

NORTH MAHARASHTRA UNIVERSITY,
JALGAON (M.S.)

Teacher, Paper Setter and Examiner's
Manual

First Year Engineering

(Common to all branches)

Faculty of Science & Technology



W.E.F 2017 – 2018

Applied Physics - I

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Environmental Science (Non- conventional and Conventional Energy Sources, Importance and Utilization.)

Environmental Science		Lecture required	Reference No.
A	Introduction: - List the all types of different Energy sources. Allow students to list these sources under Conventional & Non- Conventional type. Give brief information about potential of these energies in India. Explain the major distinguishing points between Conventional & Non -Conventional energy sources.	02	13
B	Non-conventional energy sources Solar cell- (Principle- Construction- Working & Characteristics),Merits & De-merits of Solar cell, Applications of Solar cell, Numerical	01	05,13
C	Wind energy- Explanation how solar energy causes, blowing of wind, Harnessing of Wind energy - Wind Mill, Diagram, Working, Merits and Demerits.	01	13
D	Biogas & Bio Mass (Brief Explanation about way of harnessing or utilization, advantages), Advantages of non-conventional energy source.	01	13
E	Conventional energy sources- Introduction to Nuclear energy brief explanation of Nuclear Fission ,Nuclear Fusion, Chain Reaction, Multiplication Factor	01	01
F	Definition of Nuclear reactor. Types of reactor- Homogeneous & Heterogeneous (Only Definition) Diagram of Heterogeneous Nuclear reactor. List essential parts. Working of these parts in brief, Numericals.	02	01

Guidelines for the examiner and paper setter.

- 1) Questions should not be asked on introductory part.
- 2) Brief explanation of Homogeneous nuclear reactor should not ask.
- 3) Numerical should be asked based on solar cell and Nuclear Reactor.
- 4) Questions should not be asked on solar cooker, solar water heater, Tidal energy, Hydropower, Geothermal energy, ocean thermal energy.

Unit - II

Teacher should facilitate learning of Basics of Laser& Fiber Optics

Laser & Fiber Optics		Lecture required	Reference No.
A	Laser		
	A Introduction Laser beam characteristics -Coherence, Directionality, Intensity, Mono chromaticity.	01	7,1
	B Mechanism of Laser- Stimulated absorption, Spontaneous emission, Stimulated emission. Laser Terminology- Active Medium, Population, Population Inversion, Pumping , Metastable State.	01	7,1
	C Types of Laser- Gas Laser (He-Ne Laser), Nd-Yag Laser, Applications of Laser	02	7,1
	D Holography – Introduction, Principle of Holography, Recording of 3 D Image using Hologram, Reconstruction of 3 D images, and Comparison with ordinary photography.	01	7,1
B	Fiber optics		
	A Structure of optical fiber. Principle of optical fiber. Optical fiber Materials.	01	7,11
	B Propagation Mechanism in optical fiber- Angle of acceptance, Numerical aperture, Critical angle. (Numerical)	01	7,11
	C Optical fiber communication system (Only Diagram) Advantages of optical fiber. Applications of optical fiber.	01	7,11
<p>Guidelines for the examiner and paper setter.</p> <p>1) Numerical question should not be asked on Laser.</p> <p>2) Working of Ruby laser should not be asked.</p> <p>3) No questions should not be asked on designing of fiber optics such as material, types of fiber optics.</p> <p>4) No derivation should not be asked on Numerical Aperture, Acceptance Angle and fractional refractive index change.</p>			

Unit – III

Teacher should facilitate learning of Basic of Crystal structures & Crystal Formation. Teacher should facilitate learning of production & applications of X-ray.

Crystallography & X-ray		Lecture required	Reference No.
A	Crystallography		
	a Introduction Space Lattice – Translation Vectors The Basis and crystal structure.	01	6,1
	b Unit cell & Lattice parameters, Bravais Lattices The cubic crystal- The simple Cube (SC), Body centered Cube (BCC).	01	6,1
	c Important Parameters of cubic lattice –Number of atom per unit cell, Coordination Number, Atomic Radius. Packing density OR Packing Factor.	01	6,1
	d Miller indices – Rules for finding Miller Indices, Important features of Miller Indices, Miller Indices for cube crystal (Numerical)	02	6,1
B	X-Rays-		
	a Production of X –rays (Coolidge tube) Continuous x – rays (With Derivation) and characteristic x – rays,	02	1,12
	b Bragg's law. Properties & Applications of X-ray (Numerical- on Continuous X-ray derivation)	01	1,12
<p>Guidelines for the examiner and paper setter.</p> <p>1) Question should not be asked for face centered cube (FCC) and on hexagonal closed pack (HCP)</p> <p>2) Numerical on lattice constant should be included.</p> <p>3) Question should not be asked on Crystalline and Amorphous solid.</p> <p>4) Question should not be asked on 14 Bravais Lattice structure.</p>			

Unit – IV

Teacher should facilitate learning of Physics of Semiconductor

Physics of Semiconductor		Lecture required	Reference No.
A	Formation of Energy band in solid (Brief Explanation). Valance band, Conduction Band, Forbidden Gap Classification of solid on the basis of band theory. (Conductor, Semiconductor and Insulator)	02	1,11
B	Intrinsic & Extrinsic Semiconductor. Fermi-level and position of Fermi level in intrinsic (With derivation i.e. $E_f = (E_c + E_v) / 2$) and extrinsic semiconductors	02	1,11
C	Conductivity in semiconductors- Brief explanation. (Derive Expression for Intrinsic, P-Type, N-Type semiconductor) (Numerical.)	01	1,11
D	Formation of P-N junction, Diode under forward and reverse bias.	01	1,11
E	Hall Effect, Determination Hall Coefficient. (Numerical)	02	6,1
<p>Guidelines for the examiners and paper setters.</p> <p>1) Question should not be asked on working of LED. 2) numerical should not be asked on Fermi distribution function (in terms of probability).</p>			

Unit - V

Teacher should facilitate learning of Optics & various optical Phenomenons'

Optics		Lecture required	Reference No
A	Interference- Basic Introduction Michelson's Interferometer (Construction, Working) Applications of Michelson's interferometer- wavelength determination, Refractive index of thin film, thickness of transparent material, (Numerical)	03	7,1

B	Diffraction, Theory of plane transmission diffraction grating Determination of wavelength by grating, Rayleigh's criteria of resolution, Resolving power of grating. (Numerical)	03	7,1
C	Polarization, Polarization by reflection, Brewster's law, law of Malus, Dichroism, Polaroid's, Engineering application of polarization (Numerical)	02	7,1
<p>Guidelines for the examiners and paper setters.</p> <ol style="list-style-type: none"> 1. Distinguishes between Fresnel and Fraunhofer diffraction should not be asked. 2. Question should not be asked on resolving power of telescope. 3. Question should not be asked on double refraction, Nicol prism 4. Question should not be asked on types of interference like constructive and distractive interference. 			

Reference Books:

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

Applied Chemistry – I

Teacher, Paper Setter and Examiners should follow the following guidelines.

Unit – I Water

Teacher should facilitate learning of Sources; impurities found in natural water,

Unit – I Water	Lecture required	Reference
a) Introduction: Definition of water, impurities of water	1	1,4
b) Types of hardness – Units of hardness, causes of hardness of water	1	1,4
c) Analysis of water - Chloride contents by Mohr's method	1	1,4
d) Alkalinity along with numerical.	1	1,4
e) 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	4	1,4
Guidelines for the examiners and paper setters- 1) Question should not be asked on introductory part. 2) Brief question should not be asked. 3) Numerical question on lime soda should be included. 4) Only Numerical question on Alkalinity may be asked.		

Unit – II Polymer

Teacher should facilitate learning of Sources, Classification, Synthesis, Mechanism of polymerization, Rubber & their types, Vulcanization of rubber.

Unit – II Polymer	Lecture required	Reference
a) Introduction, Definition, b) Classification: on the basis of chemical composition, synthesis, intramolecular forces.	1	1,4
c) Types of polymerization – addition & condensation polymerization with mechanism and examples d) Plastic – Types of plastic – Thermoplastic & thermosetting plastic.	2	1,4
e) Explanation & different types with their properties & applications (i) PVC (ii) Teflon (iv) Polycarbonate (v) Polystyrene	2	1,4
f) Rubber - Types of rubber- natural & synthetic g) Vulcanization of rubber: drawbacks of natural rubber	1	1,4

i) Synthetic Rubber - Synthesis, structure, properties & applications of- (i) Styrene butadiene rubber (SBR) (ii) Neoprene rubber (iii) Nitrile rubber	2	1,4
Guidelines for the examiner and paper setter 1) Question should not be asked on introductory part. 2) Brief questions should not be asked.		

Unit- III Cement

Teacher should facilitate learning of Types, classification, properties, Composition, manufacturing of cementing materials & chemistry behind their applications.

Unit – III Cement	Lecture required	Reference
a) Definition, Classification and properties – Natural Cement	2	1,3
b) Chemical constituent of Portland cement.	1	1,3
c) Manufacture of Portland cement by wet process.	1	1,3
d) Manufacture of Portland cement by dry process (using flow sheet diagram)	2	1,3
e) Setting & Hardening of Portland cement with chemical reaction.	1	1,3
f) Heat of hydration of cement	1	1,3
Guidelines for the examiner and paper setter 1) Question should not be asked on introductory part. 2) Brief questions should not be included in question paper.		

Unit – IV Alloys

Teacher should facilitate learning of Necessity, Classification, Preparation, Composition, properties & application of alloys. Applying the knowledge of alloys to protect metallic & non metallic surfaces

Unit – IV Alloys	Lecture required	Reference
a) Introduction, b) Necessity (Purpose) of making alloys c) Classification of alloys	2	1,4
d) Preparation of alloys – Fusion method, Electro deposition method	2	1,4
e) Composition, properties & application of following - (i) Brass (ii) Bronze iii) Duralumine (iv) Nichrome (v) Steel – Mild, Medium & High.	4	1,4

Guidelines for the examiner and paper setter

- 1) Question should not be asked on introductory part.
- 2) Brief questions should not be included in question paper.

Unit – V Environmental Pollution & its control

Teacher should facilitate learning of Nature, Causes & consequences of environmental degradation.

Unit – V Environmental Pollution & its control	Lecture required	Reference
a) Introduction	1	1,7
b) Water Pollution: Causes, Effects and Control measures of water pollution,	1	1,7
c) Air Pollution: Acid Rain	1	1,7
Green house effects, Depletion of Ozone	1	1,7
d) Causes, Effect and Control measures of air pollution.	1	1,7
e) Noise Pollution :Causes, effects & Control of noise pollution	1	1,7
f) Radioactive pollution: Causes, effects & Control of Radioactive pollution.	1	1,7
g) Green Chemistry - Definition & its application.	1	1,7
Guidelines for the examiner and paper setter		
1) Question should not be asked on introductory part.		
2) Brief questions should not be included in question paper.		

Reference Books:

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

Applied Mathematics - I

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit- I

Teacher should facilitate learning of basic about elementary row and column transformations.

MATRICES AND ITS APPLICATIONS.		Lecture required	Reference No.
a	Definition of Elementary Transformations, Normal Form, Canonical Form & Rank of Matrix.	01	3,4
b	System of Linear Equations. (By using rank of matrix) for both Homogeneous & non-homogeneous system.	03	3,4
c	Eigen values & Eigen vectors, Orthogonal Matrix.	02	3,2
d	Introduction to Cayley-Hamilton's Theorem. (without proof), Applications of Matrices (Translation, Scaling, Rotation)	02	3,5
Guidelines to paper setters: i) Questions should not be asked on Normal form, canonical form and rank of matrix. ii) Questions should not be asked on Cayley Hamilton theorem. iii) Questions should not be asked on repeated Eigen value of symmetric matrix.			

Unit- II.

Teacher should facilitate learning of basic about differentiation.

DIFFERENTIAL CALCULUS AND ITS APPLICATIONS.		Lecture required	Reference No.
a	Introduction to Successive Differentiation with standard formulae, Leibnitz's Theorem (without proof).	02	3,5
b	Taylor's & Maclaurin's Theorems (Without proof). Expansion of Functions by using Taylor's Theorem, Maclaurin's Theorem & Leibnitz's Theorem	04	2,5
c	Applications of Taylor's Theorem	02	2,3

Guidelines to paper setters:

- i) Questions should not be asked on introductory part.
- ii) Questions on expansion should be restricted on statement of Maclaurin's theorem.
- iii) Questions should not be asked on finding (y_n) at $x = 0$

Unit- III

Teacher should facilitate learning of basic about complex number, Cartesian and polar form of complex number.

COMPLEX NUMBER		Lecture required	Reference No.
a	Introduction to Circular Functions, Hyperbolic Functions & Inverse Hyperbolic Functions & their relations (without proof).	02	4,6
b	Hyperbolic Functions	02	4,6
c	Logarithm of a Complex Number.	02	4,6
d	Separation into Real & Imaginary Parts.	02	4,6

Guidelines to paper setters:

- i) Questions should not be asked on introductory part.
- ii) Short questions should be asked on separation into real and imaginary parts.

Unit- IV

Teacher should facilitate learning of basic about partial differentiation.

PARTIAL DIFFERENTIATION.		Lecture required	Reference No.
a	Introduction to partial derivative, Direct differentiation	02	3,4
b	Homogeneous functions, Euler's Theorem	03	3,4
c	Total derivatives, Implicit Function,	02	3,4
d	Change of independent variable /Composite Function.	01	3,4

Guidelines to paper setters:

- i) No question should be asked on introductory part.
- ii) No question should be asked on verification of Euler's theorem.
- iii) No question should be asked on change of independent variable with second order derivatives.

Unit-V

Teacher should facilitate learning of basic about integral calculus.

INTEGRAL CALCULUS		Lecture required	Reference No.
a	Gamma Function	02	4,5
b	Beta Function	03	5,6
c	Differentiation under Integral Sign. (No Verification of Rule)	02	4
d	Error function	01	4,6
Guidelines to paper setters: i) No question should be asked on introductory part. ii) No question should be asked on verification of rule of differentiation under integral sign.			

Reference Books:

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

Communicative English

Teacher, Paper setter and Examiners should follow the guidelines as given below.

UNIT 1. Teacher should facilitate Spoken English

Questions to be asked on the following topics	Lecture required	Reference
a) <u>Pronunciation & Spelling</u> Difference between Pronunciation & Spelling with suitable examples	1	1, 4
b) <u>Organs of Speech-(diagram)</u> Draw the diagram of Organs of Speech, describe Organs of Speech	1	1, 4
c) <u>Vowels</u> Explain Vowel sounds with at least two word examples	1	1, 4
d) <u>Consonants</u> Explain any Consonant sounds with at least two word examples for each	1	1, 4
e) <u>Diphthongs</u> Explain Diphthongs with at least two word examples for each	1	1, 4

f) <u>Phoneme & phonemic Transcription</u> Meaning and Description of Phoneme & phonemic Transcription with suitable examples	1	1, 4
g) <u>Intonation</u> Meaning of Intonation and Description of Rising tone, Falling Tone, Falling-Rising Tone, Rising-Falling Tone with at least two examples of sentences for each	1	1, 4
h) <u>Word & Sentence Stress</u> Meaning and Description of Word & Sentence Stress with suitable examples for Word & Sentence Stress separately	1	1, 4
Guidelines for the examiner and paper setter.		
1) Ask to Draw the diagram of Organs of Speech 2) Difference should be asked on between Pronunciation & Spelling 3) Combined question should be asked on pure vowels, diphthongs, consonants		
UNIT 2. Teacher should facilitate Effective Oral Communication		
Ask questions on Meaning & significance of Role Play, Give one Dialogue & ask Six questions based on that Dialogue		
a) Introducing oneself	1	2, 3
b) Asking questions and giving polite replies	1	2, 3
c) Complaining and apologizing	1	2, 3
d) Persuading people to do something	1	2, 3
e) Taking the initiative	1	2, 3
f) Seeking permission	1	2, 3
g) Inviting friends and colleagues		
h) Praising and complimenting people	1	2, 3
i) Expressing sympathy		
j) Using the telephone	1	2, 3
Guidelines for the examiner and paper setter.		
1) Question should be asked on Meaning & significance of Role Play 2) Expressions in English should be asked on any topics of this unit 3) Give one small Dialogue & ask questions based on that Dialogue		
UNIT 3. Teacher should facilitate Effective Professional Communication		
a) Interview Skills Purpose/ need an Interview, Types of Interview, Skills required to succeed in Interview	1	6, 12
b) Group Discussion, Purpose/ need of Group discussion, Skills required to succeed in Group discussion,	1	6, 12
c) Difference between Group Discussion & Debate , Difference between Group Discussion & Debate	1	6, 12
d) Successful Leadership Qualities	1	6, 12

Description Qualities required to be a Successful Leader		
e) Effective Presentation strategies Description of strategies /Techniques essential for Effective Presentation	1	6, 12
f) Public speaking Meaning of Public speaking Skills required to make Public speaking Effective	1	6, 12
g) Effective Listening Strategies: Difference between hearing & Listening Strategies /techniques/ skills required for Effective Listening Difference between hearing & Listening	2	6, 12
Guidelines for the examiner and paper setter.		
1) Question should be asked on a) or d) Or g)		
UNIT 4. Teacher should facilitate Effective Commercial and professional writing		
a) Job Application Write an Application for the post of Engineer	1	10, 11
b) Preparing CV/Résumé Write best example of 'CV' Write best example of 'Resume'	1	10, 11
c) Difference among Bio-data, CV & Résumé	1	10, 11
d) Business correspondence: Layout of Business letter	1	10, 11
e) Meeting, Notice, Agenda and minutes of a meeting, Memo, Fax, E-mail	1	10, 11
f) Paragraph writing & Précis writing	1	10, 11
g) Academic writing: Research article Report writing	2	10, 11
Guidelines for the examiner and paper setter.		
1) Question should be asked on a) or d)		
UNIT 5. Teacher should facilitate Grammar Usage & Vocabulary Enhancement		
a) Agreement of Subject and Verb	1	7, 9
b) Static and Dynamic Verbs	1	7, 9
c) The auxiliary system: finite and non-finite verbs & Modal Verbs	1	7, 9
d) Parts of Speech & Sequence of Tenses	1	7, 9
e) Interrogation & Reported Speech	1	7, 9
f) Conditionals	1	7, 9
g) Comprehension of Unseen Passages Read the passage & Answer the questions based on the given passage.	1	7, 9
h) Punctuation and Capitalization	1	7, 9

Guidelines for the examiner and paper setter.

- 1) One passage should be given to answer the six questions based on the same passage.
- 2) Questions should be asked on Tenses, Agreement of Subject and Verb, Punctuation and Capitalization

Reference Books:

- A Text Book of English Phonetics for Indian Students by T. Balasubramaniam.(Macmillan India Limited)
- A Course in Phonetics and Spoken English by J. Sethi and P.V. Dhamija (PrenticeHall of India.)
- Spoken English by R.K. Bansal and J.B. Harrison (Orient Longman)
- Cambridge English Pronouncing Dictionary, Cambridge University Press, India, 2012
- Better English Pronunciation by J.D.O'Connor.
- The Functional Aspects of Communication Skills- Prasad, P., Delhi.
- Communicative Grammar of English by Geoffrey Leech and Ian Svartik.
- English Vocabulary in Use- McCarthy, Michael., Cambridge University Press.
- English Grammar and Composition- Rajinder Pal and Prem Lata., Sultan Chand Publication.
- Business Correspondence and Report Writing- R C Sharma Krishna Mohan - 2002
- An introduction to Professional English and Soft Skills by B. K. Das et al., Cambridge University Press (Facilitated by BPUT)
- Effective Technical Communication by M Ashraf Rizvi, The McGraw-Hill companies.
- Entrepreneurial Development by C.B.Gupta& Srinivasan. (S.Chand&Sons)

Introduction to Civil Engineering & Engineering Mechanics

Teacher, Paper setter and Examiner should follow the following guidelines.

Guidelines for Paper Setter: -

1. The main syllabus is divided into five units. The units are sub divided into sections. There should be at least one question on each subsection. The question paper should not be eccentrically focused on certain topics. Rather it should cover all topics with weight as shown in the manual, in terms of lectures required.
2. In each unit at least one question should be based on Definition/Theorem/Principle or Derivation.

Unit – I

Teacher should facilitate learning of basic principles of civil engineering, various aspects of Civil Engineering, scope, importance and application of civil engineering. A student should be made aware of importance of civil engineering in the uplifting of society. New emerging dimensions of civil engineering must be apprised to the student.

Unit No	Sub Section	Topics	Lectures Required
1	a	a) Basic Civil Engineering : Introduction to various branches of Civil Engineering	02
	b	b) Building Construction: Introduction to Principles of Planning, Introduction to various parts of building, load bearing & frame structure.	03
	c	c) Surveying: Principles of surveying, introduction to compass, whole Circle Bearing & Reduced Bearing System and measurement of included angles. <i>Numerical should be on Conversion of Bearing from WCB to RB or Vice versa.</i>	03

Unit – II

Teacher should facilitate learning of resultant and equilibrium of coplanar force system:

	Topics	Lectures Required	
2	a	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.	02
	b	Moment of forces, couples, Varignon's theorem, equivalent force couple systems, resultant of non-concurrent force system in plane.	02
	c	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.	02
	d	Lami's theorem, Reactions of Determinate Beams. <i>Following loads should be considered in treatment: point loads, uniformly distributed loads, uniformly varying loads (triangular loads) and moment should be considered.</i> <i>Load combination should not include more than two loads at a time in a system. Numerical should be based on simple beams only (no compound beam)</i>	02

Unit – III

Teacher should facilitate learning of Centre of gravity, Analysis of Plane Truss and Friction:

	Topics	Lecture Required	
3	a	a) Centre of Gravity, Centre of mass and Centroid: Introduction, center of gravity, centre of mass, centroid of composite plane figures, Derivation for centroid of rectangle, triangle and semicircle.	03

		Numerical on centroid of composite plane figures. <i>Examiner should not include composite figure having more than two simple figures. Simple figures include rectangle, triangle, circle and semicircles.</i>	
	b	b) Plane Truss: Types of Plane trusses (perfect and imperfect), Analysis of plane truss by method of joints and method of sections. <i>Examiner should not ask numerical for solving more than three members of truss. The truss should not include more than seven members in truss.</i>	02
	c	c) Friction: Introduction, laws of friction, simple contact friction, ladder friction, application of friction on horizontal and inclined planes. <i>Numerical problem in examination should not have more than three contact surfaces subjected to friction.</i>	03

Unit – IV

Teacher should facilitate learning of Kinematics of Rectilinear and Curvilinear Motion of particle:

	Topics	Lecture Required	
4	a	Kinematics of rectilinear motion of particle: Introduction, basic concepts, types of rectilinear motions.	02
	b	Motion under gravity.	02
	c	Kinematics of curvilinear motion of particle: Introduction, basic concepts, motion along curved path, normal and tangential components of motion.	02
	d	Rectangular and path coordinate systems, projectile motion. <i>Numerical in examination should not consider motion under resisting media.</i>	02

Unit – V

Teacher should facilitate learning of kinetics of rectilinear motion of particle including Newton's second Law of motion, Work- energy and Impulse Momentum Principle:

	Topics	Lecture Required	
5	a	D'Alembert's Principle, Newton's second law of motion	03
	b	Conservation of energy and work energy principle for motion of particles.	02
	c	Impulse, momentum, direct central impact and coefficient of restitution. Conservation of momentum & impulse momentum principle of particle. <i>Numerical in examination should not consider multiple restitutions.</i>	03

Reference Books:

1. Bhavikatti S S & K G Rajashekarappa, "Engineering Mechanics", New Age International Publication.
2. Unadkat Sanju, "Engineering Mechanics", Tech-Max Publications, Pune.
3. Kanitkar T P and Kulkarni, "Surveying and Levelling, Part I", Pune

Vidyarthi Graha Prakashan, 24th Edition

4. Bindra and Arora, "Building Construction", Dhanpatrai and Sons, Delhi.
5. N Kumara Swamy and A Ksmeswara Rao, "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd, Anand, Gujarat.
6. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.
7. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition
8. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.
9. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition
10. R C Hibbeler "Engineering Mechanics statics and dynamics", Pearson Education, 11th Edition
11. Bendale S R, "Engineering Mechanics", John Wiley & Sons, Delhi, 1st Edition
12. Jaget Babu, "Engineering Mechanics", Pearson Education, Delhi, 1st Edition.
13. Sushilkumar, "Building Construction", Standard Publishers, New Delhi, 2010.
14. Shah M G, Kale C M and Patki S Y, "Building Drawing", Tata McGraw Hill Co. Ltd., New Delhi.

Introduction to Electrical Engineering

Teachers, Paper setters and Examiners should follow the guidelines as given below.

UNIT 1: DC Circuit

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
1.	Kirchhoff's laws, Node voltage and Mesh current methods	02
	Source conversion, series and parallel circuit, Current and voltage division rule	02
1.	Delta-star and star-delta conversion	01
	Superposition theorem, Thevenin's, Maximum power transfer theorem	03
	Charging and discharging of capacitor, Time constant for RC circuit (<i>Numerical should not be asked</i>)	01

UNIT 2: Single Phase AC Circuit

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
2.	Concept of single phase supply, Terms related with A.C. quantities, (<i>Numerical should not be asked</i>)	02
	Pure resistive, inductive and capacitive circuits(<i>Numerical should not be asked</i>)	02
2.	Complex and phasor representation of AC quantities	02

	Series and parallel circuits. Resonance in series and parallel circuits, Q-factor of coil	02
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UNIT 3: Three Phase AC Circuit

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
3.	Concept of Three phase supply(<i>Numerical should not be asked</i>)	02
	Star and delta connections (<i>Numerical should not be asked</i>)	02
3.	Line and phase values, solution of balanced three phase circuits, phasor diagram	02
	Measurement of power in balanced three phase circuit	02

UNIT 4: Magnetic Circuit

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
4.	Electromagnetic Induction: Faraday's laws, statically and dynamically induced EMF(<i>Numerical should not be asked</i>)	02
	Self and mutual inductance, coefficients of coupling, Terms related with magnetic circuits(<i>Numerical should not be asked</i>)	02
4.	Magnetization curve, Magnetic leakage and fringing, Leakage coefficient. (<i>Numerical should not be asked</i>)	02
	Calculation of MMF, reluctance and flux Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss	03

UNIT 5: Electrical Installation

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
5.	Types of insulated wires & wiring systems, concept of fuses, MCBs, RCCB, ELCBs, etc. (<i>Numerical should not be asked</i>)	03
	Concept of earthing(<i>Numerical should not be asked</i>)	01
5.	Energy bill calculations, study of different lamps. (<i>Numerical should not be asked</i>)	02
	Principle of operation, constructional details, types and applications of single phase Transformer. (<i>Numerical should not be asked</i>)	02

Workshop Practice- I

Teacher and Examiner should follow the following guidelines.

Teacher should facilitate the following lab experiments:

Workshop Practice I		Lab hours required
1	<p>Measuring Instruments</p> <p>Demonstration of handling measuring instruments like steel rule, measuring tape, try-square, Vernier calliper, micrometre, Vernier height gauges, bevel protector etc.</p> <p>Fitting shop</p> <p>One job on finishing two sides and make right angles of square job by filing operation, one drilling and tapping operations.</p>	06
2	<p>Welding Shop</p> <p>a) Demonstration or One Job on T-joint: one side of T-joint welded by Gas welding and another by Electric Arc Welding</p> <p>b) Demonstration of Brazing.</p>	06
3	<p>Tin Smithy Shop</p> <p>One job including soldering, Riveting etc.</p> <p>For example- letter box, Waste paper basket, tray, Funnel etc.</p>	06

4	<p>Black Smithy Shop</p> <p>One job on black smithy including Bending and Flattening</p> <p>For example: S-shape, hook shape, U shape job.</p> <p>Note: The job must be finished to the following limits: +2mm -2mm</p> <p>. . .</p>	04
5	<p>Foundry Shop</p> <p>Demonstration of preparation of molding, casting of any simple pattern.</p>	06

Reference Books.

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

Guide lines for ICA:

1. ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of workshop manual.
2. Workshop Manual to be submitted comprising of Job drawing, process sheet for a given job along with the sketches of tools used for operations.

Applied Chemistry - I
(Engineering Science Lab-I)

Teacher should facilitate learning following lab experiments:

Sr. No.	Experiment	Lab hours per week (alternate with AP-I)
1	<p>Estimation of total hardness of given sample of water by EDTA Method.</p> <p>Standardization of EDTA by using standard hard water. Estimation of total hardness of given water sample.</p>	2
2	<p>Determination of Dissolved oxygen present in given water sample (Winkler's Method).</p> <p>Standardization of Sodium Thiosulphate solution against std. $K_2Cr_2O_7$ solution using starch indicator. Calculate exact normality of Sodium Thiosulphate solution. Estimation of dissolved oxygen from given water sample.</p>	2
3	<p>Determination of alkalinity of water sample.</p> <p>To find the presence of OH^-, CO_3^{2-} and HCO_3^- ions in given sample of water by titrating against N/10 HCL using phenolphthalein & Methyl orange indicator. Calculate the amount of OH^-, CO_3^{2-} and HCO_3^- ions in given sample by end point results.</p>	2
4	<p>Estimation of Chloride content in a given water sample by Mohr's Method.</p> <p>Standardization of $AgNO_3$ solution by using Standard NaCl solution. To find the exact normality of $AgNO_3$ solution. Estimation of Chloride ions in given sample of water. Calculate the strength of Chloride ions in sample water.</p>	2
5	<p>Estimation of phenol by Iodometrically.</p> <p>Dilution of Phenol solution. Back titration of the above solution against standard 0.1 N Sodium Thiosulphate solution. Blank titration from brominating stock solution against 0.1 N Sodium Thiosulphate solution. Calculate the percentage of phenol.</p>	2
6	<p>Preparation of Polystyrene by bulk polymerization.</p> <p>Add nitrogen to styrene in oil bath. Cool the mixture and break it to give Polystyrene. Dissolve the polystyrene in benzene, filter the precipitate</p>	2

	and dry it. Calculate the yield percentage.	
7	Preparation of Phenol Formaldehyde Resin (Bakelite). above solution. Washing the residue obtained with distilled water and dry it. Calculate of the yield of Phenol formaldehyde resin.	2

Sr. No.	Experiment	Lab hours per week (alternate with AP-I)
8	Estimation Copper in Brass Iodometrically. Prepare given brass sample by acidifying, neutralizing and dilution in volumetric flask. Determine the amount of Copper in diluted brass sample solution by volumetric titration. Calculate the percentage of copper in given Brass Sample.	2
9	Estimation of Zinc from Brass Volumetrically. Standardization of K4 [Fe (CN) 6] by using Uranyl nitrate indicator. Dilution of the brass sample. By removing Sn, Pb, Cu, Fe from the solution. Titrating the remaining solution against K4 [Fe (CN) 6] and calculate the percentage of Zinc in Brass sample.	2
10	Determination of percentage of Calcium in Cement. Dilution of the cement sample in NH4Cl Solution. Distilled off and filter the solution. To the above filtrate add NH4NO3 solution, keep the filtrate and washing for the estimation of Lime. Estimation of Lime- Rectify the solution then add methyl red indicator along with ammonium oxalate solution. Calculate the amount of Calcium using oven and estimate the percentage of lime from the sample. Also find the percentage of calcium by volumetric analysis using KMNO4 solution.	2

Note: Lab journal should consist of minimum five experiments.

Reference:

1) Shashi Chawla , “Essentials of Experimental Engineering Chemistry “, Dhanpat Rai Publishing Company (P) Ltd.

2) Sudha Rani , “Laboratory Manual on Engineering Chemistry “, Dhanpat Rai Publishing Company (P) Ltd.

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 Physics – I
(Engineering Science Lab-I)

Teacher should facilitate learning following lab experiments:

Sr. No	Name of Experiment	Lab hours/week (Alternate Week With AC-I)
1	Semiconductor diode characteristics. Determination of forward and reversed characteristics of given semiconductor diode. Analyze the knee voltage of given diode. Comparison of analytical and the practical values.	02
2	Band gap in semiconductor material. Determination of forbidden energy gap of given semiconductor, Comparison of analytical and the practical values	02
3	To determine the resistivity of the given semiconductor by using four probe method. Determination of the resistivity/conductivity of given semiconductor. Study its variation with temperature.	02
4	To determine the wavelength of laser source Determine wavelength of He-Ne Laser using diffraction grating. Study the properties of Laser. Describe the operation of Laser Compare analytical and the practical values.	02
5	Fiber Optics Communications. Study of fiber optics communication. Describe the advantages of	02

	optical fiber over metallic cables.	
6	Hall effect & determination of Hall coefficient. Study of Hall Effect in semiconductors. Determination of Hall coefficient of semiconductor, Determination of sign of majority charge carrier.	02
7	Solar cell Characteristics To study the characteristics of solar cell, To find fill factor and its efficiency. Describe the working of solar cell, its advantages and disadvantages.	02
8	Spectrometer Grating To understand diffraction phenomenon. To learn about a diffraction grating. To determine wavelength of light using diffraction grating Compare analytical and the practical values.	02
9	Michelson's Interferometer Describe the operation of Michelson's Interferometer. To determine unknown wavelength of monochromatic light. Compare analytical and the practical values.	02
10	Determination of polarizing angle for glass and to determine refractive index of glass using Brewster's law. Determination of polarizing angle and refractive index using Brewster's law.	02

11	Experimental verification of law of Malus To study law of Malus. Prove- Intensity of polarized light is proportional to $\cos^2\theta$	02
12	Crystal structure To Study the given crystal structure	02

Note: Lab journal should consist of minimum five experiments.

Reference Books:

1. M N Avadhanulu, A.A.Dani, P M Pokley , “Experiments in Engineering Physics”, S. Chand.
2. S P Singh , “Advanced Practical Physics”, Pragati Prakshan.

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.

Elements of Civil Engineering & Engineering Mechanics Lab

Teachers and Examiners should follow the following guidelines.

1. Teacher should facilitate following lab experiments/assignments:

Group-A		Lab hours required
1	Concept of Vectors Study of vector will be discuss with respect to force vector, which includes rectangular component of vector, unit vector, calculation of resultant of force vector and application of equilibrium condition.	02
2	Verification of law of polygon of forces Verification of law of polygon of forces to understand the concept of force polygon. Statement and verification of law of polygon of forces.	02
3	Verification of Lami’s theorem Statement of Lami’s theorem , study the relation between force and angle between other two forces, concept of concurrent force to understand the concept of equilibrium and verification of force using universal force table.	02
4	Forces in jib crane Explain concurrent forces and law of triangle of forces, explain jib-crane apparatus, explain graphical condition of equilibrium of coplanar concurrent fore system, know the nature comparison of observed forces and calculated forces in members of jib crane.	02
5	Reactions of beam Define beam, types of support and support reactions, types of load on beam, conditions of equilibrium for non-concurrent coplanar force system, calculate support reactions using beam apparatus.	02
6	Simple friction on horizontal and inclined planes. Describe friction force, limiting friction coefficient of friction, laws of friction, $F \propto R$, calculate coefficient of friction for bodies in equilibrium on inclined planes.	02

7	Study of simple machines and verification of the law machines Define mechanical advantage, velocity ratio, efficiency, friction, effort and explain law of machine. Describe screw jack and single purchase crab and verify the law for both the apparatus.	02
8	Graphical work (statics) - minimum three problems on graphical solution of Static's problems. To understand graphical method to solve the problems in statics. a. To solve the problem on coplanar concurrent forces, parallel forces and reactions of beam by graphical method. b. To describe Bow's notation, space diagram, vector diagram, polar diagram, funicular diagram and to draw the same.	04
9	Graphical work (dynamics) - minimum three problems on graphical a. To draw the motion curve and understand significance of the same. b. To calculate displacement and distance travelled from V-T diagram	04

Communicative English Lab

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Teacher should facilitate Spoken & Written English

Questions to be asked on the following topics	Practical	Reference
Sounds of English	2	1, 2
Pronunciation & Spelling	2	1, 2
Stress and Intonation	2	1, 2
Errors in Spoken English	2	1, 2
Business Letter (Layout)	2	3
Job application with Resume preparation	2	3
Newspaper Reading	2	5

Reference books:

1. Cambridge English Pronouncing Dictionary, Cambridge University Press, India, 2012.
2. Textbook of English Phonetics for Indian Students by T. Balasubramanian, Macmillan Publisher, 1981
3. The Functional Aspects of Communication Skills- Prasad, P., Delhi.
4. Spoken English by R.K. Bansal and J.B. Harrison (Orient Longman)
5. The Times of India Newspaper

Note: ICA (25 Marks) will be based on continuous evaluation of students' performance throughout Semester and assignments submitted by students.
ESE will be based on the record submitted by the student

Applied Physics - II

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit – I

Teacher should facilitate learning of Acoustic, Importance of acoustic in our day to day Life. Learning of Ultrasonic, Production & its Engineering Applications.

Acoustics & Ultrasonic's		Lecture required	Reference No.
A	Acoustics	02	1,3
	Introduction: Elementary acoustics. Echo, Reverberation, Reverberation time, Sabine's formula (without derivation), Coefficient of absorption		
B	Intensity Level (With Formula), Limits of Audibility, Acoustical planning of building, Factors affecting the architectural acoustics of building & their remedy Numerical	02	1,3
B	Ultrasonic Waves	02	1,3
	Ultrasonic waves, Production of ultrasonic waves -by 1) Piezoelectric generator its merit & Demerit 2) Magnetostriction oscillator- Its merits & demerits		
	Properties of ultrasonic wave. Engineering applications of ultrasonic waves Numericals		
Guidelines for the examiner and paper setter. 1) Derivation of Sabine formula should not be asked. 2) No brief explanation of application of ultrasonic wave			

Unit - II

Teacher should facilitate learning of Basics of Magnetism & Superconductivity

Magnetic Materials and Superconductivity		Lecture required	Reference No.
a	Magnetic Materials	01	3,12
	Introduction, Origin of Magnetism Classification of magnetic materials into Paramagnetism, Diamagnetism & Ferromagnetism.		

A	b	Properties of Para magnetism, Diamagnetism & Ferromagnetism. Hysteresis loop (Explanation with Hysteresis loop diagram), Numericals	02	3,12
	c	Hard and Soft magnetic materials, (Distinguishing points of both materials) Ferrites – production, properties & applications	01	3,12

B	Superconductivity		01	3,12
	a	Super conductor, Properties of superconductor (Electrical Resistance, Effect of Impurity, Effect of Pressure & Stress, Isotope effects, Magnetic field effect, critical current, Persistent current.) Brief explanation of All these properties ,Numerical		
b	Type-I Superconductor, Type –II Superconductor, Comparison between them Meissner’s effect, Applications of superconductor.		03	3,12

Guidelines for the examiner and paper setter.

- 1) Question should not be asked on introductory part.
- 2) Question should not be asked on BCS theory.
- 3) Do not ask numerical on superconductivity.

Unit – III

Teacher should facilitate learning of Basic of Modern Physics & Spectroscopy

Modern Physics & Spectroscopy			Lecture required	Reference No.
A	Modern Physics		02	9,12
	a	Introduction Motion of Charged particle in electric field, in magnetic field, and Combined field		
	b	Numericals on motion of charged particle, Electron microscope (SEM) , positive ray.	01	9,12
	c	Principle, Block diagram, and Working of Cathode Ray Oscilloscope , Numerical	01	9,12
	d	Bainbridge Mass Spectrograph (Principle, Construction and Working), Numerical	01	9,12
B	Spectroscopy		01	4,13
	a	Zeeman Effect (normal and anomalous) experimental arrangement of normal Zeeman effect.		
b	Numericals on Zeeman effect, Nuclear Magnetic Resonance, (NMR) Magnetic Resonance Imaging (MRI)		02	4

Guidelines for the examiner and paper setter.

- 1) Question should not be asked on introductory part.

Unit – IV: Teacher should facilitate learning of Quantum Physics

Quantum Physics		Lecture required	Reference No.
A	Wave nature of matter, wave particle duality De- Broglie's Wave, Wavelength of matter wave –In terms of KE (For Electron)	01	9,13
B	Numericals on deBroglie wavelength Concept of group velocity, phase velocity & wave packet.	01	9,13
C	Heisenberg's uncertainty principle with illustration (Determination of the position of a particle by Microscope and Diffraction by single	02	9,12
D	Physical significance of wave function Schrodinger's time independent and time dependent wave equation.	02	9,14
E	Application of Schrodinger's time independent wave equation to the problem of particle in rigid box. Derivation and Numerical	02	9,14
Guidelines for the examiner and paper setter. 1) Question should not be asked on spherically symmetric potential well.			

Unit – V : Teacher should facilitate learning of Nano science & Technology

Nano science & Technology		Lecture required	Reference No.
a	Introduction of Nano particles, Properties of Nano particles (Optical, electrical, magnetic, structural, Mechanical),	02	5
b	Brief description of different methods of synthesis (Physical, Chemical, Biological, Mechanical),	02	5
c	Classification of Nano materials Fabrication Process-Top-down approach, Bottom up Approach.	02	5
d	Applications of nanotechnology Advantages & Limitations of Nano-materials	02	5
Guidelines for the examiner and paper setter. 1) Question should not be asked on introductory part.			

Reference Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai.
2. M R Srinivasan, "Physics for engineers", New Age International Publishers.
3. M N Avadhanulu, P G Kshrisagar, "Text book of Engineering Physics", S.Chand.
4. Brijlalal, Subramanyam, "Atomic and Nuclear Physics", S. Chand.
5. S K Kulkarni, "Nanotechnology, principles & Practices", Capital Publication Co.

6. Rajgopal, "Engineering Physics", PHI Learning Private Limited.
7. G S Raghuvanshi, "Engineering Physics", PHI Learning Private Limited.
8. G Vijayakumari, "Engineering Physics", Vikas Publishing House.
9. Hugh D Young, Roger A Freedman, "University Physics(With Modern Physics)", Pearson.
10. Uma Mukharji, "Engineering Physics", Narosa Publishing House.
11. S O Pillai, "Solid state Physics", New Age International Publishers.
12. Beiser, "Concept of modern physics", Tata macgraw-hill.
13. R B Singh, "Introduction to modern physics", New age Publication.
14. Satyapraksh, "Quantum Mechanics", Pragati Prakshan.

Applied Chemistry - II

Teacher, Paper setter and Examiner should follow the following guidelines.

UNIT- I

Teacher should facilitate learning of different types of bonds & various types of hybridization

UNIT- I Chemical Bonding	Lecture required	Reference
a) Introduction, Definition	1	3,4
b) Ionic bond, Covalent bond, coordinate or Dative bond, & Metallic bond	2	3,4
c) Metallic bond & Explanation of metallic Properties - d) i) Electrical conductivity ii) thermal conductivity iii) Metallic luster iv) Meallibility & Ductility v) Melting point	3	3,4
e) Hybridisation: Types of Hybridisation SP,SP ² ,SP ³	2	3,4
Guidelines for the examiner and paper setter 1) Question should not be asked on introductory part. 2) Brief question should not be asked.		

UNIT- II

Teacher should facilitate learning of Classification, Characteristics of good fuel, Determination of Calorific value of solid, liquid & gas fuels.

UNIT- II FUELS	Lecture required	Reference
a) Introduction – Definition, classification of Fuel, Calorific value & its units, b) Characteristics of good fuel	2	1,3
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).	2	1,3
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.	2	1,3
e) Determination of Calorific Value of gaseous Fuel/Volatile liquid by Boy's Gas Calorimeter (Numerical based on it).	2	1,3
Guidelines for the examiner and paper setter 1) Question should not be asked on introductory part. 2) Brief question should not be asked. 3) Numerical question of bomb , boy's calorimeter may be included		

UNIT- III

Teacher should facilitate learning of Importance & mechanism of lubrication.

UNIT- III Lubricant	Lecture required	Reference
a) Introduction: Classification, characteristics.	1	1,3
b) Mechanism of lubrication – Fluid Film, boundary & extreme-pressure lubrication	1	1,3
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	4	1,3

d) General Criteria for selection of lubricants for delicate machine, IC engine, gears, cutting tools, transformer & refrigeration system.	2	1,3
Guidelines for the examiner and paper setter		
1) Question should not be asked on introductory part.		
2) Brief question should not be asked.		

UNIT- IV

Teacher should facilitate learning of nature & classification of refractory & abrasive materials

Unit – IV Refractories	Lecture required	Reference
a) Introduction,	1	1,3
b) Types of Refractories, Characteristics of Refractories	2	1,3
c) Preparation, Properties & application of acidic, basic & neutral Refractories (i) Acidic - Alumina, Silica, Fireclay. (ii) Basic - Magnesite, Dolomite. (iii) Neutral - Carbon, graphite.	5	1,3
Guidelines for the examiner and paper setter		
1) Question should not be asked on introductory part.		
2) Brief question should not be asked.		

UNIT- V

Teacher should facilitate learning of Corrosion, Types of corrosion, factors, control methods and its causes & effects.

Unit – V Corrosion and Its control	Lecture required	Reference
a) Introduction – definition, causes, consequences of corrosion	1	1,3
b) Dry & Wet Corrosion - explanation with mechanism.	2	1,3
c) Types of corrosion – Pitting, waterline, soil	2	1,3
d) Corrosion Control - Design & material selection, anodic & cathodic protection, hot dipping, galvanizing , tinning, electroplating ,	3	1,3
Guidelines for the examiner and paper setter		
1) Question should not be asked on introductory part.		
2) Brief question should not be asked.		

Reference Books:

1. B K Sharma, "Engineering Chemistry", Krishna Prakashan Media (P) Ltd.
2. Suba Ramesh, "Engineering Chemistry", Wiley India Pvt. Ltd.
3. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.
4. S S Dara, "A Text Book of Engineering Chemistry", S. Chand & Co. Ltd.
5. Sunita Ratan, "Engineering chemistry", SK Kataria & Sons.
6. R. Gopalan, "A Text book of Engineering Chemistry (Third Edition)", Vikas Publishing House Pvt. Ltd..
7. R K Das, "Industrial Chemistry", Asia Pub. House, New York, 1966.
8. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.
9. Abhijit Mallick, "Engineering chemistry", Viva books.
10. S Deswal, A Deswal, "Basic Course in Environmental Pollution", Dhanpath Rai Publications.

Applied Mathematics - II

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit – I

Teacher should facilitate learning of basic about evaluation of determinant and partial derivative.

Application of Partial Differentiation		Lecture required	Reference No.
a	Jacobian and its applications.(Definition of Jacobian, chain rule of Jacobian, Jacobian of implicit Function, functional dependence & independence).	03	3,7
b	Errors & approximations.(Problems related to engineering field)	03	3,7
c	Lagrange's method of undetermined multipliers for single constraint.	02	3,7
Guidelines to paper setters:			
<ol style="list-style-type: none"> 1) No question should be asked on introductory part. 2) There should not be question on partial derivative using jacobian. 3) No question on chain rule. 			

Unit – II

Teacher should facilitate learning of basic about variable separable form of differential equation and general solution of differential equation 1st order & 1st degree.

DIFFERENTIAL EQUATION & IT'S APPLICATIONS (1 st ORDER & 1 st DEGREE)		Lecture required	Reference No.
a	Exact Differential Equation. Non-Exact Differential Equation.(Reducible to Exact Differential Equation by using Integrating Factor).	03	3,7

b	Linear Differential Equation. Reducible to Linear Differential Equation.	03	3,7
c	Applications of Differential Equation to Simple Electrical Circuits & Conduction of Heat.	02	3,7
Guidelines to paper setters:			
i) No question should be asked on introductory part.			

Unit – III

Teacher should facilitate learning of basic about co ordinate systems and integration.

Curve tracing and Fourier Series		Lecture required	Reference No.
	A] Curve Tracing		
a	Cartesian & polar curves.	02	5,6
	B] Fourier Series		
b	Full range Fourier series on	03	5,6
c	Half range Fourier series on	02	5,6
d	Applications to Harmonic analysis	01	5,6
Guidelines to paper setters:			
1) No question should be asked on introductory part.			

UNIT-IV

Teacher should facilitate learning of basic about co ordinate system, graph of standard functions, straight line and integration.

Multiple Integrals and it's Applications		Lecture required	Reference No.
a	Introduction to three co-ordinate system.	01	4,5
b	Double Integration.(Cartesian form, polar form & change of order of integration).	03	4,5
c	Triple integration.	02	4,5
d	Application of multiple integrals to area & volume.	02	4,5
Guidelines to paper setters:			
1) No question should be asked on introductory part.			
2) No question on change the order of integration.			

UNIT-V

Teacher should facilitate learning of basic about numerical methods.

Numerical solution of ordinary Differential equation (first order and first degree)	Lecture required	Reference No.

a	Numerical solution by Taylor's series method.	02	8,9
b	Runge -Kutta method (fourth order).	02	8,9
c	Picard's method	01	8,9
d	Modified Euler's method. Milne's method	03	8,9
Guidelines to paper setters:			
1) No question should be asked on introductory part.			
2) Only short question should be asked.			

Reference Books:

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

Introduction to "C" Programming

Teacher, Paper setter and Examiner should follow the following guidelines.

UNIT 1:

Teacher should facilitate learning of basic structure of C program along with Decision control statements & Operators.

1.	Introduction	Lecture required	Ref No
a	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	02	01
b	Type Declaration Instruction, Type Conversion in Assignments	01	01
c	Data Types Revisited: Integers, long & short, signed & unsigned, Chars, signed & unsigned, Float & Doubles	01	01
d	Console Input/output: Types of I/O, Console I/O Function, Formatted Console I/O Functions, Unformatted Console	01	01

		I/O Functions		
	e	Decision Control Instruction: The if statement, Multiple Statements within if, The if-else statement, Nested if-else, Forms of if	01	01
	f	Use of Logical Operators, The else if Clause, The Operator, The Conditional Operators	01	01

Guidelines for Examiners and Paper Setters:

1. Emphasis should be given to introduction of C.
2. Simple programs should ask based on above syllabus. At the least 50% of the questions should be based on program codes.
3. In program code variable declaration must be commented with the purpose of variable usage.
4. In program codes, every block / statement must be properly commented.

UNIT 2:

Teacher should facilitate learning of Iterative & Case control statements.

1.	Loop	Lecture required	Ref No
	a	Loop Control Instruction: Loops, The while Loop,	01 01
	b	Tips & Traps, More Operators	01 01
	c	For Loop, Nesting of Loops	01 01
	d	Multiple Initializations in the for Loop	01 01
	e	The break Statement, the continue Statement	01 01
	f	The do-while Loop, The Odd Loop	01 01
	g	Case Control Instruction: Decisions using switch,	01 01
	h	The Tips & Traps, switch versus if-else Ladder, The goto Keyword	01 01

Guidelines for Examiners and Paper Setters:

1. Emphasis should be given to logic & syntax.
2. Simple programs should ask based on Loop control instruction. At the least 50% of the questions should be based on program codes.
3. In program code variable declaration must be commented with the purpose of variable usage.
4. In program codes, every block / statement must be properly commented.

UNIT 3:

Teacher should facilitate learning of Function & Pointer.

1.	Function & Pointers	Lecture required	Ref No
a	Function: What is a Function? Why use Functions?	02	01
b	Passing Values between Functions, Scope Rule of Functions,	01	01
c	Order of Passing Arguments, Using Library Functions	01	01
d	An Introduction to Pointers, Pointer Notation	02	01
e	Pointers: Call by Value and Call by Reference	01	01
f	Back to Function Calls	01	01

Guidelines for Examiners and Paper Setters:

1. Emphasis should be given to logic & syntax.
2. Simple programs should ask based on Function. At the least 50% of the questions should be based on program codes.
3. In program code variable declaration must be commented with the purpose of variable usage.
4. In program codes, every block / statement must be properly commented.

UNIT 4:

Teacher should facilitate learning of Array in detail.

1.	Arrays	Lecture required	Ref No
a	Arrays: What are Arrays? A Simple Program using Array, More on Arrays	01	01
b	Array Initialization, Array Elements in Memory, Bounds Checking	01	01
c	Passing Array Elements to a Function, Passing an Entire Array to a Function, The Real Thing	01	01
d	Pointers and Arrays	01	01
e	Multidimensional Array: Two Dimensional Arrays, initializing a Two-Dimensional Array, Memory Map of a Two Dimensional Array,	01	01
f	Pointers and Two Dimensional Arrays, Pointer to an Array, Passing 2 D Array to a Function,	02	01
g	Array of Pointers, Three-Dimensional Array	01	01

Guidelines for Examiners and Paper Setters:

1. Emphasis should be given to logic & syntax.
2. Simple programs should ask based on Array. At the least 50% of the questions should be based on program codes.
3. In program code variable declaration must be commented with the purpose of variable usage.
4. In program codes, every block / statement must be properly commented.

UNIT 5:

Teacher should facilitate learning of String & Structure.

1.	Strings	Lecture required	Ref No
a	Strings: What are Strings? Standard Library String Functions: strlen(), strcpy(), strcat(), strcmp()	02	01
b	More about Strings, Pointers and Strings	01	01
c	Handling Multiple Strings: Two-Dimensional Array of Characters	01	01
d	Array of Pointers to strings, Limitations of Array of Pointers to Strings	01	01
e	Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored?	02	01
f	Array of Structure	01	01

Guidelines for Examiners and Paper Setters:

1. Emphasis should be given to logic & syntax.
2. Simple programs should ask based on String. At the least 50% of the questions should be based on program codes.
3. In program code variable declaration must be commented with the purpose of variable usage.
4. In program codes, every block / statement must be properly commented.

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

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit-I

Teacher should facilitate learning of

1	Introduction to Mechanical Engineering	Lectures required	Ref. no.
a	Introduction to Manufacturing: Definition and working of Turning, facing, knurling, Thread cutting,	01	5
	Drilling, Boring, Counter Sinking, Counter Boring, Plane milling, End milling, Slot milling.	01	5
b	Introduction to Machine Design: Basic procedure of machine design, requisite of design engineer, Introduction to steel and cast iron and its mechanical properties	01	6
	Mechanical elements: Basic functions and applications of shafts, keys, couplings, bearings.	01	6
c	Introduction to Thermal Engineering: Energy, different forms of energy, heat, work and its forms, sources of energy.	01	7
	Difference between 2 stroke & 4 stroke engines, diesel & petrol engine, introduction to steam power plant layout.	01	7
d	Introduction to Industrial Engineering: Basic concepts of method study, time study, site selection, productivity.	01	8
	Definition, concepts, aims, objectives and scope of industrial psychology.	01	8
<p>Guidelines for the examiners and paper setters: (No sketches of Machine tools and Questions are to be asked on elementary Theoretical study using simple line diagrams. No numerical is to be asked on Unit-I.)</p>			

Unit-II

Teacher should facilitate learning of

2	Projections of Lines	Lectures required	Ref. no.
1	Line parallel to both the plane, Line parallel to one plane and perpendicular to the other.	01	1
2	Line inclined to one plane and parallel to the other.	01	2
3	Line inclined to both the reference planes. (First Angle)	02	3
4	Line inclined to both the reference planes. (Third Angle)	02	4
5	Traces of lines.	02	3

Guidelines for the examiners and paper setters:

- a) Minimum one question should be compulsory on inclined to one plane and parallel to the other.
 b) Minimum one question should be compulsory on inclined to both plane

Unit- III

Teacher should facilitate learning of

3	Projections of Planes		Lectures required	Ref. no.
1	Plane with surface parallel to one plane and perpendicular to other.		01	1
2	Plane inclined to one plane and perpendicular to other (First Angle)		01	2
3	Plane inclined to one plane and perpendicular to other (Third angle)		01	3
4	Projections of planes inclined to both the plane (problems on AIP & AVP). (First Angle)		02	4
5	Projections of planes inclined to both the plane (problems on AIP & AVP). (Third angle)		03	3

Guidelines for the examiners and paper setters:

- a) Minimum one question should be on projections of plane inclined to one plane and perpendicular to other
 b) Minimum one question should be on projections of plane inclined to both plane

Unit-IV

Teacher should facilitate learning of

4.	Orthographic Projections		Lectures required	Ref. no.
1	Types of lines, methods of dimensioning and types of dimensioning.		01	1
2	Orthographic projections (First angle orthographic projection methods) of different machine parts problem		03	2
3	Types of sections & Sectional Orthographic projections (First Angle)		02	3
4	Sectional Orthographic projections (Third Angle)		02	4

Guidelines for the examiners and paper setters:

- a) Minimum one problem is to be asked on Orthographic projection with or without different sections using 1stangle method or 3rdangle method for maximum marks allotted to the unit.

Unit-V

Teacher should facilitate learning of

5.	Isometric Projections	Lectures required	Ref. no.
1	Introduction, Isometric axes, lines and planes; true scale and isometric scale. Isometric projection and Isometric view	01	1
2	Conversion of given orthographic view into isometric projection.	07	3
Guidelines for the examiners and paper setters: a) Minimum one Numerical is to be asked on conversion of given orthographic view into isometric projections / isometric view for maximum marks allotted to this work			

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 Jeyapooan, "Engineering Drawing and Graphics Using Autocad", VikasPublication, Noida, New Delhi.
3. H G Phakatkar, "Engineering Graphics", Nirali Publication, Pune.
4. Kannaiah K L, Narayana, "Engineering Graphics", Scitech Pub, Chennai
5. HajraChaudhari, Workshop Technology
6. Khurmi, Machine Design
7. P K Nag, Engineering Thermodynamics
8. Bewoor, Industrial Engineering

Introduction to Electronics Engineering

Teachers, Paper setters and Examiners should follow the guidelines as given below.

UNIT 1: Diodes

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
1. a	PN Junction Diode, V-I Characteristics, Junction break down,	02
	Diode current equation, Diode resistances, Temperature Dependence, (Numerical may be asked)	02
1. b	Zener Diode and its V-I Characteristics	01
	Rectifiers (working and waveforms only) basic clipping and clamping circuits (Unbiased)	02
	Voltage Multipliers (Half wave & Full wave Doubler)	01

UNIT 2: Bipolar Junction Transistors

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
2. a	Introduction to npn and pnp transistors & working, Alpha, Beta, Gamma and their relations (Numerical may be asked), different regions of operations	02
	CE & CB input output characteristics & input output resistances.	02
2. b	DC load line and Q point. (Numerical may be asked)	02
	Applications of BJT as switch and amplifier, comparison of CE, CB & CC	02

UNIT 3: Field Effect Transistors

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
3. a	Classification, working and V-I Characteristics of JFET and MOSFET,	03
	Parameters of FET(Numerical may be asked)),Difference between FET and BJT,	01
3. b	MOSFET resistors, MOSFET Capacitors, CMOS (NMOS & PMOS),	02
	Applications of FET as Switch.	01

UNIT 4: Optoelectronics and Power Devices

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
4. a	Luminance, Photoconductivity, Photodiode, LED, LCD,	02
	Laser Diode, Optocoupler, Power Diode,	02
4. b	SCR, SCR working,V-I Characteristics, SCR as a switch,	02
	DIAC and TRIAC , UJT and relaxation oscillator.	02

UNIT 5: OPAMP, Number System and Logic Gates

Sr. No.	Syllabus Content	Lectures Required (Hrs.)
5. a	OPAMP: IC 741 Pin diagram, opamp characteristics, Virtual ground concept, Inverting and Noninverting Amplifier,	03
	Adder, Subtractor, Integrator, Differentiator and Voltage follower.	02

5. b	Logic Gates: Number Systems(Decimal, Binary, Octal, Hexadecimal number systems & conversions) , Basic and Universal Logic gates, truth table verification, Simplification and implementation of logic equations, De-Morgan's theorem,	02
	Half adder and Half Subtractor, Concept of Combinational & Sequential logic circuits	02

Workshop Practice- II

Teacher and Examiner should follow the following guidelines.

Teacher should facilitate following lab experiments:

Workshop Practice II		Lab hours required
1	Carpentry shop a) Introduction to carpentry operations, equipment and tools. b) One job involves lap joint, bridle joint.	08
2	Plumbing shop a) 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. b) One Job having both side threading and like bending operations.	08
3	Machine shop One job on lathe machine involving operations like Facing, plain turning, step turning, taper turning, chamfering and drilling.	08

Reference Books:

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

Guide lines for ICA:

1. ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of workshop manual.
2. Workshop Manual to be submitted comprising of Job drawing, process sheet for a given job along with the sketches of tools used for operations.
3. Candidates are required to finish the job to the following limits
Machine Shop: +0.5 mm – 0.5 mm
Carpentry Shop: + 2mm – 2 mm

Applied Chemistry - II
(Engineering Science Lab-II)

Teacher should facilitate learning following lab experiments:

Sr. No.	Experiment	Lab hours per week (alternate with AP- II)
1	Determination of partition Coefficient of Iodine between water & CCl ₄ . Preparation of different composition of saturated Iodine solution in CCl ₄ . Separation of Aqueous and CCl ₄ layer from each bottle. Titration of Aqueous layer against N/100 Sodium Thiosulphate solution. Titration of CCl ₄ layer against N/20 Sodium Thiosulphate solution. Calculation of Iodine in both the layers.	2
2	Determination of saponification value of an oil. Preparation of std. KOH solution. Standardisation of Std. KOH solution against 0.5N HCL solution using Phenolphthalein indicator. Add KOH solution in 2 gm of Oil sample and reflux for 2 hours. Titrate the above solution against 0.5N HCL solution using Phenolphthalein indicator. Using two titrate values calculate the saponification number.	2
3	Determination of Viscosity by Ostwald's Viscometer. Find out the density of given liquid by using specific gravity bottle. Measure the flow time required for liquid and water by using Ostwald's Viscometer. Calculate the relative viscosity from the above observed values.	2
	Determination of Calorific value of fuel sample by using Bomb	

4	<p>calorimeter.</p> <p>Burn the known mass of solid fuel in Bomb pot. Observe the temperature difference of water in bomb pot. Calculate the actual and corrected calorific value of solid fuel sample from above observations.</p>	2
5	<p>Determination of Moisture, Volatile matter & Ash in a given sample of Coal (Proximate analysis).</p> <p>Determine and calculate the moisture content from the given coal sample. Determine and calculate the Volatile matter from the given coal sample. Determine and calculate the Ash content from the given coal sample. Determine and calculate the Fixed Carbon from the given coal sample.</p>	2
6	<p>Determination of pH using pH meter.</p> <p>Calibrate the pH-meter using buffer solution at room temperature. Measure the pH-values of given solutions. From the measured pH-values of solution, conclude which are acidic or basic solutions.</p>	2

7	<p>Acid Value of vegetable Oil sample.</p> <p>Add neutral alcoholic solution in given Oil sample and heat in water bath for 30 minutes. Titrate above solution against 0.1N KOH solution using phenolphthalein indicator. Calculate the acid value of given Vegetable Oil sample from above observations.</p> <p>Acid Value of vegetable Oil sample.</p> <p>Add neutral alcoholic solution in given Oil sample and heat in water</p>	2
8	<p>Determination of NaHCO_3 & Na_2CO_3 in given alkali mixture.</p> <p>Titration of alkali mixture solution against 0.1N HCl using methyl orange indicator. Titration of alkali mixture solution against 0.1N HCl using phenolphthalein indicator. Calculate the strength of NaHCO_3 and Na_2CO_3 from the above observed titrate values.</p>	2
9	<p>Determination of Aniline point of lubricating oil.</p> <p>Mixed Aniline and lubricating oil sample in Aniline point apparatus. Maintain the apparatus at constant temperature using water bath. Observe the temperature at which cloudiness and hazy appearance in the solution. Report the observed values as Aniline point.</p>	2
	<p>Determination of Iodine value of an Oil sample (Wij's method).</p> <p>Back Titration: Dissolve the given oil sample in CCl_4 solution then add</p>	

10	Wij's solution. Titrate the above solution against std. 0.1N Sodium	2222
	Thiosulphate solution. Blank Titration: In Wij's solution add KI solution and titrate it against 0.1N sodium Thiosulphate solution. Calculate the Iodine value of an oil sample from above observed titrate values.	2

Note: Lab journal should consist of minimum five experiments.

Reference Books:

1. Shashi Chawla, "Essentials of Experimental Engineering Chemistry", Dhanpat Rai Publishing Company.
2. Sudha Rani, "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing Company.

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 Physics – II (Engineering Science Lab-II)

Teacher should facilitate learning following lab experiments:

Sr. No	Name of Experiment	Lab hours/week (Alternate Week With AC-II)
1	Sound Level Meter Measurement of sound pressure in decibel. To study the use of sound level meter.	02
2	Ultrasonic Interferometer. Determination of velocity of ultrasonic wave in water. Study the properties of ultrasonic waves and its application. Compare analytical and practical values.	02

3	<p>Ultrasonic Detector Determination of distance, wavelength and velocity of ultrasonic wave.</p> <p>Study the production of ultrasonic wave. Compare analytical and practical values.</p>	02
4	<p>e/m by Thomson's method. Determination of specific charge of electron by using Thomson's method. To study motion of electron in electric field. Compare analytical and practical values.</p>	02
5	<p>To Study B-H curve To study and draw hysteresis curve using solenoid method. Describe remanance and coercive force from hysteresis curve.</p>	02
6	<p>Determination of magnetic susceptibility. Determination of magnetic susceptibility of given solution. To study the properties of magnetic materials and its applications To study working of electromagnet to produce magnetic field.</p>	02
7	<p>Uses of CRO To study working of CRO. Use of CRO to find frequency and amplitude. Compare analytical and practical values.</p>	02
8	<p>Synthesis and Characterization of Nano Composites</p> <p>Synthesis and characterization of metal nanoparticle like ZnO, CdP ,Fe,Ag or Core shell by electrochemical reduction process/ultrasonic cavitation/microwave/sol-gel technique at room temperature Size of metal nanoparticles can be calculated from XRD and Shearer's formula.</p> <p>shape & exact size of metal nanoparticles can be confirmed using Transmission Electron Microscope (TEM).</p>	

Note: Lab journal should consist of minimum five experiments.

Reference Books:

1. M N Avadhanulu, A A Dani, & P M Pokley, "Experiments in Engineering Physics".S.Chand
2. S P Singh, "Advanced Practical Physics".Pragati Prakashan.
3. S K Kulkarni, "Nanotechnology, Principles & Practices".Capital Publication 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

Teacher and Examiner should follow the following guidelines.

1. Teacher should facilitate following lab experiments:

Sheet No.	Title	Lab Hours
1	Free hand 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.)	04
2	Projection of lines. (a) Illustration of projection of straight line inclined to two planes. (Minimum 02 solved examples) b) a) Illustration of projection of straight line inclined to two planes (Traces of lines). (Minimum 02 solved examples)	04
3	Projection of Planes. Illustration of projection of plane inclined to both planes. (Minimum 04 solved examples)	04
4	Orthographic Projections 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)	04
5	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)	04

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and sheets submitted by the student.

Guide lines for ESE:

ESE will be based on sheets submitted by the student.

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
5. Hajra Chaudhari, Workshop Technology
6. Khurmi, Machine Design
7. P K Nag, Engineering Thermodynamics
8. Bewoor, Industrial Engineering

Introduction to “C” Programming Lab

Teacher should facilitate learning of following lab experiments.

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	Lab hours required
1	Write a C program to find area of circle, triangle, rectangle, square using switch statement.	02
2	Write a C program to find the sum of a series (looping).	02
3	Write a C program to accept a string and reverse it without using library functions. Display the original and reversed string. (String handling).	02
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.	02
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).	02
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).	02
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).	02

Note:

- Concerned faculty should suitably frame at least 10 practical assignments (FIVE assignments from Group – A &FIVE laboratory assignments from Group – B) out of the above list.
- Every assignment should include flowchart, algorithm, print out of code with proper comments & output.
- Every student should require to submit the assignments in the form of journal.

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 ANSI C", by E Balagurusamy, Tata McGraw Hill, 4/E, 2007

Introduction to Electronics Engineering Lab

Teacher should facilitate learning following lab experiments:

(Note: Minimum THREE Experiments from each group.)

Group-A

Sr.No.	Name of Experiment	Lab hours required
1	To Plot the V-I Characteristics of P-N Junction diode	02 Hours
2	Study of BJT as a Switch	02 Hours
3	To Plot the V-I Characteristics of JFET	02 Hours
4	A study of characteristics of Light Emitting Diode (LED)	02 Hours

Group-B

Sr.No.	Name of Experiment	Lab hours required
1	To plot V-I characteristics of SCR	02 Hours
2	Implementation of inverting and non-inverting amplifier using OPAMP	02 Hours
3	Implementation of any Boolean expression using LOGIC GATES	02 Hours
4	Introduction to Printed Circuit Board (PCB) & Soldering Techniques.	02 Hours

Reference Books:

1. S Salivahanan, N Sureshkumar and A Vallavaraj, "Electronics Devices and Circuits", TMH Publication
2. R S Sedha, "Applied Electronics", S Chand Publication
3. R A Gaikwad, "Op-Amps and Linear Integrated Circuits", PHI
4. R P Jain, "Modern Digital Electronics", TMH
5. Printed Circuit Board Design and technology: Walter C. Bosshart

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

Teacher should facilitate learning following lab experiments:

	Group-A Lab	Required hours
1.	Study and representation of electrical components/equipments	02
2.	Verification of Thevenin's theorems.	02
3.	Verification of Superposition theorems.	02
4.	Verification of Maximum power transfer theorems.	02
5.	Measurement of current, voltage and power in R-L series excited by single phase AC supply.	02
6.	Measurement of current, voltage and power in R-L-C series excited by single phase AC supply.	02
	Group-B Lab	Required hours
1.	Measurement of power in single-phase circuit.	02
2.	Measurement of power in three-phase circuit.	02
3.	Determination of transformation ratio of a single-phase transformer.	02
4.	Measurements of light output in lumens and energy bill calculation for different lamps.	02
5.	Study of MCB, RCCB and ELCB.	02
6.	Study of different earthing systems	02

Note: Lab file should consist of minimum FOUR experiments from each group.

Guidelines for ICA:

Faculty in charge will assess the practical's continuously and grade or mark each practical on completion date declared for each practical.

Guidelines for ESE:

ESE will be based on the Journal submitted by the students.

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, "Principles of Electrical Engineering", Prentice Hall