NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

First Year Engineering
(Common to all Branches)

Faculty of Science and Technology

'A' Grade
NAAC Re-Accredited
(3rd Cycle)

Course Outline

Semester – I & II

w.e.f. 2017 – 18

Subject Group Code and Subject Groups

A – Core Engineering Course/ Program specific course

B – Basic Sciences/ Humanities / Social Sciences course

C – Discipline Specific Course / Elective Course

D – Ability Enhancement Course/ Skill development course

E – Interdisciplinary/ Generic Elective course

Syllabus Structure for First Year Engineering (Semester – I)

Course Code	Name of the course	Group	Teaching Scheme				Theory (Marks)		Practical (Marks)		Total (Marks)	Credits
			Teaching Hrs./week	Tut. Hrs./week	PR Hrs./week	Total Hrs./week	ISE	ESE	ICA	ESE		
FEN 101	**Applied Physics -I**	B	03	--	--	03	40	60	--	--	100	03
FEN 102	**Applied Chemistry -I**	B	03	--	--	03	40	60	--	--	100	03
FEN 103	**Applied Mathematics -I**	B	03	01	--	04	40	60	--	--	100	04
FEN 104	**Communicative English**	D	03	--	--	03	40	60	--	--	100	03
FEN 105	**Introduction to Civil Engineering & Engineering Mechanics**	A	03	--	--	03	40	60	--	--	100	03
FEN 106	**Introduction to Electrical Engineering**	A	03	--	--	03	40	60	--	--	100	03
FEN 107	**Workshop Practice –I**	A	-	--	02	02	--	--	25	--	25	01
FEN 108	**Applied Sciences Lab -I**	B	--	--	*02	02	--	--	25	--	25	01
FEN 109	**Introduction to Civil Engineering & Engineering Mechanics Lab**	A	--	--	02	02	--	--	25	25 (OR)	50	01
FEN 110	**Introduction to Electrical Engineering Lab**	A	--	--	02	02	--	--	25	25(OR)	50	01
FEN 111	**Communicative English Lab**	D	--	--	02	02	--	--	25	25(OR)	50	01
Total			**18**	**01**	**10**	**29**	**240**	**360**	**125**	**75**	**800**	**24**

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

Syllabus Structure for First Year Engineering (Semester – II)

Course Code	Name of the course	Group	Teaching Scheme				Theory (Marks)		Practical (Marks)		Total (Marks)	Credits
			Teaching Hrs./week	Tut. Hrs./week	PR Hrs./week	Total Hrs./week	ISE	ESE	ICA	ESE		
FEN 112	**Applied Physics -II**	B	03	--	--	03	40	60	--	--	100	03
FEN 113	**Applied Chemistry -II**	B	03	--	--	03	40	60	--	--	100	03
FEN 114	**Applied Mathematics -II**	B	03	01	--	04	40	60	--	--	100	04
FEN 115	**Introduction to "C" Programming**	A	03	--	--	03	40	60	--	--	100	03
FEN 116	**Introduction to Mechanical Engineering & Engineering Drawing**	A	03	--	--	03	40	60	--	--	100	03
FEN 117	**Introduction to Electronics Engineering**	A	03	--	--	03	40	60	--	--	100	03
FEN 118	**Workshop Practice –II**	A	-	--	02	02	--	--	25	--	25	01
FEN 119	**Applied Sciences Lab -II**	B	--	--	*02	02	--	--	25	--	25	01
FEN 120	**Introduction to Mechanical Engineering & Engineering Drawing Lab**	A	--	--	02	02	--	--	25	25 (OR)	50	01
FEN 121	**Introduction to "C" Programming Lab**	A	--	--	02	02	--	--	25	25(OR)	50	01
FEN 122	**Introduction to Electronics Engineering Lab**	A			02	02	--	--	25	25(OR)	50	01
Total			**18**	**01**	**10**	**29**	**240**	**360**	**125**	**75**	**800**	**24**

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

Applied Physics - I

COURSE OUTLINE

Applied Physics - I	AP-I	FEN101
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied 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 (Applied Physics -I) and their applications in different areas

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th}& 12^{th} Physics

Course Objectives

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course outcomes:

Learner will be able to…

1. Apply the concepts of use of non-conventional energy for betterment of society.
2. Apply the concepts of Laser and Fiber Optic communication and Illustrate the principle, construction and working of various LASERs and its applications.
3. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.
4. Basic understanding of Semiconductor theory with use of Hall effect in science and technology as a Hall probe sensor
5. Comprehend principles of interference and diffraction.

COURSE CONTENT

Applied Physics - I | **Semester I**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

Unit-I: Environmental Science — No. of Lectures: 08 Hours, Marks: 12

a) Energy Sources (Non-conventional): Introduction to non-conventional energy sources, Solar cell (Principle, Construction, Working and Characteristics), Wind energy - Wind Mill, Biogas and Biomass (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 and Fiber Optics — No. of Lectures: 08 Hours, Marks: 12

a) Laser: Introduction, Laser beam characteristics – Coherence, Directionality, Intensity, Monochromaticity, 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 3D images using hologram, Reconstruction of 3D images, Comparison with ordinary photography.

b) Fiber Optics: Structure of optical fibre. Principle of optical fibre. Propagation mechanism in optical fibre – Angle of acceptance, Numerical aperture, Critical angle, Optical fibre communication system (only diagram), Advantages of optical fibre, Applications of optical fibre.

Unit-III: Crystallography and X-rays — No. of Lectures: 08 Hours, Marks: 12

a) Crystallography: Introduction, Space lattice – Translation vectors, the basis and crystal structure, Unit cell and Lattice parameters, Bravais lattices, the cubic crystal – The Simple Cube (SC), Body Centered Cube (BCC), Important parameters of cubic lattice – Number of atoms per unit cell, Co-ordination 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 cubic crystal, Numericals.

b) X-rays: Production of X-rays (Coolidge tube), Continuous and characteristic X-rays. Bragg's law, Properties and Applications of X-rays, Numericals.

Unit-IV: Physics of Semiconductor **No. of Lectures: 08 Hours, Marks: 12**

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

Unit-V: Optics **No. of Lectures: 08 Hours, Marks: 12**

a) Interference: Interference, Michelson's Interferometer, Applications of Michelson's interferometer – Wavelength determination, Refractive index of thin film, Thickness of transparent material.

b) Diffraction: Diffraction, Theory of plane transmission diffraction grating, Determination of wavelength by grating, Rayleigh's criteria of resolution, Resolving power of grating.

c) Polarization: Polarization, Polarization by reflection, Brewster's law, law of Malus, Dichroism, Polaroids. Engineering applications of polarization.

Text Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai Publications.
2. M N Avadhanulu, P G Kshirsagar, "Text book of Engineering Physics", S. Chand.

Reference Books:

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

13. Sanjay Jain, “Engineering Physics”, Universities Press (India) Pvt Ltd.

Applied Chemistry - I

COURSE OUTLINE

Applied Chemistry - I	AC-I	FEN102
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied 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 Applied Chemistry –I and their applications in different branches of engineering.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Chemistry

Course 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.

Course 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 classification, preparation, properties and applications of different alloys.

m) Understand the Water, Air Noise and Radioactive Pollution along with its control measures.

COURSE CONTENT

Applied Chemistry - I	**Semester I**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
	Duration of ESE: 03 hours
	Internal Sessional Exams (ISE): 40 marks

Unit–I: Water **No. of Lectures: 08 Hours, Marks: 12**

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

Unit–II: Polymer **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction, Definition

b) Classification: on the basis of chemical composition, synthesis, intramolecular forces.

c) Types of polymerization – addition &condensation polymerization with examples.

d) Plastic – Types of plastic – Thermoplastic & thermosetting plastic.

e) Explanation & different types with their properties & applications(i) PVC (ii) Teflon (iii) Polycarbonate (iv) Polystyrene

f) Rubber - Types of rubber- natural & synthetic

g) 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

Unit–III: Cement **No. of Lectures: 08 Hours, Marks: 12**

a) Definition, Classification and properties - Natural, Pozzolana & 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 Alloys **No. of Lectures: 08 Hours, Marks: 12**

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)Duralumin (iv) Nichrome (v) Steel – Mild, Medium & High.

Unit–V: Environmental Pollution & its control. No. of Lectures: 08 Hours, Marks: 12

a) Introduction

b) Water Pollution: Causes, Effects and Control measures of water pollution,

c) Air Pollution: Acid Rain, Green house effects, Depletion of Ozone

d) Causes, Effect and Control measures of air pollution.

e) Noise Pollution: Causes, effects & Control of noise pollution

f) Radioactive pollution: Causes, effects & Control of Radioactive pollution.

g) Green Chemistry -Definition & its application.

Text Books:

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.

2. S. S. Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.

2. Suba Ramesh, "Engineering Chemistry", Wiley India Pvt. Ltd.

3. R Gopalan, "A Text book of Engineering Chemistry", Vikas Publishing House Pvt. Ltd. Third Edition

4. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.

5. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.

6. V R Gowariker, "Polymer Science". New Age International.

7. Abhijit Mallick, "Engineering Chemistry", Viva books.

8. Sunita Ratan, “Engineering Chemistry”, S K Kataria & Sons.
9. Das R K, “Industrial Chemistry”, Asia Pub. House, New York, 1966

Applied Mathematics - I

COURSE OUTLINE

Applied Mathematics - I	AM-I	FEN - 103
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	**14**	**42**	**04**

Prerequisite course (s): 11^{th}& 12^{th} mathematics

Course objectives:

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.

Course outcomes:

After completion of this course learner will be able to:

1. Apply knowledge of mathematics in engineering and technology.
2. Identify, formulate and solve engineering problems.
3. Design Mathematical models for engineering problems and solve them.

COURSE CONTENT

Applied Mathematics - I	**Semester I**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
Tutorial:1 hour	**Duration of ESE: 03 hours**
	Internal Sessional Exams (ISE): 40 marks

UNIT 1: Matrices and its Applications **No. of Lectures: 08, Marks 12**

(Introduction to Definition of Elementary Transformations, Canonical Form & Rank of Matrix.)

1. System of Linear Equations. (By using rank of matrix) for both Homogeneous & non-Homogeneous systems.
2. Eigen values & Eigen vectors, Cayley Hamilton Theorem (only statement).
3. Orthogonal Transformation and Matrix.
4. Application of Matrices to the Engineering Field.

UNIT 2: Differential Calculus and its Applications **No. of Lectures: 08, Marks 12**

(Introduction to Successive Differentiation with standard formulae)

1. Leibnitz's theorem (without proof).
2. Taylor's & Maclaurin's theorems (without proof).
3. Expansion of Functions using Taylor's theorem, Maclaurin's theorem & Leibnitz's theorem.
4. Applications of Taylor's theorem.

UNIT 3: Complex Number and Its Applications **No. of Lectures: 08, Marks 12**

(Introduction of Complex Number- Definition and Properties, De-Moivre's Theorem and Argand diagrams. Roots of Complex Number)

1. Hyperbolic and Inverse Hyperbolic functions
2. Logarithm of Complex numbers,
3. Separation into Real and Imaginary parts.
4. Application to Engineering Field.

UNIT 4: Partial Differentiation **No. of Lectures: 08, Marks 12**

(Introduction to Partial Derivatives of First and Higher Order)

1. Euler's theorem on Homogeneous functions
2. Change of independent variable/ Composite Function
3. Total derivatives and Total Differential Theorem
4. Differentiation of Implicit functions.

UNIT 5: Integral Calculus **No. of Lectures: 08, Marks 12**

1. Gamma Function.

2. Beta Function.

3. Differentiation under Integral Sign. (No Verification of Rule).

4. Error Function

Text Books:

1. B S Grewal, “Higher Engineering Mathematics”, Khanna Publication.

Reference Books:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley Eastern Ltd, 7th Edition.

2. H K Das, “Advanced Engineering Mathematics”, S. Chand & Company.

3. B V Ramana, “Engineering Mathematics”, TMH, 2nd Edition.

4. N P Bali, “A Text Book of Engineering Mathematics”, Laxmi Publication, New Delhi.

5. Kandasamy, “Numerical Methods”, S. Chand & Company.

Communicative English

COURSE OUTLINE

Communicative English	CE	FEN104
Course Title	**Short Title**	**Course Code**

Course description:

This course has been designed paying special attention to the contemporary industrial needs and current society demands for Communicative Language skills.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	03

Prerequisite course (s): 11^{th} & 12^{th} English

Course objectives:

1. To help students become more fluent in the use of English and thus develop the ability to communicate easily and naturally.
2. To introduce different social situations to learners for developing their conversational skills.
3. To enhance learners English language proficiency in social and work situations, particularly in spoken interaction.
4. To develop communication skills in a professional context which will enable students to compete for an engineering or technical career and also perform effectively in their chosen profession.
5. To help students correct their pronunciation, word stress and intonation.
6. To develop the skills of technical writing and enable them to carry out their official and professional duties efficiently.
7. To help students use grammar for communication and relate grammatical structures to meaning, use and situation.
8. To inculcate student's competence in academic, commercial, and professional writing.

Course outcomes:

Upon Successful Completion of this course the students will be able to:

1. Students will be “accomplished technical communicators”;
2. Enhance learners’ English language proficiency in spoken interaction
3. They will be more fluent in the use of English and communicate naturally.
4. Augment the ability of the students to create, compose& render presentation with or without the help of media
5. Develop a logical framework for the critical analysis of spoken, written, visual and mediated messages in a diverse marketplace.
6. Become adept in their use of the spoken words in interpersonal communication, small group interactions and public speaking.
7. Students will be experts in professional writing.
8. Students will demonstrate proficiency in the use of written English, including proper spelling, grammar, and punctuation

COURSE CONTENT

Communicative English
Teaching Scheme
Lectures: 3 hours/week

Semester I
Examination scheme
End semester exam (ESE): 60 marks
Duration of ESE: 03 hours
Internal Sessional Exams (ISE): 40 marks

UNIT 1: Spoken English — No. of Lectures: 08, Marks 12

a) Pronunciation & Spelling
b) Organs of Speech-(diagram)
c) Vowels
d) Consonants
e) Diphthongs
f) Phoneme & phonemic Transcription
g) Intonation
h) Word & Sentence Stress

UNIT 2: Oral Communication (Functions) **No. of Lectures: 08, Marks 12**

Drills, Dialogues & Dialogue Comprehension, Role plays

a) Introducing oneself

b) Asking questions and giving polite replies

c) Complaining and apologizing

d) Persuading people to do something

e) Taking the initiative

f) Seeking permission

g) Inviting friends and colleagues

h) Praising and complimenting people

i) Expressing sympathy

j) Using the telephone

UNIT 3: Professional Communication **No. of Lectures: 08, Marks 12**

a) Interview Skills (campus recruitment): Why an Interview? Interview Questions, Types of Interview, how to Answer the Questions, Reasons for selecting & rejecting a candidate, how to present well in the Interview?

b) Group Discussion: Why Group discussion? Skills required in Group discussion, Areas to be concentrated while preparing for Group discussion, Techniques to initiate a Group discussion

c) Difference between Group Discussion & Debate

d) Successful Leadership Qualities

e) Effective Presentation strategies: Preparation, structuring the Presentation, Visual Aids, Positive & Negative traits

f) Public speaking

g) Effective Listening Strategies: Difference between hearing & Listening

UNIT 4: Commercial and professional writing **No. of Lectures: 08, Marks 12**

a) Job Application

b) Preparing CV/Résumé

c) Difference among Bio-data, CV & Résumé

d) Business correspondence: Layout of Business letter, (complaint & adjustment, Invitation, order, inquiry, reply letters)

e) Meeting, Notice, Agenda and minutes of a meeting, Memo, Fax, E-mail

f) Paragraph writing

e) Précis writing

f) Academic writing: Research article

g) Report writing

UNIT 5: Grammar Usage & Vocabulary Enhancement No. of Lectures: 08, Marks 12

a) Agreement of Subject and Verb

b) Static and Dynamic Verbs

c) The auxiliary system: finite and non-finite verbs

d) Modal Verbs

e) Parts of Speech

f) Sequence of Tenses

g) Interrogation

h) Reported Speech

i) Conditionals

j) Comprehension of Unseen Passages

k) Punctuation and Capitalization

Text Books:

Effective Technical Communication by M Ashraf Rizvi, The McGraw-Hill companies.

Reference Books:

1. A Text Book of English Phonetics for Indian Students by T. Balasubramaniam. (Macmillan India Limited)
2. A Course in Phonetics and Spoken English by J. Sethi and P.V. Dhamija (PrenticeHall of India.)
3. Spoken English by R.K. Bansal and J.B. Harrison (Orient Longman)
4. Cambridge English Pronouncing Dictionary, Cambridge University Press, India, 2012
5. Better English Pronunciation by J.D.O'Connor.
6. The Functional Aspects of Communication Skills- Prasad, P., Delhi.
7. Communicative Grammar of English by Geoffrey Leech and Ian Svartik.

8. English Vocabulary in Use- McCarthy, Michael., Cambridge University Press.
9. English Grammar and Composition- Rajinder Pal and Prem Lata., Sultan Chand Publication.
10. Business Correspondence and Report Writing- R C Sharma Krishna Mohan - 2002
11. An introduction to Professional English and Soft Skills by B. K. Das et al., Cambridge University Press (Facilitated by BPUT)
12. Entrepreneurial Development by C. B. Gupta& Srinivasan. (S. Chand & Sons)

Introduction to Civil Engineering and Engineering Mechanics

COURSE OUTLINE

Introduction to Civil Engineering and Engineering Mechanics	ICEEM	FEN-105
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

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Mathematics &Physics

Course objectives:

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.

Course outcomes:

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

1. Know basic areas of civil engineering
2. Know principle of planning and building byelaws.
3. Understand use of the compass for angular measurement and calculation of included angles in a traverse
4. Compute the rectangular components of a force.
5. Identify and/or list the different types of force systems.
6. Define and calculate the resultant of coplanar force systems.

7. Define and calculate the moment of forces about any given point.

8. Draw free body diagrams of coplanar force systems.

9. Understand condition of equilibrium for coplanar forces

10. Solve for the forces and reactions in statically determinate coplanar force systems

11. Calculate the centroid of composite plane and curved figures.

12. Compute the tensile and compressive values of forces in truss members.

13. Define friction, friction force, static friction, kinetic friction, normal force, coefficient of static friction, angle of friction, and angle of repose.

14. Find position, displacement, speed, velocity, acceleration, distance, and time of moving particle along the straight line and curved path.

15. Solve particle motion involving equation in 2D using rectangular and tangential/normal Coordinate systems.

16. Understand Newton's second law and D Alembert's principle, understand principle of linear impulse and momentum, Understand the principle of work and energy for particles.

COURSE CONTENT

Introduction to Civil Engineering & Engineering Mechanics **Semester I**

Teaching Scheme **Examination scheme**

Lectures: 3 hours/week **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 Marks

UNIT 1: Introduction to Civil Engineering No. of Lectures: 08, Marks 12

a) Basic Civil engineering: Introduction to various branches of civil engineering

b) Building Construction: Introduction to principles of planning, introduction to various parts of buildings. Load bearing & frames structure

c) Surveying: Principles of surveying, introduction to compass, bearing, Whole Circle Bearing & reduced Bearing System and measurement of included angles.

UNIT 2: Statics - I **No. of Lectures: 08, Marks 12**

a) Resultant of coplanar forces: Introduction, basic concepts, principals 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 diagrams, conditions of equilibriums, equilibriums of forces in a plane, Lami's theorem, reactions of determinate beams

UNIT 3: Statics – II **No. of Lectures: 08, Marks 12**

a) Centre of Gravity, Centre of mass and Centroid: Introduction, centre of gravity, centre of mass, centroid of composite plane figures, Derivation for centroid of rectangle, triangle and semicircle. Numerical on centroid of composite plane figures.

b) Plane Truss: Types of Plane trusses (perfect and imperfect), Analysis of plane truss by method of joints and method of sections.

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

UNIT 4: Dynamics - Kinematics **No. of Lectures: 08, Marks 12**

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 5: Dynamics - Kinetics **No. of Lectures: 08, Marks 12**

Kinetics of rectilinear motion of particle:

a) D Alembert's Principle, Newton's second law of motion,

b) Conservation of energy and work energy principle for motion of particles.

c) Impulse, momentum, direct central impact and coefficient of restitution. Conservation of momentum & impulse momentum principle of particle.

Text Books:

1. Sanju Unadkat, Engineering Mechanics, Techmax Prakashan

2. S C Gupta, Engineering Mechanics, Nirali Prakashan

Reference Books:

1. Bhavikatti S. S. & K. G. Rajashekarappa, "Engineering Mechanics", New Age International (P) Ltd., Publishers.

2. Kanitkar T. P. and Kulkarni, "Surveying and Levelling, Part I", Pune Vidyarthi Gruha Prakashan, 24th Edition

3. Bindra and Arora, "Building Construction", Dhanpat rai and Sons, Delhi.

4. N Kumara Swamy and A Ksmeswara Rao, "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd.

5. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.

6. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition

7. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.

8. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition

9. 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.

Introduction to Electrical Engineering

COURSE OUTLINE

Introduction to Electrical Engineering	IEE	FEN-106
Course Title	**Short Title**	**Course Code**

Course description:

This course provides an introduction to electrical engineering which includes over view of electric power generation, single and three phase AC circuit, magnetic circuit and fundamentals of electrical installation

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Physics

Course objectives:

1. To explain basic laws and theorems of electrical networks
2. To explain fundamentals of magnetic circuits and alternating current circuits
3. To study and significance of magnetic circuits
4. To illustrate electrical wiring fundamentals and safety measures

Course outcomes:

1. Students will be able to demonstrate knowledge of circuit analysis using various basic laws and theorems of electrical circuits
2. Students will be able to demonstrate knowledge of magnetic circuits
3. Students will be able to demonstrate and understand definition and relationship of various AC circuits
4. Students will be able to demonstrate and understand the operation of transformer
5. Students will be able to demonstrate and understand the electrical wiring installations

COURSE CONTENT

Introduction to Electrical Engineering | **Semester I**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: DC Circuit **No. of Lectures: 09, Marks 12**

DC Circuit: Kirchhoff's laws, Source conversion, series and parallel circuit, current and voltage division rule, Delta-star and star-delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's theorem, Maximum power transfer theorem, Charging and discharging of capacitor, Time constant for RC circuit

UNIT 2: Single Phase AC Circuit **No. of Lectures: 08, Marks 12**

Single phase AC Circuits: Concept of single phase supply, Terms related with A.C. quantities, pure resistive, inductive and capacitive circuits, complex and phasor representation of AC quantities, series and parallel circuits. Resonance in series and parallel circuits, Q-factor of coil.

UNIT 3: Three Phase AC Circuit **No. of Lectures: 08, Marks 12**

Three phase AC Circuits: Concept of Three phase supply, star and delta connections, line and phase values, solution of balanced three phase circuits, phasor diagram. Measurement of power in three phase circuit.

UNIT 4: Magnetic Circuit **No. of Lectures: 09, Marks 12**

Electromagnetic Induction: Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Calculation of mmf, reluctance and flux Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss.

UNIT 5: Electrical Installation **No. of Lectures: 08, Marks 12**

Electric Wiring installations: Types of insulated wires & wiring systems, concept of fuses, MCBs, RCCB, ELCBs, etc. in wiring installations, concept of earthling, energy bill calculations, study of different lamps.

Principle of operation, constructional details, types and applications of single phase Transformer.

Text Books:

1. B. L. Theraja and A. K. Theraja, "A Text book of Electrical Technology - Vol-I and Vol-II", S. Chand, 1st Edition, 2001.
2. J. B. Gupta, "A Course in electrical Power", S. K. Kataria and Sons, 12th Edition, 2002.

Reference Books:

1. V. N. Mittal, Arvind Mittal, "Basic Electrical Engineering", Tata McGraw Hill publishing co. ltd, New Delhi
2. D. P. Kothari, I.J Nagrath , "Basic Electrical Engineering", Tata McGraw Hill
3. M. S. Naidu, S. Kamakshaiah , "Introduction to Electrical Engineering", Tata McGraw Hill.
4. P. Tiwari, "Basic Electrical Engineering", New Age Publication.
5. Josep Administer, "Schaum's outline of Electric circuits", Tata McGraw Hill
6. Leonard Bobrow "Fundamentals of Electrical Engineering", Oxford University press.
7. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson.

Workshop Practice - I

LAB COURSE OUTLINE

Workshop Practice - I	WP-I	FEN 107
Course Title	**Short Title**	**Course Code**

Course Description:

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

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

ESE Pattern: ICA

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

Course 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, equipment's, job holding devices, job drawing, job material, job manufacturing operations and processes in different workshops.

Course Outcomes:

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

1. Measuring Instruments and fitting shop
2. Welding Shop
3. Tin smithy shop
4. Black smithy shop
5. Foundry shop

LAB COURSE CONTENT

Workshop Practice - I

Teaching Scheme

Practical: 2 hours/week

Semester I

Examination scheme

End Semester Exams (ESE): ---

Internal Continuous Assessment (ICA): 25

1. Measuring Instruments:

a. Demonstration of handling measuring instruments like steel rule, measuring tape, try- square, Vernier calliper, micrometre, 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. Demonstration or 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 Shop:

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

4.Black Smithy Shop:

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 moulding, casting of any simple pattern.

Reference Books:

1. Hajara Chaudhary and Bose S K, "Element of Workshop Technology Volume I andII", 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.

Applied Science - I Lab

LAB COURSE OUTLINE

Applied Science -I Lab	AS-II LAB	FEN 108
Course Title	**Short Title**	**Course Code**

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 can use this knowledge and apply in various branches of engineering as required.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

Prerequisite Course(s): 12^{th} Chemistry, Different laws, basic principles and theories.

Course Objective:

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.

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.

2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course Outcomes:

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

a) Analyse the partition Coefficient of Iodine between water & CCl4.

b) Analyse the saponification value of given oil sample.

c) Analyse the viscosity of given liquid by Ostwald's Viscometer.

d) Analyse the Calorific value of fuel sample by using Bomb calorimeter.

e) Identify the Moisture content, Volatile matter, Ash content and Fixedcarbon in coal sample by proximate analysis.

f) Identify the acidic and basic solution by using pH-meter.

g) Analyse the acid value of Vegetable Oil sample.

h) Analyse the strength of NaHCO3 and NA2CO3 in alkali mixture.

i) Analyse the Aniline point of lubricating oil.

j) Analyse the Iodine value of an Oil sample by Wij's method.

Learner will be able to:

1. Apply the concepts of use of non-conventional energy for betterment of society.

2. Apply the concepts of Laser and Fiber Optic communication and Illustrate the principle, construction and working of various LASERs and its applications.

3. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.

4. Basic understanding of Semiconductor theory with use of Hall effect in science and technology as a Hall probe sensor

5. Comprehend principles of interference and diffraction.

LAB COURSE CONTENT

Applied Science - I Lab	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): ---**
(Alternate)	**Internal Continuous Assessment (ICA): 25**

Applied Chemistry – I Lab

Practical -2 Hrs/Alternate weeks (Alternate with Applied Physics- I)

(Note: Minimum FIVE Experiments out of 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. K2Cr2O7 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 –, CO32- and HCO3 - 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 –, CO3- and HCO3- 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 AgNO3 solution by using Standard NaCl solution.

b. To find the exact normality of AgNO3 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.

Text Books:

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.

2. S. S. Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.

2. Suba Ramesh, "Engineering Chemistry", Wiley India Pvt.Ltd.

3. R Gopalan, "A Text book of Engineering Chemistry", Vikas Publishing House Pvt. Ltd. Third Edition

4. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.

5. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.

Applied Physics – I

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

(Note: Minimum FIVE Experiments from the following)

1. Semiconductor diode characteristics.
2. Band gap in semiconductor material.
3. To determine the resistivity of the given semiconductor by using four probe method.
4. To determine the wavelength of laser source.
5. Fiber Optics Communications.

6. Hall Effect & determination of Hall coefficient.
7. Solar cell Characteristics
8. Spectrometer Grating
9. Michelson's Interferometer
10. Determination of polarizing angle for glass and to determine refractive index of glass using Brewster's law.
11. Experimental verification of law of Malus
12. Crystal structure

Text Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai Publications.
2. M N Avadhanulu, P G Kshirsagar, "Text book of Engineering Physics", S. Chand.

Reference Books:

1. P S Aithal, H J Ravindra, Engineering Physics", Acme Learning.
2. G Vijayakumari, "Engineering Physics", Vikas Publications.
3. M R Srinivasan, "Physics for Engineers", New Age International Publishers.
4. C S Solanki, "Solar Photovoltaic", PHI Learning Private Limited.

Introduction to Civil Engineering &Engineering Mechanics Lab

LAB COURSE OUTLINE

Introduction to Civil Engineering & Engineering Mechanics Lab	ICEEM LAB	FEN109
Course Title	**Short Title**	**Course Code**

Course Description:

These laboratories cover experiments related to basic principles of Statics, Dynamics, Topographic Surveying, building planning.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	13	26	01

ESE Pattern: Oral (OR)

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

Course 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 Measurements with Compass.

Course Outcomes:

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

a) To understand basic laws of engineering mechanics & apply the same to solve problems.

b) To learn the use of prismatic compass for angular measurements.

c) Understand & apply triangle laws of forces for solving problems.

d) Understand the conditions of equilibrium of forces.

e) Describe efficiency, load, efforts, velocity ratio, frictional effort verify law of machines.

f) Describe frictional forces, limiting friction, coefficient of friction and verify law of friction.

g) Apply graphical methods to solve problems.

h) Measure bearings of lines with prismatic compass and calculate included angles.

LAB COURSECONTENT

Introduction to Civil Engineering		
& Engineering Mechanics Lab	**Semester I**	
Teaching Scheme	**Examination scheme**	
Practical: 2 hours/week	**End Semester Exams (ESE):**	**25 marks**
	Internal Continuous Assessment (ICA):	**25 marks**

Group A

1. Study of vectors

a) To calculate the resultant of coplanar and non-coplanar (space) forces.

b) To calculate unknown forces (reaction).

2. Verification of law of polygon of forces.

a) To verify the 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 ratio of P/sinα, Q/sinβ, R/sinγ 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. Reaction 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 frictions 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.

7. Study the 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 machines from graph.

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

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 three problems on graphical solutions of Dynamic's problems).

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

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

Note: The lab journal should consist of six experiments/assignments from group A. Assignment no. 8 & 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 of first unit. Any one of the following.

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

b) i) Explain principles of planning.

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

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

Text Books:

1. Sanju Unadkat, Engineering Mechanics, Techmax Prakashan
2. S C Gupta, Engineering Mechanics, Nirali Prakashan

Reference Books:

1. Bhavikatti S. S. & K. G. Rajashekarappa, "Engineering Mechanics", New Age International (P) Ltd., Publishers.
2. Kanitkar T. P. and Kulkarni, "Surveying and Levelling, Part I", Pune Vidyarthi Gruha Prakashan, 24th Edition
3. Bindra and Arora, "Building Construction", Dhanpat rai and Sons, Delhi.
4. N Kumara Swamy and A Kameswara Rao, "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd.
5. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.
6. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition
7. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.
8. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition
9. 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.

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.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Introduction to Electrical Engineering Lab.

LAB COURSE OUTLINE

Introduction to Electrical Engineering Lab	IEE LAB	FEN110
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, inductors and capacitors; magnetic circuits, AC/DC circuits and electrical installation. The students can use this knowledge to analyze more complex circuits such as electrical networks, single and three phase circuits, magnetic circuits etc.

Laboratory	Hours/week	No. of weeks	Total Hour	Semester Credits
	02	**14**	**28**	**01**

ESE Pattern: Oral [OR]

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

Course Objectives:

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

In this lab, students will be familiar with use of different theorems to analyze electrical networks. Students will also become familiar with R, L and C circuit, transformation ratio of transformer, power measurement, energy bill calculations etc.

Course Outcomes:

Upon successful completion of the lab student will be able to

a. Identify electrical components / equipment's.
b. Simplify D.C. network using Superposition Theorem.
c. Simplify D.C. network using Thevenin's Theorem.
d. Analyze RL and RLC series circuit.

e. Perform measurement of power in a single phase circuit.
f. Determine transformation ratio of a single phase transformer.
g. Analyze the measurement of power consumption of lamp.
h. Analyze light output in lumens of different lamps.
i. Analyze energy bill calculation of different lamps.
j. Describe operating principle of MCB, RCCB and ELCB.

LAB COURSE CONTENT

Introduction to Electrical Engineering	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

(Minimum FOUR practical's in each group)

Group A

1. Study and representation of electrical components / equipment's
2. Verification of Thevenin's theorems.
3. Verification of Superposition theorems.
4. Verification of Maximum power transfer theorems.
5. Measurement of current, voltage and power in R-L series exited by single phase AC supply.
6. Measurement of current, voltage and power in R-L-C series exited by single phase AC supply.

Group B

7. Measurement of power in single-phase circuit.
8. Measurement of power in three-phase circuit.
9. Determination of transformation ratio of a single-phase transformer.
10. Measurements of light output in lumens and energy bill calculation for different lamps.
11. Study of MCB, RCCB and ELCB.
12. Study of different earthing systems

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.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Text Books:

1. B. L. Theraja and A. K. Theraja, "A Text book of Electrical Technology - Vol-I and Vol-II", S. Chand, 1st Edition, 2001.

2. J. B. Gupta, "A Course in electrical Power", S. K. Kataria and Sons, 12th Edition, 2002.

Reference Books:

1. V. N. Mittal, Arvind Mittal, "Basic Electrical Engineering", Tata McGraw Hill publishing co. ltd, New Delhi.

2. D. P. Kothari, I.J Nagrath, "Basic Electrical Engineering", Tata McGraw Hill

3. M. S. Naidu, S. Kamakshaiah, "Introduction to Electrical Engineering", Tata McGraw Hill.

4. P. Tiwari, "Basic Electrical Engineering", New Age Publication.

5. Josep Administer, "Schaum's outline of Electric circuits", Tata McGraw Hill

6. Leonard Bobrow "Fundamentals of Electrical Engineering", Oxford University press.

7. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson.

Communicative English Lab

COURSE OUTLINE

Communication English Lab	CE-I	FEN111
Course Title	**Short Title**	**Course Code**

Course description:

The Communicative English Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	02	14	28	01

Prerequisite course (s): 11^{th} & 12^{th} English

Course objectives:

1. To make students recognize the accents of English through Audio-Visual aids.
2. To help students build their confidence and help overcome their inhibitions and self-consciousness while speaking in English. The focus will be on fluency.
3. To familiarize the students with communicative English.

Course outcomes:

Upon Successful Completion of this course the students will be able to:

1. Students will be sensitized towards recognition of English sound pattern.
2. The fluency in speech will be enhanced.

LAB COURSE CONTENT

Communicative English Lab	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

Laboratory Work:

Note: - The students will be required to submit practical assignments before Examination.

- Sounds of English

- Pronunciation & Spelling
- Stress and Intonation
- Errors in Spoken English
- Business Letter (Layout)
- Job application with Resume preparation
- Newspaper Reading

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.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Reference Books:

1. English Pronouncing Dictionary, Cambridge University Press, India, 2012.
2. A Textbook of English Phonetics for Indian Students by T. Balasubramanian, Macmillan Publisher, 1981

Applied Physics - II

COURSE OUTLINE

Applied Physics - II	AP-II	FEN112
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied 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 (Applied Physics -II) and their applications in different areas

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	03

Prerequisite course (s): 11^{th} & 12^{th} Physics

Course Objectives

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course outcomes:

Learner will be able to…

1. Apply the concepts of use of non-conventional energy for betterment of society.
2. Apply the concepts of Laser and Fiber Optic communication and Illustrate the principle, construction and working of various LASERs and its applications.
3. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.
4. Basic understanding of Semiconductor theory with use of Hall effect in science and technology as a Hall probe sensor.
5. Comprehend principles of interference and diffraction.

COURSE CONTENT

Applied Physics - II | **Semester II**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

Unit-I: Acoustics and Ultrasonic — No. of Lectures: 08 Hours, Marks: 12

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: Ultrasonic waves, Production of ultrasonic waves by – (1) Piezoelectric generators-its merits and demerits, (2) Magnetostriction oscillator - its merits and demerits. properties of ultrasonic. Engineering applications of ultrasonic. Numericals.

Unit-II: Magnetic Materials & Superconductivity — No. of Lectures: 08 Hours, Marks: 12

a) Magnetic Materials: Origin of magnetism, Classification of magnetic materials into paramagnetism, Diamagnetism and Ferromagnetism. Hysteresis loop, Hard and Soft magnetic materials. Ferrites – Production, Properties and Applications. Numerical.

b) Superconductivity: Superconductors, Type-I and Type-II superconductors, Properties of superconductors, Effect of Impurity, Magnetic field, Pressure, Stress etc. on superconductors, Meissner's effect, Applications of superconductor. Numericals.

Unit-III: Modern Physics and Spectroscopy — No. of Lectures: 08 Hours, Marks: 12

a) Modern Physics: Motion of a 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: 08 Hours, Marks: 12**

Wave nature of matter, Wave-particle duality, De-Broglie's wave, Wavelength of matter wave, Concept of group velocity, Phase velocity and Wave packet. Heisenberg's uncertainty principle with illustrations, 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: Nanoscience and Nanotechnology **No. of Lectures: 08 Hours, Marks: 12**

Introduction to 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 and Limitations of Nano-materials.

Text Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai Publications.

2. M N Avadhanulu, P G Kshirsagar, "Text book of Engineering Physics", S. Chand.

Reference Books:

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

Applied Chemistry - II

COURSE OUTLINE

Applied Chemistry - II	AC-II	FEN113
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied 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 Applied Chemistry –I and their applications in different branches of engineering.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Chemistry

Course objectives:

1. To apply the knowledge of science in engineering and technology.
2. To understand the basic concepts of chemistry and to analyse it from experiments.

Course outcomes:

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

a) Design and conduct experiments, analyse 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 classification, preparation, properties and applications of different alloys.

m) Understand the Water, Air Noise and Radioactive Pollution along with its control measures.

COURSE CONTENT

Applied Chemistry - II	**Semester II**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
	Duration of ESE: 03 hours
	Internal Sessional Exams (ISE): 40 marks

Unit–I: Chemical bonding — No. of Lectures: 08 Hours, Marks: 12

Introduction, Definition, Ionic bond, Covalent bond, coordinate or Dative bond, & Metallic bond

Metallic bond &Explanation of metallic Properties -

i) Electrical conductivity ii) Thermal conductivity iii) Metallic cluster iv) Malleability & Ductility v) Melting point

Hybridization: Types of Hybridization SP, SP^2, SP^3

Unit–II: Fuels — No. of Lectures: 08 Hours, Marks: 12

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. 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).

Unit–III: Lubricant **No. of Lectures: 08 Hours, Marks: 12**

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

B. Chemical properties with determination

i. Saponification value

ii. Acid value

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

Unit–IV: Refractories **No. of Lectures: 08 Hours, Marks: 12**

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–V: Corrosion and its control **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction – definition, causes, consequences of corrosion

b) Dry & Wet Corrosion - explanation with mechanism.

c) Types of corrosion – Pitting, waterline, soil.

d) Corrosion Control - Design & material selection, anodic & cathodic protection, hot dipping, galvanizing, tinning, electroplating.

Text Books:

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.

2. S. S. Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.

2. Suba Ramesh, “Engineering Chemistry”, Wiley India Pvt. Ltd.

3. R Gopalan, “A Text book of Engineering Chemistry”, Vikas Publishing House Pvt. Ltd. Third Edition

4. B S Chauhan, “Engineering Chemistry”, University Science Press, Third Edition.

5. Shashi Chawla, “A Text book of Engineering Chemistry”, Dhanpat Rai Publishing Co.

6. V R Gowariker, “Polymer Science”. New Age International.

7. Abhijit Mallick, “Engineering chemistry”, Viva books.

8. Sunita Ratan, “Engineering chemistry”, S K Kataria & Sons.

9. Das R K, “Industrial Chemistry”, Asia Pub. House, New York, 1966

Applied Mathematics - II

COURSE OUTLINE

Applied Mathematics - II	AM-II	FEN114
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 12^{th}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	14	42	04

Prerequisite course (s):11^{th}& 12^{th} mathematics

Course objectives:

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.

Course outcomes:

After completion of this course learner will be able to:

1. Apply knowledge of mathematics in engineering and technology.
2. Identify, formulate and solve engineering problems.
3. Design Mathematical models for engineering problems and solve them.
4. Use partial derivative to find total derivative of implicit functions.
5. Use partial derivative to find Jacobians
6. Find error and approximate values of problems related to engineering field.
7. Draw the rough sketch of Cartesian and polar curves.
8. Evaluate multiple integrals using spherical polar and cylindrical polar coordinates.
9. Solve ordinary differential equations using numerical methods.

COURSE CONTENT

Applied Mathematics - II	**Semester II**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
Tutorial: 1hr.	**Duration of ESE: 03 hours**
	Internal Sessional Exams (ISE): 40 marks

Unit-I: Application to Partial differentiation (No. of Lect. 08, Marks-12)

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

Unit-II: Differential Equation & its Applications (First order & First degree) (**No. of Lect. - 08, Marks-12)**

1. Exact differential equation.
2. Reducible to exact differential equation.
3. Linear differential equation.
4. Reducible to linear differential equation.
5. Applications of differential equation to simple Electrical circuits & Conduction of heat

Unit-III: Curve Tracing and Fourier series (No. of Lect. - 08, Marks-12)

1. Curve Tracing: Cartesian & polar curves.
2. Fourier series: a) Full range Fourier series on $c \leq x \leq c + 2L$
   b) Half range Fourier series on $0 \leq x \leq L$
   c) Applications to Harmonic analysis

Unit-IV: Multiple Integrals and its Applications (No. of Lect.-08, Marks- 12)

1. Introduction to three co-ordinate systems.
2. Double integration. (Cartesian form, polar form & change of order of integration).
3. Triple integration.
4. 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-12)

1. Numerical solution by Taylor's series method.
2. Runge -Kutta method (fourth order).
3. Picard's method.
4. Modified Euler's method.

5. Milne's method

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, 7th Edition.
2. B S Grewal, "Higher Engineering Mathematics", Khanna Publication.
3. H K Das, "Advanced Engineering Mathematics", S. Chand & Company.
4. B V Ramana , "Engineering Mathematics", TMH, 2nd Edition.
5. N P Bali, "A Text Book of Engineering Mathematics", Laxmi Publication, New Delhi.
6. Kandasamy , "Numerical Methods", S. Chand & Company.

Introduction to "C" Programming

COURSE OUTLINE

Introduction to "C" Programming	ICP	FEN115
Course Title	**Short Title**	**Course Code**

Course description:

This course provides students with a comprehensive study of the C /C++ programming language. Introduction to program design and problem solving using the C /C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): Physics

Course objectives:

To impart knowledge so that the student will:

1. Learn the fundamentals, structure and syntax of C Language.
2. Write simple programs in C Language.

Course outcomes:

Upon completing this course, the student will be able to:

1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Use functions to solve the given problem.
4. Implement different Operations on arrays.
5. Understand strings and structures.
6. Understand the usage of pointers

COURSE CONTENT

Introduction to "C" Programming	**Semester II**	
Teaching Scheme	**Examination scheme**	
Lectures: 3 hours/week	**End semester exam (ESE):**	**60 marks**
	Duration of ESE:	**03 hours**
	Internal Sessional Exams (ISE):	**40 marks**

UNIT 1: Introduction **No. of Lectures: 08, Marks 12**

What is C, The C Character set, Constant, Variables & Keywords, Types of C Constants, Rules for constructing Integer Constants, Rules for constructing Real Constants, Rules for constructing Character Constants, Types of C Variables, Rules for constructing Variable Names, Comments in a C Program

Type Declaration Instruction, Type Conversion in Assignments

Data Types Revisited: Integers, long & short, signed & unsigned, Chars, signed & unsigned, Float & Doubles

Console Input/Output: Types of I/O, Console I/O Function, Formatted Console I/O Functions, Unformatted Console I/O Functions

Decision Control Instruction: The if statement, Multiple Statements within if, The if-else statement, Nested if-else, Forms of if

Use of Logical Operators, The else if Clause, The | Operator, The Conditional Operators

UNIT 2: Loop **No. of Lectures: 08, Marks 12**

Loop Control Instruction: Loops, the while Loop, Tips & Traps, More Operators, for Loop, Nesting of Loops, Multiple Initializations in the for Loop, the break Statement, the continue Statement, The do-while Loop, The Odd Loop

Case Control Instruction: Decisions using switch, The Tips & Traps, switch versus if-else Ladder, The goto Keyword

UNIT 3: Function & Pointers **No. of Lectures: 08, Marks 12**

Function: What is a Function? Why use Functions? Passing Values between Functions, Scope Rule of Functions, Order of Passing Arguments, Using Library Functions

Pointers: Call by Value and Call by Reference, An Introduction to Pointers, Pointer Notation, Back to Function Calls

UNIT 4: Arrays **No. of Lectures: 08, Marks 12**

Arrays: What are Arrays? A Simple Program using Array, more on Arrays, Array Initialization, Array Elements in Memory, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing

Multidimensional Array: Two Dimensional Arrays, initializing a Two-Dimensional Array, Memory Map of a Two-Dimensional Array, Pointers and Two Dimensional Arrays, Pointer to an Array, Passing 2 D Array to a Function, Array of Pointers, Three-Dimensional Array

UNIT 5: Strings **No. of Lectures: 08, Marks 12**

Strings: What are Strings? More about Strings, Pointers and Strings, Standard Library String Functions: strlen(), strcpy(), strcat(), strcmp()

Handling Multiple Strings: Two-Dimensional Array of Characters, Array of Pointers to strings, Limitations of Array of Pointers to Strings

Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored? Array of Structure

Text Books:

1. Let Us C by Yashavant Kanetkar, 14th Edition, BPB Publication

Reference Books:

1. Programming in ANSIC C by E Balagurusamy, Tata McGraw Hill, 4/E, 2007

2. Mastering C by K. R. Venugopal and S. R. Prasad, Tata McGraw Hill, 2011

3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI

4. C How to Program by Paul Deitel and Harvey Deitel, 8th Edition, Pearson

Introduction to Mechanical Engineering and Engineering Drawing

COURSE OUTLINE

Introduction to Mechanical Engineering and Engineering Drawing	IMEED	FEN116
Course Title	**Short Title**	**Course Code**

Course description:

This course provides the elementary level knowledge of Introduction to Mechanical Engineering and Engineering Drawing. 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 and various mechanical devices.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	03

Prerequisite course (s): Elementary Physics

Course objectives:

1. To describe some of the subfields of mechanical engineering
2. To develop imagination of physical objects to be represented on paper for engineering communication
3. To develop the manual drawing skill.
4. To develop drawing interpretation skill.
5. To develop the physical realization of the dimension of the objects.

Course outcomes:

1. Students will be able to understand the theory of projection.
2. Students will be able to know and understand the conventions and the methods of engineering drawing.
3. Students will be able to improve their visualization skills so that they can apply these skills in developing new products.
4. Students will be able to define mechanical engineering
5. Students will be able to distinguish mechanical engineering from other types of engineering
6. Students will be able to describe important components of engineering design

COURSE CONTENT

Introduction to Mechanical Engineering & Engineering Drawing

Semester II

Teaching Scheme

Lectures: 3 hours/week

Examination scheme

End semester exam (ESE): 60 marks

Duration of ESE: 04 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: Introduction to Mechanical Engineering No. of Lectures: 08, Marks 12

a) Introduction to Manufacturing: Definition and working of Turning, facing, knurling, Thread cutting, Drilling, Boring, Counter Sinking, Counter Boring, Plane milling, End milling, Slot milling. (No sketches of Machine tools and no analytical portion, sketches to be used only for explaining operations.).

b) Introduction to Machine Design: Basic procedure of machine design, requisite of design engineer, Introduction to steel and cast iron and its mechanical properties.

Mechanical elements: Basic functions and applications od shafts, keys, couplings, bearings.

c) Introduction to Thermal Engineering: Energy, different forms of energy, heat, work and its forms, sources of energy.

Difference between 2 stroke & 4 stroke engine, diesel & petrol engine, introduction to steam power plant layout.

d) Introduction to Industrial Engineering: Basic concepts of method study, time study, site selection, productivity. Definition, concepts, aims, objectives and scope of industrial psychology.

UNIT 2: Projections of Lines No. of Lectures: 08, Marks 12

a) Line parallel to both the plane, Line parallel to one plane and perpendicular to the other. Line inclined to one plane and parallel to the other.

b) Line inclined to both the reference planes. (First Angle & Third angle method of projection),

c) Traces of lines.

UNIT 3: Projections of Planes **No. of Lectures: 08, Marks 12**

a) Plane with surface parallel to one plane and perpendicular to other, Plane inclined to one plane and perpendicular to other (First Angle & Third Angle method of projection)

b) Projections of planes inclined to both the plane (problems on AIP & AVP). (First Angle & Third Angle method of projection)

UNIT 4: Orthographic Projections **No. of Lectures: 08, Marks 12**

a) Types of lines, methods of dimensioning and types of dimensioning,

b) Orthographic projections (First angle orthographic projection methods) of different machine parts problem,

c) Types of sections & Sectional Orthographic projections (First angle & Third angle orthographic projection methods)

UNIT 5: Isometric Projections **No. of Lectures: 08, Marks 12**

a) Introduction, Isometric axes, lines and planes; true scale and isometric scale. Isometric projection and Isometric view

b) Conversion of given orthographic view into isometric projection.

Text Books:

1. Arunoday Kumar, Engineering Drawing, Techmax

2. Venugopal, Engineering Drawing

Reference Books:

1. Bhatt N D, Panchal V M, "Engineering Drawing – Plane and Solid Geometry", Charotar Publishing House.

2. T Jeyapoovan, "Engineering Drawing and Graphics Using Autocad", Vikas Publication Noida, New Delhi.

3. H G Phakatkar, "Engineering Graphics", Nirali Publication, Pune.

4. Kannaiah K L, Narayana, "Engineering Graphics", Scitech Pub, Chennai

6. Khurmi, Machine Design, Dhanpat Rai Publication

7. P K Nag, Engineering Thermodynamics, Tata McGraw Hill

Introduction to Electronics Engineering

COURSE OUTLINE

Introduction to Electronics Engineering	IEXE	FEN117
Course Title	**Short Title**	**Course Code**

Course description:

This course provides an introduction to electronics engineering covering: semiconductor devices such as diodes, transistors FETs and Optoelectronic and Power Electronic devices, operational amplifiers and their application; logic gates and their applications

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): Physics

Course objectives:

1. To provide students with a firm grasp of the essential principles of basic electronics.
2. To understand the concepts and terminology that is used in electronics engineering.
3. It is not an in-depth Electronic course but, rather a course aimed at acquiring an understanding of basic principles that are used in electronic engineering.

Course outcomes:

1. Understand working principle of PN junction diode, Zener diode and their applications.
2. Describe different configuration of Bipolar Junction Transistor.
3. Understand CE amplifier and working of transistor as a switch.
4. Describe different configurations of FET
5. Understand operating principle of various Optoelectronics and Power Electronics Devices
6. Understand operational amplifier and its applications.
7. Describe use of the Basic gate and Universal gate

COURSE CONTENT

Introduction to Electronics Engineering | **Semester II**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: Diodes **No. of Lectures: 08, Marks 12**

PN Junction Diode, V-I Characteristics, Junction break down, Diode current equation, Diode resistances, Temperature Dependence, Zener Diode and its V-I Characteristics,

Applications: Rectifiers, basic clipping and clamping circuits, Voltage Multipliers

UNIT 2: Bipolar Junction Transistors **No. of Lectures: 08, Marks 12**

Introduction to npn and pnp transistors, Alpha, Beta, Gamma and their relations, different regions of operations, CE & CB input output characteristics, BJT as a switch, BJT as an amplifier, DC load line and Q point. Applications of BJT as switch and amplifier.

Unit 3: Field Effect Transistors **No. of Lectures: 8, Marks 12**

Classification, working and V-I Characteristics of JFET and MOSFET, Parameters of FET, Difference between FET and BJT, MOSFET resistors, MOSFET Capacitor, CMOS (NMOS & PMOS), Applications of FET as Switch.

Unit 4: Optoelectronics and Power Devices **No. of Lectures:8, Marks 12**

Luminance, Photoconductivity, Photodiode, LED, LCD, Laser Diode, Optocoupler, Power Diode, SCR, SCR as a switch, V-I Characteristics, DIAC and TRIAC, UJT and relaxation oscillator.

Unit 5: OPAMP, Number System and Logic Gates **No. of Lectures- 8, Marks- 12**

OPAMP: IC 741 Pin diagram, Virtual ground concept, Inverting and Noninverting Amplifier, Adder, Subtractor, Integrator, Differentiator and Voltage follower.

Logic Gates: Number Systems, Basic and Universal Logic gates, truth table verification, Simplification and implementation of logic equations, De-Morgan's theorem, Half adder and Half Subtractor, Concept of Combinational & Sequential logic circuits

Text Books:

1. Applied Electronics: S. Chand Publication, R. S. Sedha

2. Principles of Electronics: S. Chand Publications, V.K. Mehta

Reference Books:

1. Modern Digital Electronics: TMH Publications, R. P. Jain

2. Applied Electronics: S. Chand Publication, B. L. Theraja

3. Electronics Principles: TMH Publications, A.P. Malvino

4. Linear Integrated Circuits: PHI Publications Ramakant Gaykwad

Workshop Practice- II

LAB COURSE OUTLINE

Workshop Practice II	WP-II	FEN 118
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.

Laboratory	**Hours/Week**	**No. of weeks**	**Total Hour**	**Semester Credits**
	02	**14**	**28**	**01**

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

Course Objectives:

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, equipment's, 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, equipment's, 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 equipment's in carpentry shop. Ability to understand the basic working principle of Plumbing operations, tools and equipment's in Plumbing shop.

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

Course Outcomes:

Upon successful completion of these practical's the student will be able to work in -

a) Carpentry shop

b) Plumbing shop

c) Machine shop

LAB COURSE CONTENT

Workshop Practice- II	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): --**
	Internal Continuous Assessment (ICA): 25 marks

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 equipment's 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.

Reference Books:

1. Hajra 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.

Applied Science-II Lab

LAB COURSE OUTLINE

Applied Science-II Lab	AS-II LAB	FEN 119
Course Title	**Short Title**	**Course Code**

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.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

Prerequisite Course(s): 12^{th} Chemistry, Different laws, basic principles and theories.

Course Objectives:

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.

2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course Outcomes:

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

a) Analyse the partition Coefficient of Iodine between water & CCl4.

b) Analyse the saponification value of given oil sample.

c) Analyse the viscosity of given liquid by Ostwald's Viscometer.

d) Analyse 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) Analyse the acid value of Vegetable Oil sample.

h) Analyse the strength of $NaHCO_3$ and Na_2CO_3 in alkali mixture.

i) Analyse the Aniline point of lubricating oil.

j) Analyse the Iodine value of an Oil sample by Wij's method.

LAB COURSE CONTENT

Applied Science - II Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): --**
	Internal Continuous Assessment (ICA): 25 marks

Applied Physics-II Lab

Practical: 2 hours/ week (Alternate with Applied Chemistry-II)

(Note: Minimum FIVE Experiments from the following)

1. Sound Level Meter
2. Ultrasonic Interferometer.
3. Ultrasonic Detectors
4. EMF by Thomson's method.
5. To Study B-H curve
6. Determination of Magnetic Susceptibility.
7. Uses of CRO
8. Synthesis and Characterization of Nano Composites

Applied Chemistry-II Lab

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

(Note: Minimum FIVE Experiments from the following)

1. Determination of partition Coefficient of Iodine between water & CCl4.

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). Standardization 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 30minutes.

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 NaHCO3 & Na2CO3 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 NaHCO3 and NA2CO3 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 CCl4 solution then add Wij'ssolution.

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 0.1Nsodium 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", Dhanpat Rai Publishing Co.

8. Abhijit Mallick, "Engineering chemistry", Viva books.

9. Sunita Ratan, "Engineering chemistry", S K 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 shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Introduction to Mechanical Engineering & Engineering Drawing Lab

LAB COURSE OUTLINE

Introduction to Mechanical Engineering & Engineering Drawing Lab	IMEED LAB	FEN 120
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.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

ESE Pattern: Oral (OR)

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

Course 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 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.

Course 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

Introduction to Mechanical Engineering	
& Engineering Drawing Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

1. Sheet No. 01 – Freehand sketches of Machine elements.

Free hand sketches of machine elements including screw threads, screwed fasteners, nuts, bolts, riveted and welded joints, Keys, shaft, couplings. (With constructional details.)

2. Sheet No. 02 – Projection of lines.

a) Illustration of projection of straight line inclined to two planes. (Minimum 02 solved examples)

b) Illustration of projection of straight line inclined to two planes (Traces of lines). (Minimum 02 solved examples)

3. Sheet No. 03 – Projection of Planes.

Illustration of projection of plane inclined to both planes. (Minimum 04 solved examples)

4. Sheet No. 04– Orthographic Projection.

a) Illustration of simple orthographic projection using both 1^{st}angle and 3^{rd}angle method. (Minimum 02 solved examples)

b) Illustration of sectional orthographic projection using both 1st angle and 3rd angle method. (Minimum 02 solved examples)

5. Sheet No. 05 – 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)

Note: FIVE drawing sheets from ED Lab shall be conducted during 14 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. R K Dhawan, "Machine Drawing", S Chand& Co., 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.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Introduction to "C" Programming Lab

LAB COURSE OUTLINE

Introduction to "C" Programming Lab	ICP LAB	FEN121
Course Title	**Short Title**	**Course Code**

Course Description:

This course provides students with a comprehensive study of the C / C++ programming language. Introduction to program design and problem solving using the C / C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Laboratory	**Hours/Week**	**No. of weeks**	**Total Hour**	**Semester Credits**
	02	**14**	**28**	**01**

ESE Pattern: Oral (OR)

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

Course Objectives:

To impart knowledge so that the student will:

1. Learn the fundamentals, structure and syntax of C Language.
2. Write simple programs in C Language.

Course Outcomes:

Upon completing this course, the student will be able to:

1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Use functions to solve the given problem.
4. Implement different Operations on arrays.
5. Understand strings and structures.
6. Understand the usage of pointers.

LAB COURSE CONTENT

Introduction to "C" programming Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

GROUP - A

Concerned faculty member will suitably frame FIVE assignments, ONE from each UNIT of the concerned theory subject, each assignment of 20 questions from unsolved exercises of Text Books as given below. The questions should be in the nature of multiple choices, TRUE / FALSE, output of a program, identify errors in a program etc. These assignments should be performed in the lab and for hands on experience.

GROUP – B

Minimum FIVE laboratory assignments from Group - B shall be performed using open source software. The suggested List is given below.

1. Write a C program to find area of circle, triangle, rectangle, square using switch statement.
2. Write a C program to find the sum of a series (looping).
3. Write a C program to accept a string and reverse it without using library functions. Display the original and reversed string. (String handling).
4. Write a C program that uses functions to perform the following string operations using function and pointers:
    i) To insert a sub-string in to given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
5. Write a C program to read 'N' elements into an array and compute the sum of all the elements stored in an array using pointer. (Arrays and pointers).
6. Write a C program to read a matrix of order (M *N) and (P * Q) and compute the addition and multiplication of two matrices. (Passing matrix to functions).
7. Write a C program to read 'N' students information and display the information with appropriate headings, where each student information consists of roll number, Name, total marks scored etc. (Structure handling).

Note: Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Guidelines 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.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Text Books:

1. Test Your C Skills by Yashavant Kanetkar, 5th Edition, BPB Publication
2. Let Us C by Yashavant Kanetkar, 14th Edition, BPB Publication

Reference Books:

1. Programming in ANSIC C by E Balagurusamy, Tata McGraw Hill, 4/E, 2007
2. Mastering C by K. R. Venugopal and S. R. Prasad, Tata McGraw Hill, 2011
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI
4. C How to Program by Paul Deitel and Harvey Deitel, 8th Edition, Pearson

Introduction to Electronics Engineering Lab

LAB COURSE OUTLINE

Introduction to Electronics Engineering Lab	IEXE LAB	FEN 122
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 analyse more complex circuits such as complex electrical networks, rectifiers, amplifiers, digital circuits, circuits using transducer etc.

Laboratory	**Hours/Week**	**No. of weeks**	**Total Hour**	**Semester Credits**
	02	**14**	**28**	**01**

ESE Pattern: Oral (OR)

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

Course Objectives:

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

In this lab, students will become familiar with various basic analogue and digital electronic circuits.

Course Outcomes:

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

a) Identify Electronic components

b) Learn diode V-I Characteristic

c) Understand BJJ as a switch

d) Understand LED, JFET, SCR V-I characteristics

e) Analyse and implementation of Op-amp and Digital circuits.

f) To understand PCB and Various soldering techniques.

LAB COURSE CONTENT

Introduction to Electronics Engineering Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

Group A

1. To Plot the V-I Characteristics of P-N Junction diode.

a) To plot forward characteristic of P-N Junction diode.

b) To plot reverse characteristic of P-N Junction diode.

c) To determine static resistances of diode.

2. Study of BJT as a Switch

a) Determination of parameters in cut off region.

b) Determination of parameters in saturation region.

c) Understanding of Q-point.

3. To Plot the V-I Characteristics of JFET.

a) To plot drain characteristic of JFET.

b) To plot transfer characteristic of JFET.

c) To determine JFET parameters.

4. A study of characteristics of Light Emitting Diode (LED)

a) To plot forward characteristic of Light Emitting Diode (LED).

b) To study difference of this characteristics with P-N junction diode characteristics.

5. To plot V-I characteristics of SCR

a) To plot forward characteristic of SCR.

b) To determine $V_{BO,}$ I_L& I_H of SCR

Group B

6. Implementation of inverting and non-inverting amplifier using OPAMP

a) To determine theoretical gain in both applications

b) To compare these with practical values

7. Implementation of any Boolean expression using LOGIC GATES.

a) Simplification of Boolean expression

b) Implementation using Basic gates

c) Implementation using Universal gates

8. Introduction to Printed Circuit Board (PCB) & Soldering Techniques.

a) Study of types of PCB's.

b) Study of Layout and artwork

c) Study of different soldering techniques.

Note: Perform any Three (03) experiments from each group.

Reference Books:

1. S Salivahanan, N Sureshkumar and A Vallavaraj, "Electronics Devices and Circuits", TMH, 2 nd Edition, 2009

2. R S Sedha, "Applied Electronics", S Chand, 1 st Edition, 2005

3. R A Gaikwad, "Op-Amps and Linear Integrated Circuits", PHI, 4 th edition,2001

4. R P Jain, "Modern Digital Electronics", TMH, 4th Edition, 2010

5. Printed Circuit Board Design and technology: Walter C. Bosshar

Guide lines for ESE:

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.