are provided into the(Pearson Education initial lectures.
Contents beyond Syllabus	❖ Students are encouraged to do in home assignments under the guidance of faculty. Special classes for students who are below average are arranged after the class hours.
Bridging Courses	Before the commencement of regular classes ,respective teachers conducts 20 minutes session on everyday basis for the first 15 days which focuses on class 12level basic maths.
Tutorials	7. Numericals on Unit I
	8. Numericals on Unit I
	9. Numericals on Unit II
	10. Numericals on Unit II
	11. Numericals on Unit III
	12. Numericals on Unit IV
Assignments No 1 to 6	Numericals on each units

Engineering Graphics Sem-II

Course Title: Engg Graphics		**Course Number: 2019 COURSE**	**Course Code: 102012**
Year: FE 2019-20		**Semester: II**	
Designation of Course		Professional Core	
Teaching Scheme: 1 Hrs/Week		**Practical:** 2 Hrs/Week	TU: 1hr/Week
Course Assessment Methods	**External**	----	End Semester Examination (50 Marks)
	Internal	TW: 25 marks	Assignments:5
Prerequisites			
Course Objectives			
1	To acquire basic knowledge about engineering drawing language, line types, dimension methods, and simple geometricalconstruction.		
2	To draw conic sections by various methods, involutes, cycloid andspiral.		
3	To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views		
4	To visualize three dimensional engineering objects and shall be able to draw their isometric views		
5	To imagine visualization of lateral development ofsolids		
6	To acquire basic knowledge about the various CAD drafting software's and itsbasic commands required to construct the simple engineeringobjects		
Course Outcomes			
CO1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries		
CO2	Construct the various engineering curves using the drawing instruments		
CO3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.		
CO4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.		
CO5	Draw the development of lateral surfaces for cut section of geometrical solids		
CO6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools		
Course Contents			
Unit-I	**Fundamentals ofEngineeringDrawing**		
Fundamentals of Engineering	Need of Engineering Drawing and design, Sheet layout, Line types and dimensioning and simple geometrical constructions		

Drawing(01 hrs)	
Assignment:	-------
Experiment:	NA
Unit-II	
Introduction to 2D and 3D computer aideddraftingpackages (02hrs)	Evolution of CAD, Importance of CAD, Basic Commands - Edit, View, Insert, Modify, DimensioningCommands,settingandtoolsetc.anditsapplicationstoconstructthe2 Dand3D drawings
Assignment:	Different Angles of Projection
Experiment:	NA
Unit-III	
EngineeringCurves (01 hrs)	Introduction to conic sections and its significance, various methods to construct the conic sections. Helix for cone and cylinder , rolling curves (Involutes , Cycloid) and Spiral
Assignment	Construct any Engineering Curve by any method
Experiment:	NA
Unit-IV	
Orthographic Projection (02Hrs)	Principle of projections, Introduction to First and Third angle Projection methods, Orthographic projection of point, line, plane, solid and machine elements/parts
Assignment:	Orthographic view of any machine element along with sectional view.
Experiment:	NA
Unit- V	
Isometric Projection (03Hrs)	Introduction to isometric projection, oblique projection and perspective projection. Draw the isometric projection from the given orthographic views
Assignment:	Draw Isometric view for given orthographic views Draw the isometric or Orthographic view of a product/object (For example Workshop Job prepared during the workshop practice or any product developed during the first year session.)
Experiment:	NA
Unit-VI	
Development ofLateral(3Hrs.)	Introduction to development of lateral surfaces and its industrial applications. Dr development of lateral surfaces for cut section of cone, pyramid, prism etc

Assignment:	Draw the development of lateral surface of a solid/ truncated solid		
Experiment:	NA		
Text Books	**Author**	**Title of Book**	**Publication**
T1	Bhatt, N. D. and Panchal, V. M	Engineering Drawing	Charotar Publication, Anand,India
T2	K. Venugopal	Engineering and Graphics	New Age International, New Delhi
T3	Jolhe, D. A	Engineering Drawing with introduction to AutoCAD	Tata McGraw Hill,
T4	Rathnam, K	A First Course in Engineering Drawing	Springer Nature Singapore Pte. Ltd., Singapore
Reference Books			
R1	Madsen, D. P. and Madsen, D. A	Engineering Drawing and design	Delmar Publishers Inc.,USA
R2	Bhatt, N. D	Machine Drawing	Chartor Publishing house, Anand,India
R3	Dhawan, R. K	A Textbook Of Engineering Drawing	S. Chand, NewDelhi
R4	Luzadder, W. J. and Duff, J. M	The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production	Peachpit Press,USA
R5	Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T.	Principles of engineering graphics	McMillan Publishing,USA
R6	Jensen, C., Helsel, J. D., Short, D. R	Engineering Drawing and Design	McGraw-Hill International, Singapore
Self-Learning Facilities, Web Resources, Research papers for reference	———		
Contents beyond Syllabus	Assembly Drawing		
Additional Experiments	-		
Bridging Courses	-		

Presentations	• Unit wise presentation of subtopics to be displayed on projector • Videos on angles of Projection