NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Syllabus of First Year Engineering (Common to all branches) Faculty of Engineering and Technology

W.E.F 2012 - 2013

FE Semester – I

Course Code	Name of the Course	Group	Teaching Scheme				Theory		Practical		Total	Credits
			Theory Hrs / week	Tut. Hrs / week	PR. Hrs / week	Total	ISE	ESE	ICA	ESE		
FE 121	Engineering Physics – I	A	3	---	---	3	20	80	---	---	100	3
FE 122	Engineering Chemistry – I	A	3	---	---	3	20	80	---	---	100	3
FE 123	Engineering Mathematics - I	A	3	1	---	4	20	80	---	---	100	4
FE 124	Elements of Civil Engineering & Engineering Mechanics	B	3	1	---	4	20	80	---	---	100	4
FE 125	Computer Programming	B	3	---	---	3	20	80	---	---	100	3
FE 126	Engineering Science Lab - I	A	---	---	2*	2*	---	---	25	---	25	1
FE 127	Computer Programming Lab	B	---	---	2	2	---	---	25	25 **(PR)**	50	1
FE 128	Elements of Civil Engineering & Engineering Mechanics Lab	B	---	---	2	2	---	---	25	25 **(OR)**	50	1
FE 129	Workshop Practice – I	B	---	---	2	2	---	---	25	---	25	1
FE 130	Soft Skills – I	C	1	---	2	3	---	---	50	---	50	2
	Total		**16**	**2**	**10**	**28**	**100**	**400**	**150**	**50**	**700**	**23**

ISE: Internal Sessional Examination, **ESE:** End Semester Examination, **ICA :** Internal Continuous Assessment

Note: For Engineering Science Lab, practical of Engineering Physics and Engineering Chemistry shall be conducted in alternate week.

FE Semester-II

Course Code	Name of the Course	Group	Teaching Scheme				Theory		Practical		Total	Credits
			Theory Hrs / week	Tut. Hrs / week	PR. Hrs / week	Total	ISE	ESE	ICA	ESE		
FE 221	Engineering Physics – II	A	3	---	---	3	20	80	---	---	100	3
FE 222	Engineering Chemistry - II	A	3	---	---	3	20	80	---	---	100	3
FE 223	Engineering Mathematics - II	A	3	1	---	4	20	80	---	---	100	4
FE 224	Elements of Electrical & Electronics Engineering	B	3	---	---	3	20	80	---	---	100	3
FE 225	Engineering Drawing & Elements of Mechanical Engineering	B	3	---	---	3	20	80	---	---	100	3
FE 226	Engineering Science - II Lab	A	---	---	2*	2*	---	---	25	---	25	1
FE 227	Engineering Drawing & Elements of Mechanical Engineering Lab	B	---	---	4	4	---	---	25	25 **(OR)**	50	2
FE 228	Elements of Electrical & Electronics Engineering Lab	B	---	---	2	2	---	---	25	25 **(PR)**	50	1
FE 229	Workshop Practice - II	B	---	---	2	2	---	---	50	---	50	1
FE 230	Soft Skills-II	C	1	---	2	3	---	---	25	---	25	2
	Total		**16**	**1**	**12**	**29**	**100**	**400**	**150**	**50**	**700**	**23**

ISE: Internal Sessional Examination, **ESE:** End Semester Examination, **ICA:** Internal Continuous Assessment

Note: For Engineering Science Lab, practical of Engineering Physics and Engineering Chemistry shall be conducted in alternate week.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Syllabus of First Year Engineering (Common to all branches) Faculty of Engineering and Technology

SEMESTER-I

W.E.F 2012 - 2013

Engineering Physics - I

COURSE OUTLINE

Engineering Physics - I	**EP- I**	**FE 121**
Course Title	Short Title	Course Code

Course Description:
This course is aimed at introducing the fundamentals of basic sciences (Engineering Physics-I) to undergraduate students. The background expected includes a prior knowledge of physics from HSC (science) and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principles of science (Engineering Physics -I) and their applications in different areas.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03

Prerequisite Course(s): 11th, 12th Physics.

General Objective:

The objective of this course is to provide learner with basic concepts and knowledge of sciences (various principles, theories, laws etc.) and to analyze it from experiments. The learner can apply the same in various branches of Engineering and Technology.

Learning Outcomes:

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

a) Understand the concept of different Energy Sources, their production, advantages, disadvantages, applications etc
b) Understand the basic properties, mechanism, terminology etc of Laser and their types, Principles, construction and re-construction of Holography. Principle, structure, and propagation mechanism of Fiber optics communication and their Industrial application.
c) Understand the basic of crystal structure, its parameter.
d) Understand the production of X-rays, properties and applications in various fields.
e) Describe the classification of solid, its properties , formation of semiconductor diode, its application and concept of Hall effect and Hall coefficient.
f) Understand to know about the basic concepts of Interference, Diffraction Polarization, their production and various applications

COURSE CONTENT

Engineering Physics - I **Semester-I**

Teaching Scheme	**Examination Scheme**	
Lectures -3 Hrs/week	**End Semester Exams (ESE)**	**: 80 Marks.**
	Duration of ESE	**: 3 Hours.**
	Internal Sessional Exam (ISE)	**: 20 Marks.**

Unit –I- Environmental Science **No of Lecture: 8 Hours, Marks: 16**

A) Energy Sources (non conventional): Introduction to non-conventional energy sources, Solar cell (Principle- Construction- Working & Characteristics), Wind energy- Wind Mill, Biogas & Bio Mass (Brief Explanation about way of harnessing or utilization, advantages), Advantages of non-conventional energy.

B) Energy Sources (conventional): Introduction to Nuclear Fission, Fusion, Chain reaction Multiplication Factor, Nuclear Reactor (with Diagram and Working), Numericals.

Unit –II- Laser & Fiber Optics **No of Lecture: 8 Hours, Marks: 16**

A) Laser: Introduction, Laser beam characteristics -Coherence, Directionality, Intensity, Mono chromaticity. Mechanism of Laser- Stimulated absorption, Spontaneous emission, Stimulated emission, Laser Terminology- Active Medium, Population, Population Inversion, Pumping, and Metastable State. Types of Laser-Gas Laser (He-Ne Laser), Nd-Yag Laser, Applications of Laser, Holography – Introduction, Principle of Holography, Recording of 3 D Image using Hologram, Reconstruction of 3 D images, Comparison with ordinary photography.

B) Fiber Optics: Structure of optical fiber. Principle of optical fiber. Propagation Mechanism in optical fiber- Angle of acceptance, Numerical aperture, Critical angle. Optical fiber communication system (Only Diagram), Advantages of optical fiber, Applications of optical fiber.

Unit-III- Crystallography & X-ray **No of Lecture: 8 Hours, Marks: 16**

A) Crystallography : – Introduction , Space Lattice – Translation Vectors, The Basis and crystal structure, Unit cell & Lattice parameters, Bravais Lattices, The cubic crystal- The Simple Cube (SC), Body Centered Cube (BCC), Important Parameters of cubic lattice – Number of atom per unit cell, Coordination Number, Atomic Radius , Packing density OR

Packing Factor, Calculation of Lattice Constant. Miller indices – Rules for finding Miller Indices, Important features of Miller Indices, Miller Indices for cube crystal, Numericals.

B) X-Rays: Production of X –rays (Coolidge tube), Continuous and characteristic x – rays, Bragg's law, Properties & Applications of X-ray, Numericals.

Unit- IV -Physics of Semiconductor **No of Lecture: 8 Hours, Marks: 16**

Classification of solid on the basis of band theory, Fermi-level and position of Fermi level in intrinsic [With derivation i.e E_f =(Ec + Ev) /2] and extrinsic semiconductors, Conductivity in semiconductors, Formation of P-N junction, Diode under forward and reverse bias, Hall Effect, Determination Hall Coefficient.

Unit-V- Optics **No of Lecture: 8 Hours, Marks: 16**

Interference- Interference, Michelson's Interferometer, Applications of Michelson's interferometer- wavelength determination, Refractive index of thin film, thickness of transparent material.

Diffraction- Diffraction, Theory of plane transmission diffraction grating, Determination of wavelength by grating, Rayleigh's criteria of resolution, resolving power of grating.

Polarization-Polarization, Polarization by reflection, Brewster's law, law of Malus, Dichroism, Polaroid's, Engineering application of polarization

Reference Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpath Rai Publications.
2. P S Aithal, H J Ravindra, "Engineering Physics", Acme Learning.
3. G Vijaya kumari , "Engineering Physics" , Vikas Publications.
4. M R Srinivasan, "Physics for Engineers", New Age International Publishers.
5. C S Solanki, "Solar Photovoltaic", PHI Learning Private Limited.
6. S O Pillai, "Solid state Physics", New Age International Publishers.
7. Ajay Ghatak, "Optics", TMH.
8. Hugh D Young, Roger A Freedman, "University Physics (With Modern Physics)", Pearson.
9. Hintendra K Malik, A K Singh, "Engineering Physics", Mc Graw Hill.
10. K Rajgopal, "Engineering Physics", PHI Learning Private Limited.
11. M N Avadhanulu, P G Kshrisagar, "Text book of Engineering Physics", S. Chand.
12. Uma Mukharji, "Engineering Physics" , Narosa Publishing House
13. S Deswal, A Deswal, "Basic Course of Environmental Pollution", Dhanpath Rai Publications.
14. N Subrahmanyam, Brijal, M N Avadhanulu, "Optics", S. Chand.
15. Sanjay Jain, "Engineering Physics", Universities Press (India) Pvt Ltd.

Engineering Chemistry – I

COURSE OUTLINE

Engineering Chemistry-I	**EC-I**	**FE 122**
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic sciences (Engineering Chemistry –I) to undergraduate students. The background expected includes a prior knowledge of chemistry from HSC (science) and familiarity with basic fundamental theories. The goals of the course are to understand the basic principles of Engineering Chemistry –I and their applications in different branches of engineering.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03

Prerequisite Course(s): 11th, 12th Chemistry,

General Objectives:

To apply the knowledge of science in engineering and technology and also understand the basic concepts of chemistry and to analyze it from experiments.

Learning Outcomes:

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

a) Design and conduct experiments, analyze and interpret data.
b) Design a component, system or process to meet desired needs within realistic constraints.
c) An ability to function on multidisciplinary terms.
d) Identify, formulate and solve problems.
e) Understand the impact of engineering solutions in global, economic, environmental and societal context.
f) Ability to appreciate contemporary issues and engages in life-long learning.
g) Use the latest techniques, skills and modern tools necessary for engineering practices.

h) Understanding of the necessity to quantitatively balance the built environment with the natural world.
i) Understanding the basic parameters of water, different water softening processes and effect of hard water in industries.
j) Understanding the preparation, basic properties and applications of various polymers as an engineering material.
k) Understand the preparation, basic properties and applications of Portland cement.
l) Understand the synthesis, various properties and applications of ceramics as an engineering material.
m) Understand the classification, preparation, properties and applications of different alloys.

COURSE CONTENT

Engineering Chemistry-I **Semester-I**

Teaching Scheme	**Examination Scheme**	
Lectures -3 Hrs/week	**End Semester Exams (ESE)**	**: 80 Marks.**
	Duration of (ESE)	**: 3 Hours.**
	Internal Sessional Exam (ISE)	**: 20 Marks.**

Unit – I Water **No. of Lect. – 08, Marks: 16**

a) Introduction: Definition of water, impurities of water
b) Types of hardness – Units of hardness, causes of hardness of water
c) Analysis of water - Chloride contents by Mohr's method, Alkalinity along with numerical.
d) Water Softening Process:(i) Lime soda process by Hot continuous process (Numerical based on it) (ii) Zeolite process, (iii) Ion exchange method, (iv) Reverse Osmosis method
e) Effect of hard water in steam generation, priming, foaming, caustic embrittlement.

Unit – II Polymer **No. of Lect. – 08, Marks: 16**

a) Introduction , Definition, functionality
b) Classification: on the basis of chemical composition, synthesis, intramolecular forces.
c) Types of polymerization – addition &condensation polymerization with mechanism and examples.
d) Plastic – Types of plastic – Thermoplastic & thermosetting plastic.
e) Compounding of plastic & their functions.

f) Explanation & different types with their properties & applications(i) PVC (ii) Teflon (iii) Polyurethane (iv) Polycarbonate (v) Polystyrene
g) Rubber - Types of rubber- natural & synthetic
h) Vulcanization of rubber: drawbacks of natural rubber
i) Synthetic Rubber - Synthesis, structure, properties & applications of- (i) Styrene butadiene rubber (SBR) (ii) Neoprene rubber (iii) Nitrile rubber (iv) Butyl rubber

Unit – III Cement **No. of Lect. – 08, Marks: 16**

a) Definition, Classification and properties - Natural, Puzzolona & Port land
b) Chemical constituent of Portland cement.
c) Manufacture of Portland cement by wet process.
d) Manufacture of Portland cement by dry process (using flow sheet diagram)
e) Setting & Hardening of Portland cement with chemical reaction.
f) Heat of hydration of cement.

Unit – IV Ceramics **No. of Lect. – 08, Marks: 16**

a) Introduction, Definition Classification of ceramics such as functional & structural classification.
b) Basic raw materials for ceramic preparation – clays, feldspars and flint or sand
c) Manufacture of ceramic by flow sheet diagram
d) Drying of ceramic wares – mechanism of drying, drying rate & shrinkage, methods of drying such as drying shades, cross – circulating drying, hot floor drying.
e) Firing of ceramic wares - Effect of heat on ceramic ware, Effect of heat on shrinkage & porosity.
f) Properties of ceramic material –
   1. Mechanical Properties such as Tensile strength, compressive strength, torsional Strength, plastic deformation.
   2. Thermal properties such as thermal conductivity, thermal shock resistance.
   3. Electrical properties such as insulator, ceramic conductor, ceramic Semiconductors.
g) Application of ceramics.

Unit – V Alloys **No. of Lect. – 08, Marks: 16**

a) Introduction,
b) Necessity (Purpose) of making alloys
c) Classification of alloys
d) Preparation of alloys – Fusion method, Electro deposition method

e) Composition , properties & application of following -(i)Brass (ii) Bronze (iii) Duralumine (iv) Nichrome (v) Steel – Mild, Medium & High.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.
2. Suba Ramesh, "Engineering Chemistry", Wiley India Pvt. Ltd..
3. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.
4. S S Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.
5. R Gopalan, "A Text book of Engineering Chemistry", Vikas Publishing House Pvt. Ltd. Third Edition
6. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.
7. Shashi Chawla, "A Text book of Engineering Chemistry", DhanpatRai Publishing Co.
8. V R Gowariker, "Polymer Science". New Age International.
9. Abhijit Mallick, "Engineering chemistry", Viva books.
10. Sunita Ratan, "Engineering chemistry", S K Kataria & Sons.
11. Das R K, "Industrial Chemistry", Asia Pub. House, New York, 1966

Engineering Mathematics - I

COURSE OUTLINE

Engineering Mathematics -I	**EM-I**	**FE 123**
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from 12th science and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03
Tutorial	01	15	13	01

Prerequisite Course(s): 11^{th}, 12^{th} Physics.

General Objective:

The basic necessity for the foundation of Engineering and Technology being Mathematics, the main aim is to teach mathematical methodologies and models, develop mathematical skill and enhance thinking and decision making power of student.

Learning Outcomes:

After completion of this course learner will be able to:

a) Apply knowledge of mathematics in engineering and technology.
b) Identify, formulate and solve engineering problems.
c) Design Mathematical models for engineering problems and solve them.

COURSE CONTENT

Engineering Mathematics-I **Semester-I**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Matrix Algebra **No. of Lect. - 08, Marks-16**

a) Definition of Elementary Transformations, Normal Form, Canonical Form & Rank of Matrix.
b) System of Linear Equations. (by using rank of matrix) for both Homogeneous & non-Homogeneous system.
c) Eigen values & Eigen vectors.
d) Orthogonal Matrix.
e) Introduction to Cayley-Hamilton's Theorem. (without proof)
f) Applications of Matrices (Translation, Scaling, Rotation).

Unit-II: Calculus of factions of single variable **No. of Lect. - 08, Marks-16**

a) Introduction to Successive Differentiation with standard formulae.
b) Leibnitz's theorem (without proof).
c) Taylor's & Maclaurin's theorems (without proof).
d) Expansion of Functions by using Taylor's theorem, Maclaurin's theorem & Leibnitz's theorem.
e) Applications of Taylor's theorem.

Unit-III: Integral Calculus (Some Special Functions) **No. of Lect. - 08, Marks-16**

a) Gamma Function.
b) Beta Function.
c) Differentiation under Integral Sign. (No Verification of Rule).
d) Error Function.

Unit-IV: Differential equation & its applications (1st order & 1st degree)
No. of Lect. - 08, Marks-16

a) Exact differential equation.

b) Non-exact differential equation. (reducible to exact differential equation by using integrating factor).
c) Linear differential equation.
d) Reducible to linear differential equation.
e) Applications of differential equation to simple electrical circuits & conduction of heat

Unit-V: Complex Number **No. Of Lect. - 08, marks-16**

a) Introduction to Circular functions, Hyperbolic functions & Inverse hyperbolic functions & their relations (without proof).
b) Hyperbolic functions.
c) Logarithm of a complex number.
d) Separation into real & imaginary parts.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.
2. C R Wylie, "Advanced Engineering Mathematics", TMH New Edition.
3. B S Grewal, "Higher Engineering Mathematics", Khanna Publication.
4. H K Das, "Advanced Engineering Mathematics", S. Chand & Company.
5. B V Ramana , "Engineering mathematics", (New Edition) TMH.
6. N P Bali, "A Text Book of Engineering Mathematics", Laxmi Publication.
7. Babu Ram, "Engineering Mathematics", Pearson Education.

Elements of Civil Engineering & Engineering Mechanics

COURSE OUTLINE

Elements of Civil Engineering & Engineering Mechanics **ECE&EM** **FE 124**
Course Title Short Title Course Code

Course Description:
This course provides the elementary level knowledge of civil Engineering and Engineering mechanics which includes-

a) Study of Forces and force systems.
b) Resultant and equilibrium of coplanar force systems.
c) Kinematics and kinetics of bodies which are in motion.
d) Scope of civil engineering and basic areas of civil engineering.
e) Types of civil engineering structures and important parts of buildings.
f) Principles of Planning and Building Byelaws.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	13	39	03
Tutorial	01	13	13	01

Prerequisite Course(s): Fundamental knowledge of Physics and mathematics of 11th and 12th std.

General Objective:

The general objective of course is to know the concepts of statics and dynamics. This includes application of math and physics principles to identify formulate and solve engineering problems. Also it aims to introduce the students the scope and basic areas of civil engineering.

Learning Outcomes:

Upon successful completion of this course the student will be able to:
(Engineering Mechanics):

a) Understand the basic physics concepts, such as force, weight, particle, and rigid body and SI system of units.
b) Compute the rectangular components of a force.
c) Identify and/or list the different types of force systems.
d) Define and calculate the resultant of coplanar force systems.
e) Define and calculate the moment of forces about any given point.

f) Draw free body diagrams of coplanar force systems.
g) Understand condition of equilibrium for coplanar forces
h) Solve for the forces and reactions in statically determinate coplanar force systems
i) Calculate the centroid of composite plane and curved figures.
j) Compute the tensile and compressive values of forces in truss members.
k) Define friction, friction force, static friction, kinetic friction,normal force, coefficient of static friction, angle of friction, and angle of repose.
l) Calculate the frictional force between two bodies in contact.
m) Find position, displacement, speed, velocity, acceleration, distance, and time of moving particle along the straight line and curved path.
n) Solve particle motion involving equation in 2D using rectangular and tangential/normal Coordinate systems.
o) Understand Newton's second law and D'Alembert's principle.
p) Understand principle of linear impulse and momentum.
q) Understand the principle of work and energy for particles.

(Element of Civil Engineering)

r) Understand of the role of the civil engineer
s) Know basic areas of civil engineering
t) Understand important civil engineering structures
u) Know principle of planning and building byelaws.
v) Understand use of the compass for angular measurement and calculation of included angles in a traverse

COURSE CONTENT

Elements of Civil Engineering & Engineering Mechanics **Semester-I**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE) : 03 Hours**
	Internal Sessional Exam (ISE) : 20 Marks

Unit I **No. of Lect. - 08, Marks-16**

A) Resultant of coplanar forces : Introduction, basic concepts, principle of mechanics, force systems, composition and resolution of forces, resultant of concurrent force system in plane, moment of forces, couples, Varignon's theorem, equivalent force couple systems, resultant of non-concurrent force system in plane.

B) Equilibrium of coplanar force system : Introduction, body constraints, types of supports and loads, free body diagram, conditions of equilibrium, equilibrium of forces in a plane , Lami's theorem, reactions of determinate beams, (simple and compound beams).

Unit II **No. of Lect. - 08, Marks-16**

A) Centre of Gravity: - Introduction, centre of gravity/centroid of composite plane figures and curves.

B) Analysis of Structure: - Plane trusses, method of joints and method of sections, cables subjected to point loads.

c) Friction: - Introduction, laws of friction, simple contact friction, ladder friction, application of friction on horizontal and inclined planes.

Unit III **No. of Lect. - 09, Marks-16**

A) Kinematics of rectilinear motion of particle: - Introduction, basic concepts, types of rectilinear motions, motion under gravity.

B) Kinematics of curvilinear motion of particle: - Introduction, basic concepts, motion along curved path, normal and tangential components of motion, rectangular and path coordinate systems, projectile motion.

Unit IV **No. of Lect. - 07, Marks-16**

A) Kinetics of rectilinear motion of particle: - D'Alembert's Principle, Newton's second law of motion, introduction to work and energy, impulse momentum principle. (No numerical on work and energy and impulse momentum principle).

B) Elements of Civil Engineering: Surveying: Compass: - Principles of surveying. Introduction to compass, bearing, Whole Circle Bearing and Reduced Bearing systems, local attraction, its detection and correction.

Note for unit 4: Out of three questions on unit 4; one question, consisting of 04 marks on Engineering Mechanics (EM), i.e. part A and 04 marks on Elements of Civil Engineering (ECE), i.e. part B is compulsory. Out of remaining two questions, one complete question should be on EM and one complete question should be on ECE.

Unit V **No. of Lect. - 07, Marks-16**

A) Basic Civil Engineering: - Introduction to various branches of civil engineering, introduction to various civil engineering structures such as buildings, highways, railways, bridges, dams, canals, elevated and ground storage reservoirs etc.

B) Building Construction: - Introduction to principles of planning, building rules and bye-laws, load bearing, framed and composite structures, introduction to various parts of buildings.

Reference Books:

1. Bhavikatti S S & K G Rajashekarappa, "Engineering Mechanics", New Age International (P) Ltd., Publishers.
2. Unadkat Sanju, "Engineering Mechanics", Tech-Max Publications, Pune.
3. Kanitkar T P and Kulkarni , "Surveying and Levelling, Part I", Pune Vidyarthi Graha Prakashan, 24th Edition
4. Bindra and Arora, "Building Construction", Dhanpatrai and Sons, Delhi.
5. N Kumara Swamy and A Ksmeswara Rao, "Building Planning and Drawing" ,Charotar Publishing House Pvt. Ltd.
6. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.
7. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition
8. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.
9. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition
10. R C Hibbeler "Engineering Mechanics statics and dynamics", Pearson Education, 11th Edition.
11. S R Bendale, "Engineering Mechanics", John Wiley & Sons, Delhi, 1st Edition
12. Jaget Babu, "Engineering Mechanics", Pearson Education, Delhi, 1st Edition.
13. Sushilkumar, "Building Construction", Standard Publishers, New Delhi, 2010.
14. M G Shah, Kale C.M. and Patki S.Y., "Building Drawing", Tata McGraw Hill Co. Ltd., New Delhi.

Computer Programming

Course Outline

Computer Programming	**CP**	**FE 125**
Course Title	Short Title	Course Code

Course Description:

The objective of this course is to introduce the students to the fundamentals of computers, the concepts of the C and C++ programming language and enable them to apply these concepts for solving real world problems.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	45	03

Prerequisite Course(s): Fundamental knowledge of Computers.

General Objective:

This course covers introduction to Computers, Algorithms and flowcharts, C and C++ programming concepts including variables, control structures, arrays and structures.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

a) Understand the principles of designing structured programs.
b) Write and debug programs using an IDE.
c) Know use of the appropriate statements available in the C and C++ language.
d) Implement small to medium programs of varying complexity, using the most commonly used features of the language.
e) Employ good programming style, standards and practices, during program development.
f) Adapt programming experience and language knowledge to other programming language Contexts.
g) Explain the principles of structured program design.
h) Describe what is meant by a well designed program.
i) Describe when and how to use the standard C and C++ statement.

COURSE CONTENT

Computer Programming **Semester-I**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit- I: Program Development Concepts and Introduction to C

No of Lect. – 8, Marks: 16

a. Algorithms, flowcharts.
b. Types of programming languages.
c. Programming language tools.
d. History of C programming.
e. Data types in C.
f. Writing simple programs.

Unit- II: Control Structures and Basic Input/output

No of Lect. – 8, Marks: 16

a. C operators and expressions.
b. Introduction to decision control statements.
c. Conditional branching statements.
d. Iterative statements.
e. Nested loops.
f. Break, continue and goto statements.
g. Basic Input/output statements.

Unit- III: Arrays and Strings **No of Lect. – 8, Marks: 16**

a Declaration and initialization of arrays
b Accessing and storing values in arrays
c Operations performed on arrays
d One and Two- dimensional arrays
e Introduction to strings.
f Declaration and initialization of string.
g String operations with and without C library functions.

Unit- IV: Functions and Structures **No of Lect. – 8, Marks: 16**

a Introduction to functions.

b Function declaration and definition.

c Function call and parameter passing.

d Introduction to structures.

e Initializing and accessing members of a structure.

Unit- V: Introduction to C++ **No of Lect. – 8, Marks: 16**

a Limitations of procedure oriented programming.

b Object-oriented programming paradigm.

c Basic concepts of object-oriented programming.

d Classes and objects

e Defining member functions and scope resolution operator.

f Simple C++ program with class and object.

Reference Books:

1. E Balagurusamy, "Programming in ANSIC C", Tata McGraw Hill, 4/E, 2007.
2. E Balagurusamy "Object Oriented Programming with C++", Tata McGraw Hill, 4/E, 2008.
3. Yashavant Kanetkar, "Let Us C", BPB Publications ,10/E, 2010.
4. Reema Thareja, "Computer Fundamentals and Programming in C", OXFORD University Press, 2012.
5. Stephen G Kochan "Programming in C", Pearson Education , 3/E, 2004.
6. Ashok N Kamthane, "Computer Programming", Pearson Education , 2/E,2008.
7. Vikas Gupta, "Computer Concepts and C Programming", Dreamtech Press, 2009.
8. K R Venugopal and S R Prasad, "Mastering C", Tata McGraw Hill, 1/E, 2011.
9. Behrouz A Forouzan, Richard F Gilberg, "COMPUTER SCIENCE – A Structured Programming approach using C", Thomson, 3/E Indian Edition, 2007.
10. Kernighan, Ritchie, "The C Programming Language", Prentice Hall of India , 2/E, 1988.
11. Pradeep K Sinha and Priti Sinha, "Computer Fundamentals", BPB Publications , 4/E, 2007.
12. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publication, 2003.

(Engineering Science Lab-I)

LAB COURSE OUTLINE

(Engineering Science Lab-I)

Engineering Science Lab-I	**ES-I LAB**	**FE 126**
Course Title	Short Title	Course Code

Laboratory (Alternate week)	**Hours/ Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	02	15	26	1

Engineering Physics – I

Course Description:

In this laboratory, course emphasis is on the understanding of basic principles, characteristic – properties for semiconductor diode, different instruments used in a field of optics, electronics, communication and metallurgy etc. The learner here can use this knowledge and apply in various branches of engineering as required.

Prerequisite Course(s): Course of Physics at HSC level.

General Objective:

The objective of the laboratory is to impart the fundamental knowledge of physics to the students and develop their ability to apply the specific procedures to analyze the experimental results.

In this lab, students will be familiar with the use of different equipments, basic principles, properties etc which they can apply in various disciplines of engineering during their studies and in future.

Learning Outcomes: After successful completion of this lab student will be able to:

a) Use the latest techniques, skills, and modern tools necessary for engineering practices.

b) Design a component, system or process to meet desired needs with in realistic constraints.

c) Understand classification of solid on the basis of band gap

d) Can analyze characteristic properties and determine the resistivity of semiconductor.

e) Analyze wavelength of Laser, working of Laser, various properties and applications.

f) Describe the use of fiber optics in communication.

g) Can study Hall effect & determine Hall coefficient.

h) Describe working of solar cell, its advantages, disadvantages and uses.

i) Describe the working of Michelson's Interferometer & find unknown wavelength of monochromatic light..

j) Can understand the phenomenon of diffraction & diffraction grating and determine wavelength of light using diffraction grating.

k) Can determine the polarizing angle & refractive index of glass by using Brewster's law.

l) Can study the law of Malus.

m) Can study the crystal structure.

LAB COURSE CONTENT

Practical -2 Hrs/Alternate weeks (Alternate with Engineering Chemistry- I)

(Note: Minimum FIVE Experiments from the following)

1. Semiconductor diode characteristics.

a) To determine forward and reversed characteristics of given semiconductor diode.

b) Analyze the knee voltage of given diode.

c) Compare analytical and the practical values.

2) Band gap in semiconductor material.

a) To determine forbidden energy gap of given semiconductor.

b) Compare analytical and the practical values.

3) To determine the resistivity of the given semiconductor by using four probe method.

a) To determine the resistivity of given semiconductor.

b) To study its variation with temperature.

4) To determine the wavelength of laser source

a) To determine wavelength of He-Ne Laser using diffraction grating.

b) Study the properties of Laser.

c) Compare analytical and the practical values.

5) Fiber Optics Communications.

a)Study of fiber optics communication

b) Describe the advantages of optical fiber over metallic cables.

6) Hall effect & determination of Hall coefficient.

a) A study of Hall Effect in semiconductors.

b) To determine Hall coefficient of semiconductor.

c) To determine the sign of majority charge carrier.

7) Solar cell Characteristics

a) To study the characteristics of solar cell

b) To find fill factor.

c) To determine its efficiency.

d) Measure intensity of source using Lux meter.

8) Spectrometer Grating

a) To understand diffraction phenomenon and diffraction grating.

b) To determine wavelength of light using diffraction grating

c) Compare analytical and the practical values.

9) Michelson's Interferometer

a) To determine unknown wavelength of monochromatic light.

b) Describe the operation of Michelson's Interferometer.

c) Compare analytical and the practical values.

10) Determination of polarizing angle for glass and to determine refractive index of glass using Brewster's law.

a) To determine polarizing angle and refractive index using Brewster's law.

11) Experimental verification of law of Malus

a) To study law of Malus (i.e.- Intensity of polarized light is proportional to $\cos^2\theta$)

12) Crystal structure

a) To Study the given crystal structure.

Reference Books:

1. M N Avadhanulu, A A Dani, P M Pokley, "Experimets in Engineering Physics", S.Chand.
2. S P Singh, "Advanced Practical Physics", Pragati Prakashan.

Engineering Chemistry-I

LAB COURSE OUTLINE

Course Description: In this laboratory course emphasis is on the understanding of basic principles, characteristic properties of water, polymers, and alloys as engineering materials. The learner here can use this knowledge and apply in various branches of engineering as required.

Prerequisite Lab Course(S): 12th Chemistry, Different laws, basic principles and theories.

General Objectives:

This course is intended to provide engineering students with a background in important concepts and principles of chemistry and emphasis on those areas considered most relevant in an engineering context, and practical applications in engineering and technology.

Learning Outcomes:

Upon successful completion of lab Course, student will be able to:

a) Analyze the total hardness of water sample by EDTA method.

b) Analyze the strength of dissolved oxygen from water sample by

Winkler's Method.

c) Analyze the alkalinity of water sample by volumetric method.

d) Analyze the chloride content of water sample by Mohr's method.

e) Estimate the percentage of phenol iodometrically.

f) Determine the yield percentage of Polystyrene by bulk polymerization.

g) Determine the yield percentage of Phenol Formaldehyde Resin (Bakelite).

h) Analyze the percentage of copper in given Brass Sample.

i) Analyze the percentage of Zinc in given Brass Sample.

j) Analyze the percentage of Calcium in given Cement sample.

LAB COURSE CONTENT

Practical : 2 hour/ week (Alternate with Engineering Physics-I)

(Note: Minimum FIVE Experiments from the following)

1. Estimation of total hardness of given sample of water by EDTA Method.

a. Standardization of EDTA by using standard hard water.

b. To find the exact normality of EDTA solution.

c. Estimation of total hardness of given water sample.

2. Determination of Dissolved oxygen present in given water sample (Winkler's Method).

a. Standardization of Sodium Thiosulphate solution against std. $K_2Cr_2O_7$ solution using starch indicator.

b. Calculate exact normality of Sodium Thiosulphate solution.

c. Estimation of dissolved oxygen from given water sample.

d. Calculate the strength of dissolved oxygen from given water sample.

3. Determination of alkalinity of water sample.

a. To find the presence of OH^-, CO_3^{2-} and HCO_3^- ions in given sample of water by titrating against N/10 HCL using phenolphthalein indicator.

b. Using Methyl orange indicator in the same solution, to find out the methyl orange end point.

c. Calculate the amount of OH^-, CO_3^{2-} and HCO_3^- ions in given sample by end point results.

4. Estimation of Chloride content in a given water sample by Mohr's Method.

a. Standardization of $AgNO_3$ solution by using Standard NaCl solution.

b. To find the exact normality of $AgNO_3$ solution.

c. Estimation of Chloride ions in given sample of water.

d. Calculate the strength of Chloride ions in sample water.

5. Estimation of phenol by Iodometrically.

a. Dilution of Phenol solution.

b. Back titration of the above solution against standard 0.1 N Sodium Thiosulphate solutions.

c. Blank titration from brominating stock solution against 0.1 N Sodium Thiosulphate solutions.

d. Calculate the percentage of phenol.

6. Preparation of Polystyrene by bulk polymerization.

a. Add nitrogen to styrene in oil bath.

b. Cool the mixture and break it to give Polystyrene.

c. Dissolve the polystyrene in benzene, filter the precipitate and dry it.

d. Calculate the yield percentage.

7. Preparation of Phenol Formaldehyde Resin (Bakelite).

a. Dissolution of Glacial acetic acid, formaldehyde and phenol.

b. Acidifying the above solution.

c. Washing the residue obtained with distilled water and dry it.

d. Calculate of the yield of Phenol formaldehyde resin.

8. Estimation Copper in Brass Iodometrically.

a. Prepare given brass sample by acidifying, neutralizing and dilution in volumetric flask.

b. Determine the amount of Copper in diluted brass sample solution by volumetric titration.

c. Calculate the percentage of copper in given Brass Sample.

9. Estimation of Zinc from Brass Volumetrically.

a. Standardization of K_4 [Fe (CN) $_6$] by using Uranyl nitrate indicator.

b. Dilution of the brass sample.

c. By removing Sn, Pb, Cu, Fe from the solution.

d. Titrating the remaining solution against K_4 [Fe (CN) $_6$] and calculate the percentage of Zinc in Brass sample.

10. Determination of % of Ca in Cement.

a. Dilution of the cement sample in NH_4Cl Solution.

b. Distilled off and filter the solution with Whatmann paper No. 1.

c. To the above filtrate add NH_4NO_3 solution, keep the filtrate and washing for the estimation of Lime.

d. Estimation of Lime- Rectify the solution then add methyl red indicator along with ammonium oxalate solution.

e. Calculate the amount of Calcium using oven and estimate the percentage of lime from the sample.

f. Also find the percentage of calcium by volumetric analysis using $KMNO_4$ solution.

Reference Books:

1. Shashi Chawla, "Essentials of Experimental Engineering Chemistry", DhanpatRai Publishing Co.Pvt. Ltd.
2. Dr Sudha Rani, "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing Co.Pvt. Ltd.

Guide lines for ICA :

ICA (Internal Continuous Assessment) marks of 25 are for practicals in Engineering Physics - I & Engineering Chemistry – I.

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Computer Programming Lab

LAB COURSE OUTLINE

Computer Programming Lab	**CP LAB**	**FE 127**
Course Title	Short Title	Course Code

Course Description:

This laboratory provides students with a comprehensive study of the C and C++ programming language. Classroom lectures stress the strengths of C and C++, which provide students with the means of writing efficient, maintainable, and portable code.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Laboratory	2	15	30	1

ESE Pattern: Practical (PR)

Prerequisite Course(s): Fundamental knowledge of Computers.

General Objective:

The objective of this laboratory is to introduce the students to the fundamentals of computers, the concepts of the C and C++ programming language and enable them to apply these concepts for solving real world problems.

Learning Outcomes:

Upon successful completion of the lab student will be able to

a) Program for basic arithmetic operations and expressions

b) Program for finding roots of a quadratic equation, square root of a number

c) Find area and volume of geometric objects

d) Find greatest and smallest of 2or 3 numbers

e) Generate odd / even numbers

f) Find factorial of a number

g) Check / generate prime numbers

h) Check for Armstrong numbers

i) Check a number for palindrome

j) Find GCD of two numbers

k) Generate sine /cosine series/value

l) Solve a linear equation

m) Print a number in words

n) Find Greatest / smallest/ sum /average of 'n' numbers

o) Convert Integer to binary / hex and octal

p) Find Greatest / smallest/ sum /average of 'n' numbers(Using arrays)

q) Apply Linear / binary search

r) Generate Permutation and Combination

s) Perform String processing / operations

t) Sort numbers and Strings

u) Perform Matrix operations

v) Record processing using structure

LAB COURSE CONTENT

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Program for basic arithmetic operations and expressions.**
    a. Performing simple arithmetic operations like
    b. Addition,
    c. Subtraction,
    d. Multiplication,
    e. Division.
2. **Program for finding roots of a quadratic equation, square root of a number**

    Finding roots of any quadratic equation and square root of any given number.
3. **Find area and volume of geometric objects**

    Calculate area and volume of geometric objects (circle, square, triangle etc.)
4. **Finding greatest and smallest of 2 or 3 numbers**

    To find smallest and largest numbers from given 2 or 3 numbers.

5. **Generating odd / even numbers**

   To generate odd and even numbers.

6. **Finding factorial of a number**

   Calculate the factorial of any given number.

7. **Checking / generating prime numbers**

   Generate the prime numbers.

8. **Checking for Armstrong numbers**

   Generate the Armstrong numbers.

9. **Checking a number for palindrome**

   Check the given number for palindrome.

10. **Finding GCD of two numbers**

    Calculate GCD of any two numbers.

11. **Generating sine /cosine series/value**

    Generate the sine/cosine series.

12. **Solving a linear equation**

    To solve the linear equation.

13. **Printing a number in words**

    Print any given number in words.

14. **Greatest / smallest/ sum /average of 'n' numbers**

    Find the greatest/smallest/sum/average of any given n numbers.

15. **Integer to binary / hex and octal conversion**

    To integer to binary, hex and octal.

Group B

1. **Greatest / smallest/ sum /average of 'n' numbers**

   To find the greatest/smallest/sum/average of given n numbers using arrays.

2. **Linear / binary search**

   To search a number from given n numbers using linear and binary search.

3. **Permutation and Combination generation**

   Calculate the permutation and combination.

4. **String processing / operations**

Performing string operations using arrays.

5. **Sorting of numbers and Strings**

   Sorting any string and numbers ascending and descending order using arrays.

6. **Matrix operations**

   Performing matrix operation (addition, subtraction, multiplication etc.) using arrays.

7. **Record processing using structure**

   Processing student record using structures.

Reference Books:

1. E Balagurusamy, "Programming in ANSIC C", Tata McGraw Hill, 4/E, 2007.
2. E Balagurusamy "Object Oriented Programming with C++", Tata McGraw Hill, 4/E, 2008.
3. Yashavant Kanetkar, "Let Us C" , BPB Publications ,10/E, 2010.
4. Reema Thareja, "Computer Fundamentals and Programming in C", OXFORD University Press, 2012.
5. Stephen G Kochan "Programming in C",Pearson Education , 3/E, 2004.
6. Ashok N Kamthane, "Computer Programming", Pearson Education , 2/E,2008.
7. Vikas Gupta, "Computer Concepts and C Programming", Dreamtech Press, 2009.
8. K R Venugopal and S R Prasad ,"Mastering C", Tata McGraw Hill, 1/E, 2011.
9. Behrouz A Forouzan, Richard F Gilberg, "COMPUTER SCIENCE – A Structured Programming approach using C", Thomson, 3/E Indian Edition, 2007.
10. Kernighan, Ritchie, "The C Programming Language", Prentice Hall of India , 2/E, 1988.
11. Pradeep K Sinha and Priti Sinha, "Computer Fundamentals", BPB Publications , 4/E, 2007.
12. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publication, 2003.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

a. ESE will be based on the practical assignments submitted by the students in the form of journal.

b. In the ESE, the students may be asked to perform the practical assignment with minor modification.

c. Evaluation will be based on the paper work of flowchart and algorithm, understanding of the logic and the syntax, quality of program code, execution of the program code, type of input and output for the program code.

Elements of Civil Engineering & Engineering Mechanics Lab

LAB COURSE OUTLINE

Elements of Civil Engineering & Engineering Mechanics Lab	**ECE & EM LAB**	**FE 128**
Course Title	Short Title	Course Code

Course Description:

These laboratories cover experiments related to basic principles of Statics, Dynamics and Compass Surveying.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	13	26	1

ESE Pattern: Oral (OR)

General Objective:

In these laboratories students will be introduced to the applications of different theorems of mechanics to solve problems in statics and dynamics. Also students will get familiar with surveying with Compass. These include:

a) Concept of vectors.
b) Triangle law of forces.
c) Lami's theorem.
d) Conditions of equilibrium.
e) Laws of friction.
f) Laws of simple machines.
g) Angular measurement with Compass.

Objective to develop following Intellectual skills:

a) To understand basic laws of engineering mechanics & apply the same to solve problems.
b) To learn use of prismatic compass for angular measurements.
c) To identify principles and working of different apparatus in laboratories.

Objective to develop following Motor skills:

a) Ability to draw diagrams and graphs.
b) Ability to apply forces and measure the corresponding effects.
c) Ability to perform the experiments and record the observations.
d) Ability to apply the basic principles in various field conditions.

Learning Outcomes:

Upon successful completion of these experiments the student will be able to

a) Apply concept of vectors to solve problems in engineering.
b) Study and verify Lami's theorem and apply it to solve problems in engineering.
c) Understand and apply triangle law of forces for solving problems.
d) Understand the conditions of equilibrium of forces.
e) Describe efficiency, load, effort, velocity ratio, frictional effort and verify law of machines.
f) Describe frictional forces, limiting friction, coefficient of friction and verify law of friction.
g) Apply graphical method to solve problems.
h) Measure bearings of lines with prismatic compass and calculate included angles.

LAB COURSE CONTENT

Group A

1 Study of vectors.

a. To calculate resultant of coplanar and non coplanar (space) forces.
b. To calculate unknown force (reaction).

2 Verification of law of polygon of forces.

a. To verify law of polygon of forces.
b. To calculate analytically and experimentally resultant of concurrent force system.
c. To compare analytical values with measured ones.

3 Verification of Lami's theorem.

a. To Verify Lami's theorem.
b. To observe the ratios of $P/\sin\alpha$, $Q/\sin\beta$, $R/\sin\gamma$ and compare the same.

4 Forces in jib crane

a. To study law of triangle of forces analytically and graphically.
b. To apply conditions of equilibrium.
c. To calculate forces in members of jib crane.
d. To compare the theoretical results with experimental values.

5 Reactions of beam.

a. To verify conditions of equilibrium of a system of coplanar parallel forces using reaction of beam apparatus.
b. To understand active and reactive forces.

6 Simple friction on horizontal and inclined planes.

a. To describe frictional force, limiting friction, coefficient of friction, angle of repose.
b. To know the concept that the Force ? Reaction.

c. To find coefficient of friction for bodies in equilibrium on inclined planes.

7 Study of simple machines and verification of law of machines

a. To describe efficiency, load, effort, velocity ratio, frictional effort and verify law of machines.

b. To establish the law of machine from graph.

8 Graphical work (Statics) – (minimum three problems on graphical solution of Static's problems).

To understand graphical method to solve the problems in statics.

a. To solve the problem on coplanar concurrent forces, parallel forces and reactions of beam by graphical method.

b. To describe Bow's notation, space diagram, vector diagram, polar diagram, funicular diagram and to draw the same.

9 Graphical work (Dynamics) – (minimum two problems on graphical solution of Dynamic's problems).

a. To draw the motion curve and understand the significance of the same.

b. To calculate displacement and distance travelled from V-T diagram.

Note: The laboratory journal should consist of six experiments/assignments from group A. Assignment no. 8 and 9 are compulsory. Any four out of remaining seven experiments/assignments are to be conducted.

Group B

1 Observations of bearings by using Compass and calculations of included angles.

a. Describe whole circle and quadrantal bearing system.

b. Calculate included angles from observed bearings in a closed traverse.

2 Assignment based on fifth unit. Any one of the following.

a. Write notes on the following: Various branches of civil engineering such as Structural Engineering, Water Resources Engineering, Geotechnical Engineering, Transportation Engineering, Environmental Engineering, Building Science and Construction Management.

b. Write notes on the following Civil Engineering structures such as buildings, highways, railways, bridges, dams, canals, elevated & ground storage reservoirs.

c. i) Explain principles of planning.

ii) Differentiate between load bearing and framed structures with neat sketches.

Note: The laboratory journal should consist of above two experiments/assignments from group B.

Reference Books:

1. Bhavikatti S S & K G Rajashekarappa, "Engineering Mechanics", New Age International (P) Ltd., Publishers.
2. Unadkat Sanju, "Engineering Mechanics", Tech-Max Publications, Pune.
3. Kanitkar T P and Kulkarni , "Surveying and Levelling, Part I", Pune Vidyarthi Graha Prakashan, 24th Edition
4. Bindra and Arora, "Building Construction", Dhanpatrai and Sons, Delhi.
5. N Kumara Swamy and A Ksmeswara Rao, "Building Planning and Drawing" ,Charotar Publishing House Pvt. Ltd.
6. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.
7. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition
8. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.
9. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition
10. R C Hibbeler "Engineering Mechanics statics and dynamics", Pearson Education, 11th Edition.
11. S R Bendale, "Engineering Mechanics", John Wiley & Sons, Delhi, 1st Edition
12. Jaget Babu, "Engineering Mechanics", Pearson Education, Delhi, 1st Edition.
13. Sushilkumar, "Building Construction", Standard Publishers, New Delhi, 2010.
14. M G Shah, Kale C.M. and Patki S.Y., "Building Drawing", Tata McGraw Hill Co. Ltd., New Delhi.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignments submitted by the student in the form of journal. In ESE the student may asked to answer questions based on experiments/assignments. Evaluation will be based on performance in oral examination.

Workshop Practice- I

LAB COURSE OUTLINE

Workshop Practice I	**WP-I**	**FE 129**
Course Title	Short Title	Course Code

Course Description:

Workshop Practice I covers the basic knowledge and practices on measuring instrument, fitting shop, welding shop, Tin smithy, Black smithy, foundry shop and computer hardware workshop in order to improve the practical skill of students in different workshops.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Laboratory	2	11	22	1

Prerequisite Course(s): 11th, 12th Physics, Mathematics, Engineering Drawing, Engineering Materials.

General Objective:

In workshop practice, students will get familiar with use of different workshop practices like fitting, welding, tin smithy, black smithy, foundry and computer hardware workshop. Students will also get familiar with different tools, machines, equipments, job holding devices, job drawing, job material, job manufacturing operations and processes in different workshops.

Objective to develop following Intellectual skills:

a. Identification and selection of manufacturing processes/operations according to job requirement in different workshops.
b. Identification, selection and understanding of tools, equipments, machines and job material according to job drawing for different workshops.
c. Understanding working principle and construction of process planning sheet.
d. Identification, understanding of the working principle of computer hardware components.

Objective to develop following Motor skills:

a. Ability to handle measuring instruments.
b. Ability to read the job drawing.

c. Ability to understand the basic working principle of fitting operations, tools and equipments in fitting shop.
d. Ability to understand the basic working principle of welding operations, tools and equipments in welding shop.
e. Ability to understand the basic working principle of sheet metal operations, tools and equipments in tin smithy shop.
f. Ability to understand the basic working principle of black smithy operations, tools and equipments in black smithy shop.
g. Ability to understand the basic working principle of moudling and casting operations, tools and equipments in foundry shop.
h. Ability to understand working principle of computer hardware and its application.

Learning Outcomes:

Upon successful completion of these practical's the student will be able to hand

a) Measuring Instruments and fitting shop
b) Welding Shop
c) Tin smithy shop
d) Black smithy shop
e) Foundry shop
f) Computer Hardware Workshop

LAB COURSE CONTENT

1 Measuring Instruments

a. Demonstration of handling measuring instruments like steel rule, measuring tape, try- square, vernier caliper, micrometer, vernier height gauges, bevel protector etc.

b. **Fitting shop**

One job on finishing two sides and make right angles of square job by filling operation, one drilling and taping operations.

2 Welding Shop

a. One Job on T-joint: one side of T-joint welded by Gas welding and another by Electrical Arc Welding
b. Demonstration of Brazing.

3 Tin Smithy

One job including soldering, Riveting etc. For example- letter box, Waste paper basket, tray, Funnel etc.

4 Black Smithy

One job on black smithy including Bending and Flattening etc. For example: S-shape, hook shape, U shape job.

5 Foundry Shop

Demonstration of preparation of molding, casting of any simple pattern.

6 Computer Hardware Workshops

a. Introduction to Personal Computers, PC Main Parts: CPU, Input and Output devices.
b. Introduction of Floppy & CD drives, HDD, CD, DVD, USB Flash Drives, and Memory cards.
c. Introduction of Motherboard, I/O connectors. Installation of cards, devices and connecting cables, Identification of cables of computers (connecting media)

Reference Books

1. Hajara Chaudhary and Bose S K, "Element of Workshop Technology Volume I and II", Asia Publishing House.
2. P N Rao, "Production Technology Volume I and II", Tata McGraw Hill Publication.
3. R K Jain, "Production Technology", Khanna Publications.
4. P C Sharma, "Production Technology", Khanna Publication.
5. Chapman W A J, "Workshop Technology", ELBS Publication.
6. HMT, "Production Technology", Tata McGraw Hill Publication.
7. Kannaiah K L, Narayana, "Workshop Manual", Scitech Publications, Chennai, 2nd Edition.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Soft Skills - I

LAB COURSE OUTLINE

Soft Skills-I	**SS I**	**FE 130**
Course Title	Short Title	Course Code

Course Description:

Through this course we have tried to bridge the gap of industry and institution by bringing in an awareness and practical approach to soft skills such as communication skills, presentation skills and written language. This course stresses on ability to communicate, public speech, e-presentations and structure of English language.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	1	15	15	2
Laboratory	2	15	30	

Prerequisite Course(s): Fundamental knowledge of English of 11th and 12th.

General Objectives:

We have tried to achieve the following objectives through this course:

a) To make the student industry ready in terms of his/her ability to communicate effectively

b) To augment the ability of the student to create, compose and render presentations with or without the help of media

c) To understand the importance of public speech and the role language plays in that

d) To enhance the ability of written communication by giving a primer on English

Learning Outcomes:

Upon successful completion of this course the student will be able to:

a) Understand the importance of communicating effectively

b) Communicate effectively by removing barriers

c) Address an audience effectively and deliver speeches without inhibition

d) Create and deliver effective e-presentations

e) Understand the meaning and utility of Active Listening in communication

f) Use the vocabulary more effectively

g) Expand and enrich grammatical structure and vocabulary in English

h) Comprehend thoughts through body language and use it as a tool to understand non-verbal signals for better communication

LAB COURSE CONTENT

1 Communicate With Confidence No of Lect. – 9, Marks: 10

a Communication Skills and Barriers to Communication

b Listening Skills

c Assertion Skills

2 Speaking to be Understood No of Lect. – 9, Marks: 10

a Basic Corpus for Formatted Feeding

b A Matter of Pronunciation

c Pattern Drills and Dialogues

3 Public Speech No of Lect. – 9, Marks: 10

a Influencing Others

b Speaking in Public

c Learning to Read Through Body and Voice

4 Effective Presentations No of Lect. – 9, Marks: 10

a Formulas and Advanced Techniques of Presentations

b E-Presentations

c The Fear Factor

5 Eloquent Writing - I No of Lect. – 9, Marks: 10

a Comprehension of Passages

b Understanding of English Language

c Vocabulary Enhancement Practice

Reference Books:

1. Allan and Barbara Pease, "A Definitive Book on Body Language", Publication Bantam Books.
2. Robert Bolton, "People Skills: How to Assert Yourself, Listen to Others and Resolve Conflicts", Publication Simon and Schuster.
3. R K Iyer, "Spoken English", IU Publications.
4. Sethi and Dhamija , "A Course in Phonetics and Spoken English", Prentice Hall of India.
5. Matthew McKay , "The Communication Skills", Publisher: New Harbinger Publications Inc.
6. Frank Paolo , " How to Make a Great Presentation in 2 Hours", Pustak Mahal.
7. Kaplan's GRE, Kaplan Publications.
8. Barron's GRE, Galgotia Publications.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

First Year Engineering

(Common to all branches)

Faculty of Engineering and Technology

SEMESTER-II

W.E.F 2012 – 2013

Engineering Physics - II

COURSE OUTLINE

Engineering Physics – II	**EP- II**	**FE221**
Course Title	short Title	course code

Course Description:
This course is aimed at introducing the fundamentals of basic sciences (Engineering Physics-II) to undergraduate students. The background expected includes a prior knowledge of physics from HSC (science) and familiarity with various laws, principles and theories. The goals of the course are, to understand the basic principles of science (Engineering Physics -II) and their applications in different areas.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03

Prerequisite Course(s): HSC Physics, Different Laws, Principles and Theories.

General Objective:

The objective of this course is to provide learner with basic concepts and knowledge of sciences (various principles theories laws etc.) and to analyze it from experiments. The learner can apply the same in various branches of Engineering and Technology.

Learning Outcomes:

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

a) Understand the impact of Engineering Solutions in global, economic, environmental and societal contexts.
b) Design and conduct experiments, analyze and interpret data.
c) Use the latest techniques, skills, and modern tools necessary for engineering practices.
d) Design a component, system or process to meet desired needs with in realistic constraints.
e) Identify, formulate and solve problems.

f) Describe the basics of acoustics and its use in designing/ planning of Hall, Building, and Theaters etc. Various factors affecting acoustics of building and its remedy.
g) Understand the concept of ultrasonic waves , its production and applications.

h) Describe the different properties, classification and applications of magnetic materials and super conductors.
i) Understand and describe the concepts of Modern Physics and Spectroscopy and their applications in various fields.
j) Understand the state of micro particles, its physical parameters, Uncertainty Principle, Schrodinger's wave equation and their applications
k) Understand the basic concepts of nano science, nano particles properties and classification of nano materials, their advantages and applications.

COURSE CONTENT

Engineering Physics - II **Semester-II**

Teaching Scheme	**Examination Scheme**	
Lectures -3 Hrs/week	**End Semester Exam (ESE)**	**: 80 Marks**
	Duration of (ESE)	**: 3 Hours.**
	Internal Sessional Exam (ISE)	**: 20 Marks.**

Unit –I- Acoustics & Ultrasonic's **No of Lectures: 8 Hours, Marks: 16**

A) Acoustics- Elementary acoustics, Echo, Reverberation, Reverberation time, Sabine's formula(without derivation). Coefficient of absorption, Intensity Level, Loudness, decibel, Acoustic Intensity, Limits of Audibility, Acoustical planning of building, Factors affecting the architectural acoustics of building, Limits of audibility, Numericals

B) Ultrasonic's -Ultrasonic waves, Production of ultrasonic waves -by 1) Piezoelectric generator its merit & Demerit 2) Magnetostriction oscillator- Its merits & demerits Properties of ultrasonic. Engineering applications of ultrasonic, Numericals

Unit –II- Magnetic Materials and Superconductivity

No of Lectures: 8 Hours, Marks: 16

A) Magnetic Materials – Origin of Magnetism, Classification of magnetic materials into Para magnetism, Diamagnetism & Ferromagnetism, Hysteresis loop, Hard and Soft magnetic materials. Ferrites – production, properties & applications, Numericals

B) Superconductivity- Superconductor, Type-I & Type –II superconductor, Properties of superconductor, effect of impurity, magnetic field, pressure, stress etc on super conductor, Meissner's effect, Applications of superconductor. Numericals

Unit-III Modern Physics & Spectroscopy **No of Lectures: 8 Hours, Marks: 16**

A) Modern Physics: Motion of Charged particle in electric field, magnetic field, and Combined field, Electron microscope (SEM) , Positive rays, Block diagram, principle, and

working of Cathode ray oscilloscope, Bainbridge Mass Spectrograph(Principle ,Construction and Working) , Numericals

B) Spectroscopy- Zeeman Effect (normal and anomalous) experimental arrangement for Normal Zeeman Effect, Nuclear Magnetic Resonance, Magnetic Resonance Imaging, Numericals

Unit- IV Quantum Physics No of Lectures: 8 Hours, Marks: 16

Wave nature of matter, wave particle duality, De- Broglie's Wave, Wavelength of matter wave, concept of group velocity, phase velocity & wave packet, Heisenberg's uncertainty principle with illustration, Physical significance of wave function, Schrodinger's time independent and time dependent wave equation,, Application of Schrodinger's time independent wave equation to the problem of particle in rigid box.

Unit-V Nano science & Technology No of Lectures: 8 Hours, Marks: 16

Introduction of Nano particles, Properties of Nano particles (Optical, electrical, magnetic, structural, Mechanical), Brief description of different methods of synthesis (Physical, Chemical, Biological, Mechanical), Classification of Nano materials, Fabrication Process-Top-down approach, Bottom up Approach. Applications of nanotechnology
Advantages & Limitations of Nano-materials

Reference Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai.
2. M R Srinivasan, "Physics for engineers", New Age International Publishers.
3. M N Avadhanulu, P G Kshrisagar, "Text book of Engineering Physics", S.Chand.
4. Brijlalal, Subramanyam, "Atomic and Nuclear Physics", S. Chand.
5. S K Kulkarni, "Nanotechnology, principles & Practices", Capital Publication Co.
6. Rajgopal, "Engineering Physics", PHI Learning Private Limited.
7. G S Raghuvanshi, "Engineering Physics", PHI Learning Private Limited.
8. G Vijayakumari, "Engineering Physics", Vikas Publishing House.
9. Hugh D Young, Roger A Freedman, "University Physics(With Modern Physics)", Pearson.
10. Uma Mukharji, "Engineering Physics", Narosa Publishing House.
11. S O Pillai, "Solid state Physics", New Age International Publishers.
12. Beiser , "Concept of modern physics", Tata macgraw-hill.
13. R B Singh, "Introduction to modern physics", New age Publication.

Engineering Chemistry - II

COURSE OUTLINE

Engineering Chemistry-II	**EC-II**	**FE222**
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic sciences to undergraduate students. The background expected includes a prior knowledge of chemistry from HSC (science) and familiarity with basic fundamental theories. The goals of the course are to understand the basic principles of Engineering Chemistry –II and their applications in different branches of engineering.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03

Prerequisite Course(S): 12th Chemistry, Different laws, basic principles and theories.

General Objectives:

To apply the knowledge of science in engineering and technology and also understand the basic concepts of chemistry and to analyze it from experiments.

Learning Outcomes:

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

a) Design and conduct experiments, analyze and interpret data.
b) Design a component, system or process to meet desired needs within realistic constraints.
c) An ability to function on multidisciplinary terms.
d) Identify, formulate and solve problems.
e) Understand the impact of engineering solutions in global, economic, environmental and societal context.
f) Ability to appreciate contemporary issues and engages in life-long learning.
g) Use the latest techniques, skills and modern tools necessary for engineering practices.
h) Understanding of the necessity to quantitatively balance the built environment with the natural world.
i) Understand the Classification of various fuels, their analysis by Bomb and Boy's Gas calorimeter.

j) Understand the mechanism, physical and chemical properties of lubricants and its applications.
k) Understand the preparation, basic properties and applications of Refractories.
l) Understand the types of corrosion and its mechanism. It will also help us to develop the corrosion control methods.
m) Understand the Water, Air Noise and Radioactive Pollution along with its control measures.

COURSE CONTENT

Engineering Chemistry-II **Semester-II**

Teaching Scheme	**Examination Scheme**	
Lectures -3 Hrs/week	**End Semester Exams (ESE)**	**: 80 Marks**
	Duration of (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit – I Fuels and Combustion **No. of Lect. – 08, Marks: 16**

a) Introduction – Definition, classification of Fuel, Calorific value & its units,
b) Characteristics of good fuel
c) Solid Fuel: Analysis of Coal-(i) Proximate analysis – Determination & its significance(ii) Ultimate analysis – Determination & its Significance
d) Determination of Calorific Value by Bomb calorimeter (Numerical based on it). Liquid Fuel: Refining & fractional distillation of LPG, petroleum, gasoline, diesel, kerosene. Power Alcohol: - Preparation, properties & Uses, Biodiesel – preparation, properties & uses. Gaseous Fuel: Preparation, properties & uses of (i) Water gas, (ii) Natural gas.
e) Determination of Calorific Value of gaseous Fuel/Volatile liquid by Boy's Gas Calorimeter (Numerical based on it).
f) Combustion: Chemical reactions, calculation on air requirement for combustion (Numerical based on it).

Unit – II Lubricant **No. of Lect. – 08, Marks: 16**

a) Introduction: Classification, characteristics.
b) Mechanism of lubrication – Fluid Film, boundary & extreme-pressure lubrication
c) Properties of lubricant –
   A. Physical properties with Experimental determination
      i. Viscosity & Viscosity Index by Red wood viscometer.
      ii. Flash & fire point by Pensky - Marten's apparatus
      iii. Cloud & pour points

iv. Oiliness

B. Chemical properties with determination
   i. Saponification value
   ii. Acid value
   iii. Emulsification

d) General Criteria for selection of lubricants for delicate machine, IC engine, gears, cutting tools, transformer & refrigeration system.

Unit – III Refractories **No. of Lect. – 08, Marks: 16**

a) Introduction,
b) Types of Refractories, Characteristics of Refractories
c) Preparation, Properties & application of acidic, basic & neutral Refractories
   (i) Acidic - Alumina, Silica, Fireclay.
   (ii) Basic - Magnesite, Dolomite.
   (iii) Neutral - Carbon, graphite.

Unit – IV Corrosion and Its control **No. of Lect. – 08, Marks: 16**

a) Introduction – definition, causes, consequences of corrosion
b) Dry & Wet Corrosion - explanation with mechanism.
c) Types of corrosion – Pitting, waterline, soil, inter granular, Stress corrosion.
d) Corrosion Control - Design & material selection, anodic & cathodic protection, hot dipping, galvanizing , tinning, electroplating , powder coating& surface coating.

Unit – V Environmental Pollution and Its control **No. of Lect. – 08, Marks: 16**

a) Introduction
b) Water Pollution: Methods to determine the extent of water pollution –BOD, COD, DO.
c) Causes, Effects and Control measures of water pollution,
d) Air Pollution: Acid Rain, Green house effects, Depletion of Ozone
e) Causes, Effect and Control measures of air pollution.
f) Noise Pollution :Causes, effects & Control of noise pollution
g) Radioactive pollution: Causes, effects & Control of Radioactive pollution.

Reference Books:

1. B K Sharma, “Engineering Chemistry”, Krishna Prakashan Media (P) Ltd.
2. Suba Ramesh “Engineering Chemistry”, Wiley India Pvt. Ltd.
3. Jain & Jain, “Engineering Chemistry “, Dhanpat Rai Publishing Co.
4. S S Dara, “A Text Book of Engineering Chemistry”, S. Chand & Co. Ltd.

5. R. Gopalan, “A Text book of Engineering Chemistry (Third Edition)”, Vikas Publishing House Pvt. Ltd.
6. B S Chauhan, “Engineering Chemistry”, University Science Press. Third Edition.
7. Shashi Chawla, “A Text book of Engineering Chemistry”, DhanpatRai Publishing Co.
8. Abhijit Mallick, “Engineering chemistry”, Viva books.
9. Sunita Ratan, “Engineering chemistry”, SK Kataria & Sons.
10. R K Das, “Industrial Chemistry”, Asia Publishing House
11. S Deswal, A Deswal, “Basic Course in Environmental Pollution”, Dhanpath Rai Publications.

Engineering Mathematics - II

COURSE OUTLINE

Engineering Mathematics -II	**EM-II**	**FE223**
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from 12th science and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03
Tutorial	01	15	13	01

Prerequisite Course(s): 12th Mathematics, different laws, principles and theorems.

General Objective:

The basic necessity for the foundation of Engineering and Technology being Mathematics, the main aim is to teach mathematical methodologies and models, develop mathematical skill and enhance thinking and decision making power of student.

Learning Outcomes:

After completion of this course learner will be able to:

a. Apply knowledge of mathematics in engineering and technology.
b. Identify, formulate and solve engineering problems.
c. Design Mathematical models for engineering problems and solve them.
d. Use partial derivative to find total derivative of implicit functions.
e. Use partial derivative to find Jacobians
f. Find error and approximate values of problems related to engineering field.
g. Draw the rough sketch of Cartesian and polar curves.

h. Evaluate multiple integrals using spherical polar and cylindrical polar coordinates.

i. Solve ordinary differential equations using numerical methods.

COURSE CONTENT

Engineering Mathematics-II **Semester-II**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Calculus of function of several variables **No. of Lect.-08, Marks- 16**

a) Definition of Partial Derivative, Rules & Theorems of Partial Derivatives.
b) Euler's Theorem on homogeneous function.
c) Change of Independent Variable, Differentiation of Composite Function (1st order only).
d) Total Differentiation.
e) Differentiation of Implicit Function.

Unit-II: Application to Calculus of functions of several variables
No. of Lect.-08, Marks- 16

a) Jacobian and its applications. (Definition of Jacobian, chain Rule of Jacobian, Jacobian of implicit function, Functional dependence & independence).
b) Errors & approximations.(Problems related to engineering field)
c) Lagrange's method of undetermined multipliers for single constraint.

Unit-III: Curve Tracing and Fourier series **No. of Lect.-08, Marks- 16**

a) Curve Tracing
Cartesian & polar curves.
b) Fourier series
Full range Fourier series on $c \leq x \leq c + 2l$.
Half range Fourier series on $0 \leq x \leq l$.

Unit-IV: Multiple Integrals and its Applications **No. of Lect.-08, Marks- 16**

a) Introduction to three co-ordinate system.
b) Double integration.

(Cartesian form, polar form & change of order of integration).

c) Triple integration.

d) Application of multiple integrals to area & volume.

Unit-V: Numerical solution of ordinary Differential equation (first order and first degree)

No. of Lect.-08, Marks- 16

a) Numerical solution by Taylor's series method.

b) Runge -Kutta method (fourth order).

c) Picard's method.

d) Modified Euler's method.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, 7th Edition.
2. C R Wylie, L C Barrett, "Advanced Engineering Mathematics", TMH 6th Edition.
3. B S Grewal, "Higher Engineering Mathematics", Khanna Publication.
4. H K Das, "Advanced Engineering Mathematics", S. Chand & Company.
5. B V Ramana , "Engineering Mathematics", TMH,2nd Edition.
6. N P Bali, "A Text Book of Engineering Mathematics", Laxmi Publication, New Delhi.
7. Babu Ram, "Engineering Mathematics", Pearson Education.
8. S S Shastri , "Numerical Methods", Printice Hall of India.
9. Kandasamy , "Numerical Methods", S. Chand & Company.

Elements of Electrical & Electronics Engineering

COURSE OUTLINE

Elements of Electrical & Electronics Engineering	EEEE	FE224
Course Title	Short Title	Course Code

Course Description:
This course provides an introduction to electrical and electronics engineering covering: basic electric circuit quantities and circuit analysis techniques; semiconductor devices such as diodes, transistors and operational amplifiers and their application; logic gates and their applications, introduction to Microprocessor and Micro-controller; and study of different transducers.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): knowledge of Physics at HSC level.

General Objective:

The objective of the course is to provide students with a firm grasp of the essential principles of electric circuit analysis and basic electronics. This course will help student to understand the concepts and terminology that are used in electrical and electronics engineering. It is not an in-depth electrical/electronic course but, rather a course aimed at acquiring an understanding of basic principles that are used in electrical/electronic engineering.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

a) Cary out circuit reduction using series parallel, star delta and/or source transformation method.
b) Analyze DC circuits by using Loop analysis and Nodal analysis method and DC circuit Theorems.
c) Explain various terms related to AC quantities such as R.M.S. value, Average value, Form factor, Crest factor. Phase and phase difference.
d) Draw and Explain phasor diagrams of sinusoidal AC quantities and explain the terms impedance, reactance, admittance, conductance and susceptance. Active, reactive and apparent power.
e) Understand generation of 1-ϕ & 3-ϕ EMF.

f) Understand working principle of PN junction diode, Zener diode and their applications.
g) Describe different configuration of Bipolar Junction Transistor.
h) Understand CE amplifier and working of transistor as a switch.
i) Describe and Understand difference between unregulated and regulated power supplies, DC power supply and its various building blocks.
j) Understand operating principle of various transducers and their applications.
k) Understand operational amplifier and its applications.
l) Describe use of the Basic gate and Universal gate.
m) Understand block diagram of 8085 and 8051.
n) Describe types of Earthing, Fuses and lamps.

COURSE CONTENT

Elements of Electrical & Electronics Engineering **Semester-II**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**:80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: DC Circuits **No of Lect. – 9, Marks: 16**

a) Review of series and parallel circuits.
b) Kirchhoff's current and voltage law and their applications.
c) Loop analysis and Nodal analysis.
d) Ideal/practical voltage/current sources and Source conversion.
e) Superposition, Thevenin's, Norton's and Maximum power transfer theorem.
f) Star to Delta and Delta to star conversion.

Unit-II: AC Circuits **No of Lect. – 9, Marks: 16**

a) Generation of single phase AC and terms related to sinusoidal waveforms.
b) Definitions and derivation of RMS value, Average value, Form factor, Crest factor.
c) Phasor representation of AC quantities, voltage-current phasor diagram, addition of AC quantities, complex notation (rectangular and polar form) for AC quantities.
d) AC through pure resistance, pure inductance, pure capacitance, RL, RC, RLC series/parallel circuits- concept of impedance, reactance, admittance, conductance, susceptance and their voltage / current phasor diagram.
e) Concept of active, reactive, apparent power and power f\actor.
f) 3-ϕ EMF generation and equation of 3-ϕ EMFs.

g) Relation between line/phase voltages, currents in Star /Delta connected system with phasor diagrams and relation for three phase power.

Unit-III: Semiconductor Devices **No of Lect. – 9, Marks: 16**

a) Introduction to PN junction diode.
b) Application as a rectifier: Half wave, Full wave and Bridge rectifier.
c) Introduction to Zener diode, its working and Characteristics.
d) Transistor configurations: CB , CE & CC.
e) Transistor specifications: - alpha, beta and gamma and their relation.
f) Working of transistor as a switch and CE amplifier.
g) Transistor biasing – Voltage Divider Bias.

Unit-IV: D C Power Supplies, Transducers & Op-Amp. **No of Lect. – 8, Marks: 16**

a) DC Regulated power supplies Block diagram.
b) Zener shunt regulator and Transistor series regulator.
c) Definition and operating principle of RTD, Thermistor, LVDT, Potentiometer, strain gauge transducers.
d) Virtual ground concept of Op-Amp, applications - Inverting, non-inverting amplifier & as a comparator.

Unit-V: Digital Electronics, Automation, Earthing, Fuses and Lamps
No of Lect. – 9, Marks: 16

a) Definition of: Generation of Integrated Circuits- SSI, MSI, LSI and VLSI.
b) Logic gates - AND, OR, NOT, NAND, NOR, X-OR, X- NOR their truth table.
c) De-Morgan's theorem. Adder & Subtractor circuit.
d) Microprocessor-8085 and Microcontroller-8051 block diagram.
e) Safety precautions, types of Earthing and Fuses.
f) Operating principle of lamps.

Reference Books:

1. B L Theraja and A K Theraja, "A Text book of Electrical Technology- Vol-I", S Chand, 1st Edition, 2001
2. S Salivahanan, N Sureshkumar and A Vallavaraj, "Electronics Devices and Circuits", TMH, 2nd Edition, 2009
3. R S Sedha, "Applied Electronics", S Chand, 1st Edition, 2005
4. H S Kalsi, " Electronic Instrumentaion", TMH, 2nd Edition, 2007
5. R A Gaikwad, "Op-Amps and Linear Integrated Circuits", PHI, 4th edition, 2001
6. R P Jain, "Modern Digital Electronics", TMH, 4th Edition, 2010
7. R S Gaonkar, "Microprocessor Architecture, Programming and Application with the 8085", Penram International, 4th Edition, 2000

8. S K Bhattacharya, “Basic Electrical and Electronics Engineering”, Pearson Education, 1st Edition, 2012
9. J B Gupta, “ A Course in electrical Power ”, S K kataria and Sons, 12th Edition, 2002

Engineering Drawing & Elements of Mechanical Engineering

Course Outline

Engineering Drawing & Elements of Mechanical Engineering	ED & EME	FE225
Course Title	Short Title	Course Code

Course Description:

This course provides the elementary level knowledge of Engineering Drawing and Elements of Mechanical Engineering. Course includes introduction to Engineering Drawing, Orthographic Projection, Isometric view and Isometric Projection. The course also introduces students to concept of Energy and energy conservation, Energy management & Audit, Conventional Energy Sources, Working Principle of Work producing devices, work absorbing devices and various mechanical devices.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): Fundamental knowledge of Physics of 11^{th} and 12^{th}.

General Objective:

This course covers introduction to Engineering Drawing, Orthographic Projection, Isometric view and Isometric Projection. The course also introduces students to concept of Energy and energy conservation, Energy management & Audit, Conventional Energy Sources, Working Principle of Work producing devices, work absorbing devices and various mechanical devices.

Learning Outcomes: Upon successful completion of this course the student will be able to:

a) Use various drawing instruments to layout and draw a sheet.
b) Explain various types of lines used, Lettering, Numbering and Dimensioning and Scales.
c) Draw and explain Planes of projection, quadrants and first angle & third angle method of projection.
d) Illustrate Principles of Orthographic projection by Projection of straight line and plane in 1^{st} and 3^{rd} quadrant.
e) To draw front view, Top View and side View of Simple objects.
f) Orthographic projection with different sections and Conversion of simple views into orthographic views.
g) Illustrate Principles of Isometric projection and Isometric view.
h) Conversion of given orthographic view into isometric view.
i) Describe Energy, Different forms of energy and mass conservation laws.
j) Understand non Renewable energy sources and Renewable energy sources.
k) Explain energy management strategy and energy audit.

l) Illustrate with principle various conventional energy producing devices and energy absorbing devices.

m) Illustrate with principle various power transmission elements, drives, direction and flow control valves.

n) Explain types of Actuators, Simple Hydraulic & Pneumatic power unit with its applications, merits and demerits.

COURSE CONTENT

Engineering Drawing & Elements of Mechanical Engineering Semester-II

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-1 Introduction to Engineering Drawing No of Lect. – 9, Marks: 16

a Significance and scope of Engineering Drawing, use of Drawing instruments, Sheet layout.

b Types of lines used, Lettering, Numbering and Dimensioning - aligned and unidirectional systems, Scales.

c Planes of projection, Horizontal Plane, Vertical Plane, four quadrants and first angle & third angle method of projection.

d Principles of Orthographic projection.

e Projection of a point in different quadrants.

f Projection of straight line and plane in 1st quadrant strictly INCLINED TO ONE PLANE only.

Unit-2 Orthographic Projection No of Lect. – 9, Marks: 16

a Introduction to Orthographic Projection.

b To draw front view, Top View and side View of Simple objects in different positions using both 1st angle method and 3rd angle method.

c Orthographic projection with different sections (Full section, half section, revolved section, offset section, etc) and Conversion of simple views into orthographic views.

Unit-3 Isometric projection No of Lect. – 9, Marks: 16

a Introduction, Isometric axes, lines and planes

b True scale and isometric scale.

c Isometric projection and Isometric view.

d Conversion of given orthographic view into isometric view.

Unit-4 Energy No of Lect. – 9, Marks: 16

a Energy, energy and mass conservation laws, Different forms of energy, Heat Transfer, Work Transfer and it form.

b Energy management strategy, energy audit: types and methodology,

energy audit reporting format. Energy producing devices.

c Conventional energy Sources – Heat Engines such as I. C. Engine (2S and 4S Engines, Diesel and Petrol engines),

d Steam Power Plant, hydroelectric power plant, water turbine

e Nuclear power plant, gas turbine power plant.

Unit-5 Energy absorbing devices and Mechanical devices

No of Lect. – 9, Marks: 16

a **Energy absorbing devices** – reciprocating air compressor and pump, centrifugal pump, rotary pump, blower, air motors, household refrigerator and window air conditioner.

b **Mechanical devices:**

Elements: power transmission shafts, axles, keys, couplings, bearings

c **Drives**: types of drives, belt drive, rope drive, chain drive, gear drive and friction clutches.

d **Valves**: Various types of Pressure, Direction & Flow control valves & their applications, On-off valves, flow control valves, non return valve, pressure regulating valve, throttle valve, butterfly valve, and solenoid operated valve.

e Various types of Actuators, Simple Hydraulic power unit and Pneumatic power unit.

f Applications, advantages and disadvantages of Hydraulic and Pneumatic systems.

Reference Books:

1. Bhatt N D, Panchal V M, "Engineering Drawing – Plane and Solid Geometry", Charotar Publishing House.
2. Rajan T S, "Basic Mechanical Engineering", New Age International, New Delhi.
3. T Jeyapoovan, "Engineering Drawing and Graphics Using Autocad", Vikas Publication Noida, New Delhi.
4. Kannaiah K L, Narayana, "Engineering Graphics", Scitech Pub, Chennai, 2nd Edition
5. H G Phakatkar, "Engineering Graphics", Nirali Publication, Pune.
6. Nag P K, "Engineering Thermodynamics", McGraw Hill.
7. Thomas Beven, "Theory of Machines", Pearson.
8. Rattan S S, "Theory of Machines", McGraw Hill.
9. Khan B H, "Non Conventional Energy Resources", Tata McGraw Hill, New Delhi.
10. Rai G D, "Non Conventional Sources of Energy", Khanna Publication, New Delhi.
11. David G Alciatore, Michael Histand, "Introduction to Mechatronics and Measurement Systems", McGraw-Hill, 2003
12. H L Stewart, "Hydraulics and Pneumatics Power for Production", Industrial Press Inc. N.Y. USA, 2001

(Engineering Science Lab-II)

LAB COURSE OUTLINE

(Engineering Science Lab-II)

Engineering Science Lab-II	**ES-II LAB**	**FE 226**
Course Title	Short Title	Course Code

Laboratory (Alternate week)	**Hours/ Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	02	15	26	1

Engineering Physics – I

Course Description:

In this laboratory, course emphasis is on the understanding of basic principles, working of ultrasonic interferometer, ultrasonic detector, sound level meter, motion of charged particle (e/m), hysteresis curve, properties of magnetic material, production of magnetic field, working of CRO synthesis and characterization of metal nano particles etc. The learner here can use this knowledge and apply in various branches of engineering as required.

Prerequisite Course(s): Course of Physics at HSC level.

General Objective:

The objective of the laboratory is to impart the fundamental knowledge of physics to the students and develop their ability to apply the specific procedures to analyze the experimental results.

In this lab, students will be familiar with the use of different equipments, basic principles, properties etc which they can apply in various disciplines of engineering during their studies and in future.

Learning Outcomes: After successful completion of this lab; student will be able to:

a) Use the latest techniques, skills, and modern tools necessary for engineering practices.

b) Design a component, system or process to meet desired needs with in realistic constraints

c) Describe the use of sound level meter

d) Describe ultrasonic wave and analyze its velocity

e) Analyze e/m of an electron and describe motion of electron in electric field.

f) Can understand and draw Hysteresis curve (B-H curve)
g) Describe and analyze the magnetic materials and their properties.
h) Describe working CRO and its uses.
i) Can understand the synthesize & characterization of Nano composites and describe its properties.

LAB COURSE CONTENT

(Engineering Science Lab-II)

Practical -2 Hrs/Alternate weeks (Alternate with Engg. Chemistry- II)

(Note: Minimum FIVE Experiments from the following)

1. Sound Level Meter

a) To measure sound pressure in decibel
b) To study the use of sound level meter

2. Ultrasonic Interferometer.

a) Determine velocity of ultrasonic wave in water
b) Study the properties of ultrasonic waves and its application
c) Compare analytical and practical values.

3 Ultrasonic Detectors

a) Determine distance, wavelength and velocity of ultrasonic wave.
b) Study the production of ultrasonic wave.
c) Compare analytical and practical values.

4. e/m by Thomson's method.

a) To determine specific charge of electron by using Thomson's method.
b) To study motion of electron in electric field.
c) Compare analytical and practical values.

5) To Study B-H curve

a) To study and draw hysteresis curve using solenoid method.
b) Find remanance and coercive force.

6) Determination of Magnetic Susceptibility.

a) To determine magnetic susceptibility of given solution.
b) To study the properties of magnetic materials.
c) To study working of electromagnet to produce magnetic field.

7) Uses of CRO

a) To study working of CRO.
b) Use of CRO to find frequency and amplitude.

c) Compare analytical and practical values.

8) Synthesis and Characterization of Nano Composites

Synthesis and characterization of metal nanoparticle like ZnO, CdP, Fe, Ag or Core shell by electrochemical reduction process/ultrasonic cavitation/microwave/sol-gel technique at room temperature. Size of metal nanoparticles can be calculated from XRD and Shearer's formula. Shape and exact size of metal nanoparticles can be confirmed using Transmission Electron Microscope (TEM).

Reference Books:

1. R K Gaur, S L Gupta, Dhanpat Rai, "Engineering Physics".
2. M R Srinivasan, "Physics for engineers", New Age International Publishers.
3. M N Avadhanulu, P G Kshrisagar,"Text book of Engineering Physics", S.Chand.
4. Brijlalal, Subramanyam, "Atomic and Nuclear Physics", S. Chand.
5. S K Kulkarni, "Nanotechnology, principles & Practices", Capital Publication Co.
6. Rajgopal, "Engineering Physics", PHI Learning Private Limited.
7. G S Raghuvanshi, "Engineering Physics", PHI Learning Private Limited.
8. G Vijayakumari, "Engineering Physics", Vikas Publishing House.
9. Hugh D Young, Roger A Freedman, "University Physics(With Modern Physics)", Pearson.
10. Uma Mukharji, "Engineering Physics", Narosa Publishing House.
11. S O Pillai, "Solid state Physics", Wiley Eastern.
12. Beiser , "Concept of modern physics", Tata macgraw-hill.
13. R B Singh, "Introduction to modern physics", New age Publication.
14. Satyapraksah, "Quantum Mechanics", Pragati Prakashan

Engineering Chemistry-II

LAB COURSE OUTLINE

Course Description:

In this laboratory, course emphasis is on the understanding of basic principles, working of pH-meter, Bomb calorimeter, Ostwald's Viscometer, various properties of lubricating oils, proximate analysis of fuels etc. The learner here can use this knowledge and apply in various branches of engineering as required.

Prerequisite Lab Course(S): 12th Chemistry, Different laws, basic principles and theories.

General Objectives:

This course is intended to provide engineering students with a background in important concepts and principles of chemistry and emphasis on those areas considered most relevant in an engineering context, and practical applications in engineering and technology.

Learning Outcomes:

Upon successful completion of lab Course, student will be able to:

a) Analyze the partition Coefficient of Iodine between water & CCl_4.
b) Analyze the saponification value of given oil sample.
c) Analyze the viscosity of given liquid by Ostwald's Viscometer.
d) Analyze the Calorific value of fuel sample by using Bomb calorimeter.
e) Identify the Moisture content, Volatile matter, Ash content and Fixed carbon in coal sample by proximate analysis.
f) Identify the acidic and basic solution by using pH-meter.
g) Analyze the acid value of Vegetable Oil sample.
h) Analyze the strength of $NaHCO_3$ and NA_2CO_3 in alkali mixture.
i) Analyze the Aniline point of lubricating oil.
j) Analyze the Iodine value of an Oil sample by Wij's method.

LAB COURSE CONTENT

(Engineering Science Lab-II)

Practical: 2 hour/ week (Alternate with Engineering Physics-II)

***ICA (Internal Continuous Assessment) marks of 25 are for practical's in Engineering Physics - II &Engineering Chemistry – II.**

(Note: Minimum FIVE Experiments from the following)

1. Determination of partition Coefficient of Iodine between water & CCl_4.
   a. Preparation of different composition of saturated Iodine solution in CCl_4.
   b. Separation of Aqueous and CCl_4 layer from each bottle.
   c. Titration of Aqueous layer against N/100 Sodium Thiosulphate solution.
   d. Titration of CCl_4 layer against N/20 Sodium Thiosulphate solution.
   e. Calculation of Iodine in both the layers.

2. Determination of saponification value of oil.
   a. Preparation of std. KOH solution.
   b. Standardisation of Std. KOH solution against 0.5N HCL solution using Phenolphthalein indicator.
   c. Add KOH solution in 2 gm of Oil sample and reflux for 2 hours.
   d. Titrate the above solution against 0.5N HCL solution using Phenolphthalein

indicator.

e. Using two titrate values calculate the saponification number.

3. Determination of Viscosity by Ostwald's Viscometer.
   a. Find out the density of given liquid by using specific gravity bottle.
   b. Measure the flow time required for liquid and water by using Ostwald's Viscometer.
   c. Calculate the relative viscosity from the above observed values.

4. Determination of Calorific value of fuel sample by using Bomb calorimeter.
   a. Burn the known mass of solid fuel in Bomb pot.
   b. Observe the temperature difference of water in bomb pot.
   c. Calculate the actual and corrected calorific value of solid fuel sample from above observations.

5. Determination of Moisture, Volatile matter & Ash in a given sample of Coal (Proximate analysis).
   a. Determine and calculate the moisture content from the given coal sample.
   b. Determine and calculate the Volatile matter from the given coal sample.
   c. Determine and calculate the Ash content from the given coal sample.
   d. Determine and calculate the Fixed Carbon from the given coal sample.

6. Use of pH meter.
   a. Calibrate the pH-meter using buffer solution at room temperature.
   b. Measure the pH-values of given solutions.
   c. From the measured pH-values of solution, conclude which are acidic or basic solutions.

7. Acid Value of vegetable Oil sample.
   a. Add neutral alcoholic solution in given Oil sample and heat in water bath for 30 minutes.
   b. Titrate above solution against 0.1N KOH solution using phenolphthalein indicator.
   c. Calculate the acid value of given Vegetable Oil sample from above observations.

8. Determination of $NaHCO_3$ & Na_2CO_3 in given alkali mixture.
   a. Titration of alkali mixture solution against 0.1N HCl using methyl orange indicator.
   b. Titration of alkali mixture solution against 0.1N HCl using phenolphthalein indicator.
   c. Calculate the strength of $NaHCO_3$ and NA_2CO_3 from the above observed titrate values.

9. Determination of Aniline point of lubricating oil.
    a. Mixed Aniline and lubricating oil sample in Aniline point apparatus.
    b. Maintain the apparatus at constant temperature using water bath.
    c. Observe the temperature at which cloudiness and hazy appearance in the solution.
    d. Report the observed values as Aniline point.

10. Determination of Iodine value of an Oil sample (Wij's method).
    a. Back Titration: Dissolve the given oil sample in CCl_4 solution then add Wij's solution.
    b. Titrate the above solution against std. 0.1N Sodium Thiosulphate solution.
    c. Blank Titration: In Wij's solution add KI solution and titrate it against 0.1N sodium Thiosulphate solution.
    d. Calculate the Iodine value of an oil sample from above observed titrate values.

Reference Books:

1. B K Sharma, "Engineering Chemistry", Krishna Prakashan Media (P) Ltd.
2. Subaramesh, "Engineering Chemistry, Wiley India Pvt. Ltd.
3. Jain & Jain, "Engineering Chemistry ", Dhanpat Rai Publishing Co.
4. S S Dara, "A Text Book of Engineering Chemistry", S. Chand & Co. Ltd.
5. R. Gopalan, "A Text book of Engineering Chemistry (Third Edition)", Vikas Publishing House Pvt. Ltd.
6. B S Chauhan, "Engineering Chemistry", University Science Press. Third Edition.
7. Shashi Chawla, "A Text book of Engineering Chemistry", DhanpatRai Publishing Co.
8. Abhijit Mallick, "Engineering chemistry", Viva books.
9. Sunita Ratan, "Engineering chemistry", SK Kataria & Sons.
10. R K Das, "Industrial Chemistry", Asia Publishing House.
11. S Deswal, A Deswal, "Basic Course in Environmental Pollution", Dhanpat Rai Publishing Co.

Guide lines for ICA :

ICA (Internal Continuous Assessment) marks of 25 are for practicals in Engineering Physics -II & Engineering Chemistry – II.

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Engineering Drawing & Elements of Mechanical Engineering Lab

LAB COURSE OUTLINE

Engineering Drawing & Elements of Mechanical Engineering	ED & EME LAB	FE227
Course Title	Short Title	Course Code

Course Description:

This lab includes drawing sheets related to Engineering Drawing and labs related to elementary level knowledge of Elements of Mechanical Engineering.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	4	15	60	2

ESE Pattern: Oral (OR)

Prerequisite Course(s): 11th Physics, 12th Physics

General Objective:

In this lab, students will imbibe essentials of Engineering Drawing through progressive practice of Orthographic Projection, Isometric view and Isometric Projection. Students will also get familiar with principle and working of boilers, boiler mountings & accessories and mechanical devices used to transmit power.

Objective to develop following Intellectual skills:

a) Identify elements of given Engineering Drawing.
b) Interpretation of given engineering drawing.
c) Understand Orthographic projection.
d) Understand Isometric projection and Isometric view.
e) Understand principle and working of Boiler, its mountings & accessories.
f) Understand principle and working of power transmission devices.
g) Understand principles of energy audit of domestic devices.

Objective to develop following Motor skills:

a) Ability to layout a drawing sheet and apply basic drawing concepts to it.
b) Ability to draw Orthographic projection of given object.
c) Ability to draw Orthographic projection with section view.
d) Ability to draw Isometric projection and Isometric view of given object.
e) Ability to perform energy audit of domestic devices.

Learning Outcomes:

Upon successful completion of these practical the student will be able to

a) Read the given engineering drawing sheet.
b) Interpret different views of given engineering object.
c) Construct an orthographic projection i.e. front view, top view, side views of an object.
d) Prepare an orthographic projection with section of an object.
e) Construct an isometric projection of an object.
f) Prepare an isometric view of an object.
g) Convert orthographic projections of given object into isometric drawing.
h) Illustrate principle and working of fire tube and water tube boiler.
i) Illustrate principle and working of boiler mountings and accessories.
j) Explain principle and working of power transmission devices.
k) Illustrate energy audit of simple domestic appliances.

LAB COURSE CONTENT

Engineering Drawing Lab

1 Sheet No. 01 - Lines, Lettering and methods of dimensioning.

A. Illustration of lettering, numbering, types of lines.
B. Sketch of symbols for 1st and 3rd angle method of projection.
C. Illustration with a simple drawing with at least 2 views to show uses of line types and methods of dimensioning.

2 Sheet No. 02 – Projection of lines and planes.

A. Illustration of projection of straight line in 1st quadrant strictly INCLINED TO ONE PLANE only. [Minimum 02 solved examples]
B. Illustration of projection of plane in 1st quadrant strictly INCLINED TO ONE PLANE only. [Minimum 02 solved examples]

3 Sheet No. 03 – Orthographic Projection.

A. Illustration of simple orthographic projection using both 1st angle and 3rd angle method. [Minimum 02 solved examples]
B. Illustration of sectional orthographic projection using both 1st angle and 3rd angle method. [Minimum 02 solved examples]

4 Sheet No. 04 – Isometric Projection

A. Illustration of Isometric projection with natural scale.
   [Minimum 02 solved examples]
B. Illustration of Isometric projection with isometric scale.
   [Minimum 02 solved examples]

5 Sheet No. 05 – freehand sketches of Machine elements.

A. Free hand sketches of machine elements including screw threads, screwed fasteners, nuts, bolts, riveted and welded joints, Keys, shaft, couplings. (With constructional details.)
B. Introduction to limits, fits and tolerance.

Elements of Mechanical Engineering Lab

6 Demonstration and Study of Cochran and Lancashire boiler.

a. Study the principle, construction and working of Cochran boiler.
b. Demonstrate construction and working of Cochran boiler using chart/model/multimedia.
c. Study the principle, construction and working of Lancashire boiler.
d. Demonstrate construction and working of Cochran boiler using chart/model/multimedia.
e. Discuss relative merits and demerits.

7 Demonstration and Study of Babcock and Wilcox boiler.

a. Study the principle, construction and working of Babcock and Wilcox boiler.
b. Demonstrate construction and working of Babcock and Wilcox boiler using chart/model/multimedia.
c. Discuss relative merits and demerits with fire tube boilers.

8 Demonstration and Study of boiler mountings.

a. Study the principle, construction and working of various boiler mountings.
b. Demonstrate various boiler mountings using chart/model/multimedia.

9 Demonstration and Study of boiler accessories.

a. Study the principle, construction and working of various boiler accessories.
b. Demonstrate various boiler mountings using chart/model/multimedia.

10 Demonstration and Study of power transmission - Single plate clutch, oldham coupling, Hook's Joint.

a. Study the principle, construction and working of Single plate clutch, Oldham coupling, Hook's Joint.
b. Demonstrate various Single plate clutches, Oldham coupling, and Hook's Joint using chart/model/multimedia.

11 Measurement of energy consumption of domestic appliances.

a. Lab demonstration of measurement of energy consumed in kWh for simple household appliances.
b. Students will conduct such experiment at home and submit a case study.

12 Measurement of thermal efficiency of domestic cooking devices.

a. Lab Demonstration of measurement of energy consumed and thermal efficiency of simple household appliances using simple measurement techniques.
b. Students will conduct such experiment at home and submit a case study.

Note: FIVE drawing sheets from ED Lab and FIVE practical from EME Lab shall be conducted during 15 weeks available during semester.

Reference Books:

1. Bhatt N D, Panchal V M, "Engineering Drawing – Plane and Solid Geometry", Charotar Publishing House.
2. Rajan T S, "Basic Mechanical Engineering", New Age International Pvt. Ltd, New Delhi.
3. T Jeyapoovan, "Engineering Drawing and Graphics Using Autocad", Vikas Publication Noida, New Delhi.
4. Kannaiah K L, Narayana, "Engineering Graphics", Scitech Publications, Chennai, 2nd Edition
5. H G Phakatkar, "Engineering Graphics", Nirali Publication, Pune.
6. Nag P K, "Engineering Thermodynamics", McGraw Hill.
7. Thomas Beven, "Theory of Machines", Pearson.
8. Rattan S S, "Theory of Machines", McGraw Hill.
9. Khan B H, "Non Conventional Energy Resources", Tata McGraw Hill, New Delhi.
10. Rai G D, "Non Conventional Sources of Energy", Khanna Publication, New Delhi.
11. David G Alciatore, Michael Histand, "Introduction to Mechatronics and Measurement Systems", McGraw-Hill, 2003
12. H L Stewart, "Hydraulics and Pneumatics Power for Production", Industrial Press

Inc. N.Y. USA, 2001

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignments submitted by the student in the form of journal. Evaluation will be based on paper work.

Elements of Electrical & Electronics Engineering Lab

LAB COURSE OUTLINE

Elements of Electrical & Electronics Engineering Lab	**EEEE LAB**	**FE228**
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding of the characteristics of basic circuits that use resistors, capacitors, diodes, bipolar junction transistors, Op-Amp, logic gates, transducers etc. The students can use this knowledge to analyze more complex circuits such as complex electrical networks, rectifiers, amplifiers, digital circuits, circuits using transducer etc.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	15	30	1

ESE Pattern: Practical (PR)

Prerequisite Course(s): Course on physics at HSC level.

General Objective:

The objective of this lab is to impart the fundamental knowledge of electrical and electronics engineering to the students and to develop the students ability to apply the specific procedures to analyze the electrical and electronics engineering Systems.

In this lab, students will be familiar with use of different theorems to analyze electrical networks. Students will also become familiar with various basic analog and digital electronic circuits.

Learning Outcomes:

Upon successful completion of the lab student will be able to

a) Analyze DC networks by using Kirchhoff's Voltage Law and Current Law.
b) Analyze RLC series circuit.
c) Apply superposition theorem to a D.C. network.
d) Apply Thevenin's Theorem to a D.C. network and develop Thevenin's equivalent circuit.
e) Describe operation and construction of different types of lamps.
f) Describe the need and types of earthing.
g) Identify Electronics Components.
h) Analyze half, full and bridge wave rectifier.

i) Analyze transistor, Op-Amp and Digital Circuits.
j) Describe operating principle of LVDT and its application for displacement measurement.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Verification of Kirchhoff's laws.

a. Measure Voltage and current in a dc circuit for each element.
b. Find the analytical solution for the circuit to calculate the voltages and currents for each element.
c. Compare analytical and the practical values.
d. Verification of Kirchhoff's voltage law and current law.

2. Study of RLC series circuit.

a. Measure voltages and current of series RLC circuit. (V_R, V_L, V_C, I)
b. Calculate/measure the values for resistance, inductive reactance, and capacitive reactance of the circuit. .
c. Calculate the impedance, inductance, capacitance and power factor of circuit.
d. Draw the phasor diagram for the circuit quantities.

3. Verification of Superposition Theorem.

a. Apply superposition theorem to find analytical values of the branch currents for the given D.C. network.
b. Measure the branch current of the network with both the sources acting simultaneously and also with each source alone at a time.
c. Compare the analytical and measured values of the currents.

4. Verification of Thevenin's Theorem.

a. Find the analytical solution for the load current for the given DC circuit using Thevenin's theorem.
b. Measure the open circuit voltage, equivalent resistance and load current in network.
c. Develop Thevenin's equivalent circuit from measured values.
d. Compare the analytical and practical values.

5. Study of lamps.

a. Describe operation and construction of filament lamp.
b. Describe operation and construction of Mercury vapor lamp.
c. Describe operation and construction of fluorescent tube.
d. Describe operation and construction of Sodium vapor lamp.
e. Describe operation and construction of CFL lamp.

6. Study of Earthing.

a. Describe the Need of Earthing.
b. Describe the Earthing types.
c. Describe types of Fuse and safety precaution working with electricity.

Group B

7. Study and testing of electronics components and their terminals.

a. Identify the values of resistance, inductance, capacitor (mica, electrolyte etc) and identify terminals of diode and transistor.
b. Testing of resistance, inductance, capacitor (mica, electrolyte etc), diode, and transistor using multi meter.

8. Displacement measurement using LVDT.

a. Describe working principle of displacement transducer.
b. Describe how displacement is converted into voltage.
c. Find out the output voltage.

9. Study of half wave, full wave and bridge rectifier.

a. Compare the input and output voltage waveforms for half wave, full wave and bridge rectifier.
b. Measure output DC voltage for half wave, full, and bridge rectifier.

10. Implementation of inverting and non inverting amplifier using Op-Amp.

a. Describe use of Op-Amp as amplifier.
b. Calculate theoretical output voltage of inverting and non-inverting amplifier and find out gain of Op-Amp.
c. Compare measured values and Theoretical values.

11. Input output characteristics curve for CE configuration of transistor.

a. Describe use of Transistor as amplifier.
b. Draw Input Output Characteristics curves for CE configuration of transistor.
c. Describe which configuration is commonly used and why?
d. Compare CC, CB, & CE configuration.

12. Implementation of simple Boolean expression using logic gates.

a. Simplification of any Boolean expression.
b. Implementation of any Boolean expression using basic gate.
c. Implementation of any Boolean expression using universal gate.

Reference Books:

1. B L Theraja and A K Theraja, "A Text book of Electrical Technology- Vol-I", S Chand, 1st Edition, 2001
2. S Salivahanan, N Sureshkumar and A Vallavaraj, "Electronics Devices and Circuits", TMH, 2nd Edition, 2009
3. R S Sedha, "Applied Electronics", S Chand, 1st Edition, 2005
4. H S Kalsi, " Electronic Instrumentaion", TMH, 2nd Edition, 2007
5. R A Gaikwad, "Op-Amps and Linear Integrated Circuits", PHI, 4th edition, 2001
6. R P Jain, "Modern Digital Electronics", TMH, 4th Edition, 2010
7. R S Gaonkar, "Microprocessor Architecture, Programming and Application with
   the 8085", Penram International, 4th Edition, 2000
8. S K Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education, 1st Edition, 2012
9. J B Gupta, " A Course in electrical Power ", S K kataria and Sons, 12th Edition, 2002

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Workshop Practice- II

LAB COURSE OUTLINE

Workshop Practice II	**WP-II**	**FE229**
Course Title	Short Title	Course Code

Course Description:

Workshop Practice II covers the basic knowledge and practices on Carpentry shop, Plumbing shop, Machine shop, and Electronics and Electrical workshop in order to improve the practical skill of students in different workshops.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Laboratory	2	11	22	1

Prerequisite Course(s): 11th, 12th Physics, Mathematics, Engineering Drawing, Engineering Materials.

General Objective:

In workshop practice, students will get familiar with use of different workshop practices like carpentry shop, plumbing shop, machine shop, electronics and electrical workshop. Students will also get familiar with different tools, machines, equipments, job holding devices, job drawing, job material, job manufacturing operations and processes in different workshops.

Objective to develop following Intellectual skills:

a. Identification and selection of manufacturing processes/operations according to job requirement in different workshops.
b. Identification, selection and understanding of tools, equipments, machines and job material according to job drawing for different workshops.
c. Understanding working principle and construction of process planning sheet.
d. Identification, repairing, maintenance and understanding of the working principle of electronic and electrical components/devices.

Objective to develop following Motor skills:

a. Ability to handle measuring instruments.
b. Ability to read the job drawing.
c. Ability to understand the basic working principle of carpentry operations, tools and equipments in carpentry shop.

d. Ability to understand the basic working principle of Plumbing operations, tools and equipments in Plumbing shop.
e. Ability to understand the basic working principle of lathe machine operations, tools and equipments in Machine shop.
f. Ability to understand the basic working principle of Electronics components used in electronics workshop.
g. Ability to understand the repair and maintenance of domestic appliances in electrical workshop.

Learning Outcomes:

Upon successful completion of these practical's the student will be able to hand

a) Carpentry shop
b) Plumbing shop
c) Machine shop
d) Electronics workshop
e) Electrical workshop

LAB COURSE CONTENT

A. Carpentry shop

1. Introduction to carpentry operations, equipment and tools.
2. One job involves lap joint, bridle joint.

B. Plumbing shop

1. Introduction to the tools and equipments like pipe vice, pipe bending machine, pipe dies, cutting dies, pipe wrench etc. used for plumbing operations on G.I. pipe.
2. One Job having both side threading and like bending operations.

C. Machine shop

1. One job on lathe machine involving operations like Facing, plain turning, step turning, taper turning, chamfering and drilling.

D. Electronics workshop

Types of PCB, PCB making, soldering, testing of electronic component like diode, transistor, R.L.C. etc and desoldering of a simple electronic circuit; probe making; Use of multimeter (each function)

E. Electrical workshop

1. Introduction and Difference between 1 Φ AC, DC; Transformers;
2. Repair and maintenance of domestic appliances like electric fan, tube light etc;
3. MCB, ELCB; Different types of wiring, Demonstration on preparation of extension boards, tube light wiring etc; demonstration of earthing and neutral.

Reference Books:

1. Hajara Chaudhary and Bose S K, "Element of Workshop Technology Volume I and II", Asia Publishing House.
2. P N Rao, "Production Technology Volume I and II", Tata McGraw Hill Publication.
3. R K Jain, "Production Technology", Khanna Publications.
4. P C Sharma, "Production Technology", Khanna Publication.
5. Chapman W A J., "Workshop Technology", ELBS Publication.
6. HMT, "Production Technology", Tata McGraw Hill Publication.
7. Kannaiah K L, Narayana, "Workshop Manual", Scitech Publications, Chennai, 2nd Edition

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Soft Skills - II

LAB COURSE OUTLINE

Soft Skills-II	**SS II**	**FE230**
Course Title	Short Title	Course Code

Course Description:

This course is a continuation of SSAD1 in the first semester. We continue to empower the language capabilities of the students. Strengthening of grammatical structure of English and advanced level vocabulary are introduced and consolidated in this course. Students are introduced to basics of business writing and etiquette. They are also made to undergo group discussions and learn the art of debating. Personal Interviews and their subtle nuances are taught to the students. Laws of leadership and team-workmanship are enforced.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	1	15	15	2
Laboratory	2	15	30	

Prerequisite Course(s): Fundamental knowledge of English of 11th and 12th.

General Objectives:

We have tried to achieve the following objectives through this course:

a) To make the students effective team workers with a capacity to lead in any circumstances
b) To augment the ability of the student to render logically good arguments in support of their opinion during debates
c) To understand and become adept in corporate communication of writing letters and memos etc.
d) To enhance the ability of written communication by continuing to advanced level in English
e) To be successful in an HR or Personal Interview and to be a better communicator in technical interviews

Learning Outcomes:

Upon successful completion of this course the student will be able to:

a. Detect errors in simple and complex sentences of English.
b. Expand their vocabulary in English.
c. Debate and discuss cordially but fervently on any given issue.
d. Write corporate letters and take further other corporate communication.
e. Augment his/her performance in personal as well as technical interviews.
f. Increase the ability to calmly handle the pressure in Interviews and discussions.
g. Understand the basic laws of team-workmanship viz. its importance and excellence.
h. Augment the ability to lead a team under any circumstances and create an example for others.

LAB COURSE CONTENT

Unit-1 Eloquent Writing – II **No of Lect. – 9, Marks: 10**

a Comprehension of Passages
b Understanding of English Language
c Vocabulary Enhancement Practice

Unit-2 Corporate Communication **No of Lect. – 9, Marks: 10**

a Corporate Letter
b Resume and Curriculum Vitae Writing
c Writing Report

Unit-3 Discussions and Debates **No of Lect. – 9, Marks: 10**

a Basics of a Group Discussion
b Group Discussion Models
c Debates – Value and Process

Unit-4 Successful Interviews **No of Lect. – 9, Marks: 10**

a Pre-Interview Strategies
b Strategies During the Interview
c Strategies After the Interview

Unit-5 Leadership and Team-Building **No of Lect – 9, Marks: 10**

a Laws of Successful Leadership
b Becoming a Motivator
c Principles of Team-workmanship

Reference Books:

1. Allan and Barbara Pease, "A Definitive Book on Body Language", Publication Bantam Books.

2. Robert Bolton, "People Skills: How to Assert Yourself, Listen to Others and Resolve Conflicts", Publication Simon and Schuster.

3. R K Iyer, “Spoken English”, IU Publications.
4. Sethi and Dhamija, “A Course in Phonetics and Spoken English”, Prentice Hall of India.
5. Matthew McKay, “The Communication Skills”, Publisher: New Harbinger Publications Inc.
6. Frank Paolo, “How to Make a Great Presentation in 2 Hours”, Pustak Mahal.
7. Kaplan’s GRE, Kaplan Publications.
8. Barron’s GRE, Galgotia Publications.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.