CHALAPATHI INSTITUTE OF ENGINEERING & TECHNOLOGY

(Accredited by NBA, NAAC with 'A' grade,, Approved AICTE & Affiliated to ANU)(An ISO 9001-2015 Certified Institution)
Chalapathi Nagar, LAM, Guntur-522 034, Andhra Pradesh, INDIA

(Autonomous)

Scheme of Instruction, Examination and
Detailed Syllabi of
Electrical and Electronics Engineering

SEMESTER I (First Year 1ST SEM)

SI.NO.	CATEGORY	CODE	SUBJECT NAME	HOURS PER WEEK			SCHEME OF EXAMINATION		
				L	T	P	INT	EXT	CREDITS
1	BSC	EE 111	Mathematics -I	3	1	0	30	70	3
2	BSC	EE 112	Engineering Chemistry	3	0	0	30	70	3
3	HSS	EE 113	Communicative English	3	0	0	30	70	3
4	ESC	EE 114	Basic Electronics Engineering	3	1	0	30	70	3
5	ESC	EE 115	Generation of Electrical Power	3	0	0	30	70	3
6	BSC LAB	EE 152	Engineering Chemistry Lab	0	0	3	30	70	1.5
7	HSS LAB	EE 152	English Communication Skills Lab	0	0	3	30	70	1.5
8	ESC LAB	EE 153	Computing Lab	0	0	3	30	70	1.5
			TOTAL	15	2	9	240	560	19.5

SEMESTER II (First Year 2ND SEM)

SI.NO.	CATEGORY	CODE	SUBJECT NAME	HOURS PER WEEK			SCHEME OF EXAMINATION		
				L	T	P	INT	EXT	CREDITS
1	BSC	EE 121	Mathematics -II	3	1	0	30	70	3
2	BSC	EE 122	Engineering Physics	3	1	0	30	70	3
3	ESC	EE 123	Electrical Measurement and Instrumentation	3	0	0	30	70	3
4	ESC	EE 124	Basic Electrical Engineering	3	1	0	30	70	3
5	ESC	EE 125	Engineering Graphics	1	0	2	30	70	3
6	MC	MC 140	Design Thinking	3	0	0	30	70	0
7	BSC LAB	EE 161	Engineering Physics Lab	0	0	3	30	70	1.5
8	BSC LAB	EE 162	Electrical Measurement and Instrumentation Lab	0	0	3	30	70	1.5
9	ESC LAB	EE 163	Basic Electrical Engineering Lab	0	0	3	30	70	1.5
			Total	16	3	11	270	630	19.5

CE/CS/CI/DS/AI/EC/EE-111   **MATHEMATICS-I**

(Common to all branches of Engineering)   **L T**

P C3

1 0 3

COURSE OBJECTIVES

1. To introduce theory of matrices and solving system of linear equations

2. To explain the role of Eigen values and Eigen vectors for orthogonal transformations.

3. To impart knowledge of mean value theorems and series expansions.

4. To explain the importance of partial differentiation and improper integrals.

5. To describe the role of multiple integrals in calculating areas and volumes.

UNIT I

Matrices

Matrices: Types of Matrices, Rank – Echelon form – Normal form -Inverse of a matrix by Gauss-Jordan method - Solution of Homogeneous linear systems – Solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

UNIT II

Eigen values – Eigen vectors:

Eigen values – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse, Power of Matrix by Cayley Hamilton theorem —— Reduction of quadratic form to Canonical form (Orthogonal transformation) – Rank, Index, and Signature of a Quadratic form

UNIT III

Sequences –Series & Mean value theorems:

Sequences and Series: Convergence and divergence-Oscillatory sequences and series – Ratio test – Comparison test-D-Alembert's ratio test – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule.

Rolle's theorem - Lagrange's mean value theorem - Geometrical interpretation - Cauchy's mean value theorem - Geometrical interpretation - Taylor's theorem - Maclaurin's series.

UNIT IV

Special Functions & Calculus:

Definitions of improper integrals: Beta & Gamma functions and their applications

Partial Differentiation – Homogeneous function – Euler's theorem – Total derivative – Chain rule –Taylor's and Maclaurin's series – Expansion of two variable functions – functional dependence – Jacobean – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT V

Multivariable Calculus:

Double Integrals:

Double integrals, change of order of integration, double integration in polar coordinates, area enclosed by plane curves.

Triple Integrals:

Evaluation of triple integrals, change of variables between Cartesian and cylindrical
 Coordinates

COURSE OUTCOMES

Student will be able to

1. Solve system of linear equations in the engineering domains.

2. Apply the functions of multiple variables to evaluate rate of change of physical quantities

3. List/compare different types of mean value theorems.

4. Apply improper integrals for estimating /solving error functions.

5. Evaluate the multiple integrals in Cartesian, Polar and Cylindrical coordinate systems.

TEXT BOOKS:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2017.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.

REFERENCES:

1. R. K. Jain and S. R. K. Iyengar Advanced Engineering Mathematics, 3th Edition, AlphaScience International Ltd., 2002.

2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13th Edition, PearsonPublishers, 2013.

3. Glyn James Advanced Modern Engineering Mathematics, 4th Edition, Pearson Publishers,2010.

EC/EE/CE – 112 ENGINEERING CHEMISTRY

(Common to all branches)

L T P C

3 0 0 3

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.
- compare the materials of construction for battery and electrochemical sensors
- explain the preparation, properties, and applications of thermoplastics & thermo settings, elastomers & conducting polymers.
- explain the principles of spectroscopy, GC and HPLC in separation of gaseous and liquid mixtures.

UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness unit sand determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion-exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

UNIT-II: POLYMER CHEMISTRY

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

PLASTICS: Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

Conducting Polymers- Introduction, examples, general applications and mechanism of Conduction on Poly acetylene.

Chemistry of Nano materials: Introduction to nano chemistry, preparation of nano materials - carbon nano tubes and fullerenes and their engineering applications.

UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.
BATTERIES: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and theiradvantages, Fuel cell (H_2-O_2 cell).

Corrosion:

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

Corrosion control: Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

UNIT-IV: INSTRUMENTAL METHODS
Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.
UNIT-V:
(i) CEMENT AND CONCRETE CHEMISTRY
Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process,Setting and Hardening Cement.
(ii) ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE:
Introduction to reactions involving Substitution (SN_1 and SN_2), Elimination reactions (E_1 andE_2), Synthesis of commonly used drug molecule – Aspirin and Paracetamol.

COURSE OUTCOMES

At the end of the course, the students will be able to

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)

- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)

- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)

- **explain** the manufacturing of portland cement and concrete formation (L2)

- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous andliquid mixtures (L2)

TEXT BOOKS

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi

2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi

3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut

4. A text book of engineering chemistry,3rd Edition, Shashi chawla, Dhanpat rai & Co

5. Instrumental methods of analysis, 7th edition, Gurudeep raj & Chatwal Anand , CBS Publications,1986.

6. Text book of Nano Science and Nano technology, B.S. Murthy and P.Shankar, Universitypress.

REFERENCE BOOKS

1. Quantitative analysis - Day & Underwood.

2. A Text book of Instrumental methods - Skoog and West.

3. Instrumental methods of analysis, 7th edition, H.W. Wilard and Demerit, CBSPublications,1986.

4. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, Universitypress.

L T P C3 0   0

<u>**COURSE OBJECTIVES:**</u>

1. To inculcate a sense of professionalism among the students while emphasizing onvocabulary building.
2. To adopt activity-based teaching-learning methods to ensure that learners would beengaged in use of language.
3. To provide pertinent reading strategies for comprehension.
4. To impart effective strategies for sensible writing and demonstrate the same in briefing.

UNIT – I

Text Title: A Proposal to Girdle the Earth (Excerpt) by Nellie Bly

Theme:

ExplorationSpeaking: Introducing oneself and

others

Listening: Topic, Context, and specific pieces of information

Reading Skills:

Reading Comprehension, Introduction, skimming and Scanning for Central Idea

Writing Skills: Writing Paragraphs

Grammar and Vocabulary: Functional words and Parts of Speech and Wh-Questions

Parts of Speech, Subject – verb Agreement, Wh - Questions

UNIT – II

Text Title: The District School as It was by One Who went to It, Warren Burton

Theme: On Campus

Speaking Skills: Preparing and delivering short, structured

talksListening: Main idea and supporting Ideas

Reading Skills:

Reading Comprehension, Tips for Identifying the central Idea

Writing Skills: Punctuation, Paragraph Writing, Principles of Paragraph Writing –

SentenceLinkers/Signposts/Transition Signals

Grammar and Vocabulary: Articles, Prepositions, Synonyms and Phrases in

contextTenses, Conditional Sentences, Sign Posts and Transition Signals.

UNIT – III

Title: Working Together Theme: The Future of Work

Speaking: Discussing and Reporting what is discussed

Listening: Global Comprehension

Reading Skills:

Reading Comprehension

Writing Skills: Summarising, Rephrasing what is read, avoiding redundances and

repetitions**Grammar and Vocabulary:** Subject-Verb Agreement, Tenses, Direct and

Indirect Speech

UNIT – IV

Title: H.G. Wells and the uncertinities of Progress, Peter J.

BowlerTheme: Fabric of Change

Speaking Skills: Role Plays-Formal and Informal

Listening Skills: Making Predictions (listening with or without videos)

Reading Skills:

Studying the use of graphic elements in texts

Writing Skills:

Information transfer

Grammar and Vocabulary: Quantifying expression, Adjective and Adverbs and

Degrees ofComparison

UNIT – V

Title: Leaves from the mental Portfolio of a Eurasian, Sui Sin

FarTheme: Tools for Life

Listening: Identifying Key terms, Understanding concepts,

Speaking Skills: Formal oral presentations

Reading Skills: Comprehension exercises

practice**Writing Skills:** Structured Essays

Grammar and Vocabulary: Letter Writing: Formal and

InformalOne-word substitutes and Idioms

COURSE OUTCOMES:

At the end of the course
1. The learners would be able to express their feelings using relevant vocabulary.
2. They can apply the use of cohesive devices for better reading comprehension.
3. Able to write appropriate structures on relevant topics.
4. Capable of framing proper sentences using grammatical structures and correct wordforms.

TEXTBOOKS

1. English All Round: Communication Skills for Undergraduate Learners-Volume 1,Orient Black Swan, 2019.

REFERENCE BOOKS:

1. *Academic writing: A handbook for International Students* Bailey, Stephen. . Routledge,2014.

2. *Pathways: Listening, Speaking and Critical Thinking* Chase, Becky Tarver. . HeinleyELT; 2nd Edition, 2018.

3. *Skillful Level 2 Reading & Writing Student's Book Pack (B10),* Macmillan Educational.

4. *Word Power Made Handy* Dr. Shalini Verma ,, S.Chand & Co Ltd., 2009.

5. *Objective English for Compititive Examinations* Hari mohan Prasad, Uma rani sinha, ,New Delhi, Tata McGrraw-Hill P.Ltd, 2007.

AICTE RECOMMENDED BOOKS

1. *Communication Skills* Sanjay Kumar and Pushp Lata, , Noida: Oxford University Press,2012.

2. *Communication Skills*- Meenakshi Raman, Sangeetha Sharma, , Oxford University Press,2011

EE -114   BASIC ELECTRONICS ENGINEERING

L   T   P   C

3   1   0   3

<u>COURSE OBJECTIVES</u>

At the end of this course, students will demonstrate the ability

1. To be familiar with the structure of basic electronic devices
2. To be exposed to the operation of electronic devices and their circuits
3. To be exposed to the application of electronic devices and their circuits
4. To analyze circuit transistor characteristics

UNIT-I: Semiconductors

Semiconductors, Classification of semiconductors, Extrinsic semiconductor, Intrinsic semiconductor, P-type, N-type, semiconductor conductivity, temperature dependence, Carrier density and energy band diagram.

UNIT-2: The PN Junction Diode

Basic Structure of the PN Junction, Biasing of PN Junction Diode, V-I characteristics of PN junction diode, Diode Current Equation, Effect of temperature on PN junction diodes, Static and Dynamic Resistances, Break Down of PN Junction Diode, Diffusion Capacitance, Transition Capacitance of The Diode, Diode Switching times, Piecewise Linear Diode Model,

UNIT-3: Diode Applications

Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms.Zener diodes, clamping and clipping circuits. Opto-Electronic Devices – LEDs,Photo Diode and Applications;

UNIT 4: Bipolar Junction Transistor (BJT)

BJT Construction, Operation, Common Base, Common Emitter and Common Collector Configurations, Operating Point. Operation of NPN and PNP transistor, Transistor configurations and their characteristics, CE, CB, CC model.

UNIT-5: BJT Biasing and Stabilization

Need for Biasing, Operating Point, Load lines and Quiescent Point, Fixed Bias Circuit, Self-Bias Circuit, Voltage Divider Bias Circuit, Bias Compensation using Diodes and Transistors Stabilization Factors, Stabilization against variations in VBE and β, Thermal Runaway, Thermal Stability.

COURSE OUTCOMES

At the end of course, the student will be able to

1. Explain fundamentals of semiconductor physics.

2. Apply the principles of modern physics to analyze the operation of semiconductor diodes.

3. Design electronic circuits using diodes.

4. Evaluate the transistor (BJT) configurations, and plot their characteristics.

5. Analyze the performance of BJTs.

TEXT BOOKS

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGrawHill, 2nd Ed., 2007.

2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/PrenticeHall,9th Edition,2006.

3. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.

4. Electronic Devices and Circuits - S. Shalivahanan, N. Suresh Kumar, A. Vallavaraj , TataMcGraw Hill(India), 3rd edition, 2007.

REFERENCE BOOKS

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education,6th edition, 2004.

2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.,1998.

3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.

4. Electronic Devices and Circuits- Prof GS N Raju I K International Publishing House Pvt .Ltd2006

WEB RESOURCES

1. http://nptel.iitm.ac.in/courses/

2. http://www.deas.harvard.edu/courses/es154/

EE -115   GENERATION OF ELECTRICAL POWER

L T P C

3 0 0 3

COURSE OBJECTIVES

1. To make the student to understand various types of electrical power generation in detail.
2. To know various factors associated with power plants, power plant economics.
3. To know about factors affecting selection of type of power generating station & tariffstructure.

UNIT – I: Thermal power stations

Selection of site for thermal station – layout and salient features - boilers – economizers – condensers – coal handling – feed water treatment - steam turbines – turbo generators.

UNIT – II: Hydroelectric power stations

Hydroelectric Stations: Hydrology – hydrographs – mass curves – classification of hydroelectric plants - general arrangement and operation of hydroelectric plants and its function.

UNIT – III Nuclear Power Stations

Principles of nuclear power station – basic factors in designing of reactors – pressurized water reactor – boiling water reactor – CANDU reactor – liquid metal cooled reactor – shielding and safety precautions.

UNIT – IV: Gas Turbine Plants

Layout of gas turbine plant – principle of operation – open cycle and closed cycle plants.- improvement of thermal efficiency of gas plant.

UNIT – V: Economical Aspects and Tariff

Economics of generation - factors affecting cost of generation -Definitions: load factor – diversity factor – plant use factor - reduction of cost by inter connected stations.

Power factor considerations – causes of low power factor – methods of improving power factorTariff: Characteristics of Tariff – types of Tariff.

COURSE OUTCOMES

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

1. To study the principle of operation of Thermal power station in detail.

2. To study the principle of operation of different components Hydroelectric power station

3. To study the principle of operation of different components Nuclear power station

4. To study the principle of operation of Gas Turbine power stations in detail

5. To know various factors associated with power plants, power plant economics.

TEXT BOOKS

1. Elements of Electrical power station design by M.V.Deshpande Wheeler Publishing Co

2. Generation of Electric Power by B.R. Gupta S. Chand & Company Ltd

3. Non-conventional energy sources by G. D. Rai Khanna Publishers,New Delhi

REFERENCE BOOKS

1. Generation distribution and utilization of electrical energy by C.L.Wadhwa, New Age Internations (P) Limited, 2005

2. Solar power engineering by B.S.Magal TMH Publishing Company. Ltd., New Delhi

3. Power plant Technology by MML.Wakil TMH Publishing Company. Ltd., New Delhi

4. Electrical power systems theory and practice by M. N. Bandyopadhyay – PHI

WEB REFERENCES:

1. www.nptel.iitm.ac.in

2. http://solarsystem.nasa.gov/planets/sun

3. www.microhydropower.net

EC/EE/CE – 151 ENGINEERING CHEMISTRY LABORATORY

(**Common to all branches**)   L   T   P   C

                                               0   0   3

                                                        1.5

COURSE OBJECTIVES:

- Verify the fundamental concepts with experiments.
- To know the methods of determining hardness and chloride ion concentration of watersample.
- To determine Iron present in sample by Redox Titration and Potentiometric method.
- To know the molecular properties like Surface Tension and Viscosity.

LIST OF EXPERIMENTS

1. Determination of hardness of water by EDTA method
2. Estimation of Mohr's salt by Permanganometry
3. Estimation of Mohr's salt by Dichrometry
4. Determination of alkalinity of water
5. Percentage of purity of washing soda
6. Determination of available chlorine in bleaching powder
7. Preparation of Urea-Formaldehyde resin
8. Determination on strength of NaOH using HCl conductometry
9. Acid-Base titration by pH meter
10. Acid-Base titration by Potentiometer
11. Determination of viscosity of lubricating oil
12. Determination of Surface tension

COURSE OUTCOMES:

At the end of the course, the students will be able to

- **Measure** the strength of an acid by Conductometric method.
- **determine** the physical properties like surface tension, adsorption and viscosity.
- **estimate** Iron in given sample by Redox Titration.
- **calculate** the hardness of water.

REFERENCE BOOKS

1. Qualitative Analysis – Vogel
2. Qualitative Analysis – Day & Underwood
3. Laboratory Manual for Qualitative Analysis – Gurudeep Raj.

CE/EC/EE -152   ENGLISH COMMUNICATION SKILL LAB

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

1. To make the students aware to different kinds of learner-friendly modes oflanguage to a variety of self-instructional learning.
2. To make the students enhance their communicative competence and equip studentswith interactive skills.
3. To make the students get clear understanding and learn correct usage of rules andregulations of grammar.
4. To achieve a reasonably good level of competency in writing, Group Discussionsand Public speaking.

LIST OF MODULES

Module-1: **Phonetics**
   a) Introduction to Phonetics
   b) Vowels and Consonants
   c) Accent, Intonation and Rhythm

Module-2: **Listening Comprehension**
   a) Comprehending Spoken material in British English
   b) Comprehending Spoken material in American English
   c) Intelligent listening in situations

 Module-3: **Every Day Situations: Conversation and Dialogues**
   a) Introducing oneself & others
   b) Asking for & giving permissions
   c) Asking for and responding to give directions
   d) Seeking request
   e) Inviting and responding invitations

Module-4: **Interview Skills**
   a) Introduction and Definition
   b) Process of Interviews
   c) Stress Interview
   d) Technical Interview

Module-5: **Presentation Skills**
   a) Extempore (JAM) Sessions
   b) Group discussion
   c) Identification of Source Material

OURSE OUTCOMES
1. To realize the importance of communication skills in job arena to enhance thestudents ability to communicate.
2. Able to realize the importance of body language while communicating with othersin professional life.
3. Acquire the ability to participate in all recruitment procedures.
4. Able to communicate effectively over a phone and proficient to demonstratetelephoning skills.

REFERENCE BOOKS

Books Suggested for English Language Lab Library (to be located within the lab in addition tothe CDs of the text book which are loaded on the systems):
1. Communicate to Conquer: A Handbook of Group Discussions and Job Interviews withCD, PHI Publications.
2. The ACE of Soft Skills: Attitude, communication and Etiquette for Success, - PearsonPublications.
3. Communication Skills2nd Edition - LeenaSen, - PHI, 2007.
4. Organizational Behavior 13th Edition- Stephen P. Robbins and Timothy A. Judge, PHI,2009.
5. Business Communication - Meenakshi Raman and Prakash Singh, Oxford Univ. Press,2006.
6. Communication Skills, Sanjay Kumar and PushpLata, Oxford University Press, 2011.
7. Word Power Made Handy - Dr. ShaliniVerma, S.Chand& Co Ltd., 2009.
8. Phonetics-O'Connor, J.D., Penguin, Harmondsworth, 1984

EE 153   COMPUTING LAB

	L	T	P	C
	0	0	3	1.5

COURSE OBJECTIVES

After successful completion of the course, the students will be able to –

- To understand basic functions of computer hardware and software components includingoperating system functions
- To use different application programs like word processing, spreadsheet, presentation, anddatabase management systems
- To Design and create web pages using XHTML
- To access and use of GITHUB
- To Design of Cloud Services

LIST OF EXPERIMENTS

Exercise No: 1

a. Identify various kinds Computing devices and their components.

b. Identify the different peripherals, ports and connecting cables in a PC.

c. Assemble and disassemble components of a PC

Exercise No: 2

Title : Document creation, Text manipulation with Scientific Notations

a. Starting Word

b. Creating Documents

c. Opening a Word document

d. Cutting, Copying and Pasting Text

e. Modifying Font

f. Aligning Text

g. Indenting Paragraphs and modifying line spacing

h. Setting and Modifying Tabs

i. Inserting Numbers and bullets in the word document

j. Inserting Bullets

Exercise No: 3

Title : Table creation, Table formatting and Conversion

a. Open a new document and insert a table with the following data: First Name Last NamePhone Address

b. Save the document with address.doc

c. Select the first Row and Bold the Text.

d. Align the text in the first row to "Center" and align the text in the remaining rows to "Left".

e. Insert a New Column to the beginning of the table with the data given.

f. Add a New Row to the End of the Table.

g. Insert a New Row between 3 and 4

h. Insert a New Column between 4th and 5th Column.

i. Change the size of the second column's width.

j. Sort the data according to alphabetical order of "First Name".

k. Delete the third row and third Column from the table.

l. Create a new row at the top of your table, merge the cells, and add a title to the table.

m. Split the above table into two tables

n. Apply Borders, Shading and Color to the table.

o. Spell check your document and correct all the grammatical as well as spelling mistakes

p. Save the above document as table.doc.

Exercise No: 4

Title :CHARTS – Line, XY, Bar and

PieSPREAD SHEET

To analyze the marks of I year students

	A	B	C	D	E	F	G	H
1				Mark Analysis – I year				
2	Roll No.	Name	Mark I	Mark II	Mark III	Total	Average	
3	1	Meena	67	98	56			
4	2	Vishal	56	67	65			
5	3	Elisa	98	97	90			
6	4	Richa	78	87	89			
7	5	Swetha	45	56	54			
8	6	Dravid	78	56	87			
9	7	Sourav	34	45	53			

a. Enter the above data in a worksheet and save the workbook as student.xls ii) Calculate totaland average for each student.

b. Save the workbook again.

c. Draw a pie chart to denote the names Vs total marks.

d. Try out various charts.

Exercise No: 5

Title :Power Point Presentation

Prepare a power point presentation on the topic given with minimum 10 slides and present it.

Exercise No: 6

Title :Mail Merge

Open a new document and type the following letter.

Enclosure: Resume.

a. Save the document as "Letter.doc."

b. Send the document to 10 recipients using Mail merge. (Use 10 different addresses)

c. Close the document.

Exercise No: 7

Title :Website Design

Design a sample website with minimum 6 pages.

Exercise No: 8

Title :Git Hub

Open an account in GitHub and upload the designed website to GitHub.

Exercise No: 9

Title :Cloud Services

Design Cloud Service with Web Role to demonstrate Windows Azure Blob Storage.

Exercise No: 10

Title :Cloud Services

Design Cloud Service with WebRole to demonstrate Windows Azure Table Storage.

COURSE OUTCOMES

After successful completion of the course, the students will be able to

1. Understand basic functions of computer hardware and software components includingoperating system functions
2. Use different application programs like word processing, spreadsheet, presentation, anddatabase management systems
3. Design and create web pages using XHTML
4. Access GITHUB
5. Design of Cloud Services

SEMESTER IV (SECOND YEAR 2ND SEM)

SI.NO.	CATEGORY	CODE	SUBJECT NAME	HOURS PER WEEK			SCHEME OF EXAMINATION		
				L	T	P	INT	EXT	CREDITS
1	ESC	EE 221	Mathematics -IV	3	1	0	30	70	3
2	PCC	EE 222	Python Programming	3	0	0	30	70	3
3	PCC	EE 223	Digital Electronics	3	1	0	30	70	3
4	PCC	EE 224	Electrical Machines – II	3	1	0	30	70	3
5	HSS	EE 225	Professional Ethics and Human Values	3	0	0	30	70	3
6	MC	MC 160	Constitution of India	3	0	0	30	70	0
7	PCC LAB	EE 261	Python Programming Lab	0	0	3	30	70	1.5
8	PCC LAB	EE 262	Digital Electronics Lab	0	0	3	30	70	1.5
9	PCC LAB	EE 263	Electrical Machines Lab – II	0	0	3	30	70	1.5
10	Skill oriented course	EE 264	As Suggested By APSCHE	1	0	2	30	70	2
			TOTAL	19	3	11	300	700	21.5
HONORS / MINOR COURSES				**4**	**0**	**0**	**30**	**70**	**4**
SUMMER INTERSHIP 1 MONTH MANDATORY									

CE/CS/CI/DS/AI/EC/EE-121 MATHEMATICS-II

(Common to all branches of Engineering)   L T P C

3 1 0 3

COURSE OBJECTIVES

1. To introduce important features of differential equations and related methods

2. To familiarize the techniques of solving partial differential equations arising in engineering

3. To introduce the subject of vector calculus to the students.

4. To make the students aware of the importance between mathematics and engineering.

UNIT-I

Linear Differential Equations of first Order:

Introduction-Exact – Reducible to exact differential equations, Linear and Bernoulli's equations –Applications: Orthogonal trajectories – Newton's law of cooling – Law of exponential growthand decay.

UNIT-II

Linear Differential Equations of Higher Order:

Non homogeneous equations of higher order with constant coefficients with Right hand sideterms of the type: e^{ax}, sin ax, cos ax, x^k, $e^{ax} V(x)$ and $x^m V(x)$.

Applications: Method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy- Euler equation.

UNIT-III

Partial Differential Equations and Applications:

Introduction, Formation of PDE, Solution of PDE, Linear equations of first order, Non-linear equations of first order.

Applications: Method of separation of Variables, One dimensional Wave, Heat equations andLaplacian equation.

UNIT-IV

Vector Calculus: Vector differentiation:

Scalar and vector point functions, Del applied to scalar point functions. Gradient – Divergence –Curl – Vector identities.

UNIT-V

Vector Integration:

Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems

<u>**COURSE OUTCOMES**</u>

Student will able to

1. Determine the solutions of ordinary differential equations by applying different methods.

2. Solve the higher order differential equations apply the same to the real-world problems.

3. Acquire the knowledge on partial differential equations wave, heat, Laplacian equations.

4. Explain the physical interpolation of gradient, divergence and curl.

5. Apply Green's, Stoke's, Gauss divergence theorems to evaluate double and triple integrals.

<u>**TEXT BOOKS**</u>

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

<u>**REFERENCES**</u>

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett,2011.

2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018

3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, PearsonPublishers, 2013.

4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha ScienceInternational Ltd., 2002.

EE-122   ENGINEERING PHYSICS

L T P C
3 1 0 3

COURSE OBJECTIVES

- Introduce the fundamental concepts of wave optics, conducting materials and optoelectronic devices
- Familiarize the students with topics of Electromagnetic waves and Fiber optics
- Understand the concepts of Quantum mechanics and Semiconductors.
- Gain knowledge about the concepts of Lasers and learning advanced concepts like Superconductivity.

UNIT-I: WAVE OPTICS

Principle of Superposition–Interference of light–Young's double slit Experiment–Interference in thin films by reflected light-Newton's Rings–Determination of Wavelength-Michelson Interferometer –Engineering applications

Diffraction–Fresnel Diffraction–Fraunhofer Diffraction –Single slit Diffraction–Diffraction Grating–Grating Spectrum –Determination of Wavelength–engineering applications

UNIT – II: LASER AND FIBER OPTICS

Characteristics of Laser–Spontaneous and Stimulated emissions–Principle of lasing action–Population inversion– Pumping–Einstein's Coefficients–Components of laser system– Working principle of Ruby laser, He-Ne laser–Applications of lasers.

Introduction to Optical Fibers–Principle of optical fiber–Critical angle, Acceptance angle–Numerical Aperture–Classification of fibers based on Refractive index profile, Modes–Fiber optic Communication system–Applications of Optical fiber.

UNIT-III: QUANTUM MECHANICS

Introduction–Matter waves–de-Broglie's Hypothesis of matter waves–Properties of matter waves– Heisenberg's uncertainty principle–Schrodinger's time independent and time dependent wave equation –Physical significance of the wave function–Particle in one dimensional potentialbox.

UNIT – IV: SEMICONDUCTORS

Origin of energy band formation in solids–Classification of materials into conductors, semi-conductors & insulators – Semiconductors–Intrinsic semiconductors–dependence of Fermi level on carrier concentration and temperature(Qualitative)–Electrical conductivity–Extrinsic semiconductors–P-type & N-type, Dependence of Fermi level on carrier concentration and temperature (Qualitative)–Drift & Diffusion Currents–Einstein's equation–Hall effect–Direct and Indirect band gap semiconductors– LED, Photo conductor and Solar cell–Applications of Semiconductors.

UNIT – V: ELECTROMAGNETIC THEORY AND SUPERCONDUCTIVITY

Gauss theorem, Strokes theorem– Fundamental laws of electromagnetism–Equation of continuity–Displacement Current– Maxwell's electromagnetic wave equations–Propagation of electromagnetic waves in dielectric and conducting media.

Introduction to superconductivity–Properties-critical parameters (T_c, H_c, I_c)–Meissner effect–Types of superconductors–London Equations–BCS Theory (Qualitative)–Josephson effect–High T_C Superconductors–Applications of superconductors

COURSE OUTCOMES

The students will be able to

- Explain the basic concepts of optics, principles of Physics in Electronic communicationSystems and Quantum mechanics.

- Apply the concepts of Optics, Electromagnetic field theory, Quantum mechanics andsemiconductors to obtain required parameters.

- Analyze concepts of Interference, diffraction, Quantum mechanics and applications ofdifferent types of materials of semiconductors and superconductors.

  Evaluate the wavelength of light using concepts of optics and quantum mechanics, conductivity of the different materials in the development of technology and appliances for improvement of society and people.

TEXT BOOKS

1. A Text book of Engineering Physics - M.N. Avadhanulu and P.G. Kshirsagar - S.ChandPublications,2017
2. A Text book of Engineering Physics - Dr. D. Thirupathi Naidu and M Veeranjaneyulu - V.G.S. Book Links,2019

REFERENCE BOOKS

1. Engineering Physics - R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications (P) LTD,2008
2. Optical Fiber Communications- 4/e, Gerd Keiser, Tata Mc GrawHill, 2008
3. Introduction to Solid State Physics- Charles Kittel, Wiley Publications, 2011
4. Semiconductor devices-Physics and Technology- S.M. Sze,Wiley, 2008

EE-123 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
                                                     L T P C
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COURSE OBJECTIVES
1. To study the principle of operation and working of different types of instruments formeasurement of Electrical Quantities.
2. To study the working principle of operation of different types of instruments formeasurement of power and power factor.
3. To understand the principle of operation and working of various types of bridges andInstrument Transformers
4. To understand the principle of operation and working of transducers.
5. To study the principle of operation and working of DVMS, Power analyser andapplications of CRO.

UNIT–I:
Analog Ammeter and Voltmeters

Classification – deflecting, control and damping torques,– PMMC, Moving Iron type and Electrostatic instruments, Construction, Torque equation, advantages and disadvantages. Instrument transformers: Current Transformer and Potential Transformer-construction, theory,(Without derivation of ratio and phase angle error) - Numerical Problems.

UNIT –II:
Analog Wattmeters and Power Factor Meters

Electrodynamometer type wattmeter (LPF and UPF), Power factor meters: Dynamometer and type (Single phase), construction, theory, torque equation, advantages and disadvantages -Numerical Problems.

UNIT – III:
Bridges:

Maxwell's - Anderson's - Wien's - Schering's - Kelvin's double bridge. Measurement of highresistance by Price's guard wire, loss of charge methods.

Instrument Transformers:

Need of instrument transformers, Principle of operation of C.T & P.T, Errors and testing.

UNIT – IV:
Transducers

Classification, Resistive, Inductive and Capacitive Transducer, LVDT, Strain Gauge, Thermistors, Thermocouples, Piezo electric and Photo Diode Transducers, Digital shaftencoders, Hall effect sensors- Numerical Problems.

UNIT – V:

Digital meters

Digital voltmeter – Successive approximation DVM, – Digital frequency meter, Digital multimeter, Digital tachometer, Digital Energy Meter, LCRQ - Meter,

COURSE OUTCOMES

After the completion of the course the student should be able to:

1. Choose right type of instrument for measurement of ac and dc Electrical quantities.
2. Choose right type of instrument for measurement of power and power factor.
3. Select right type for measurement of R, L,C.
4. Understand the working of Transducer.
5. Understand the operation of Digital Meters.

TEXT BOOKS

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney, Dhanpat Rai & Co17th edition 2000.

2. Electrical Measurements and measuring Instruments - by E.W. Golding and F.C. Widdis, 5thEdition, Wheeler Publishing, 1999.

3.Modern Electronic Instrumentation and Measurement Techniques by A.D. Helfrick and W.D.Cooper, PHI, 5th Edition, 2002.

REFERENCE BOOKS

1. Electrical Measurements - by Buckingham and Price, Prentice - Hall, 1961

2. Electrical Measurements by Harris John Wiley.

3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, NewAge International (P) Limited, Publishers

WEB REFERENCES

1. http://nptel.ac.in/courses/

2. http://www.facstaff.bucknell.edu/mastascu/elessonshtml/Measurements/MeasIntro.htm

3. http://www.electrical4u.com/electrical-measuring-instruments-types-accuracy-precision- resolutionspeed/

EE-124   BASIC ELECTRICAL ENGINEERING

L T P C

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COURSE OBJECTIVES

1. To learn the basics of the D.C. circuit analysis.
2. To have an idea about single-phase and three-phase A.C. electrical circuits.
3. To gain knowledge about basic magnetic circuits and transformers.
4. To learn the construction and operation of D.C. and A.C. machines.
5. To understand the operation of LT Switchgear

UNIT – I: DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Analysis of simple circuits with DC excitation. Superposition, Thevenin andNortonTheorems.

UNIT – II: AC Circuits

Representation of sinusoidal waveforms, peak and RMS values, phasor representation, realpower, reactive power, apparent power, power factor. Analysis of single-phase ac circuitsconsisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phasebalanced circuits, voltage and current relations in star and delta connections.

UNIT-III: DC Machines &Transformers

Construction and working of DC machine - EMF equation DC Generator- OCC characteristics ofDCgenerator, Classifications of DC motor and their applications

Transformer - Ideal and practical transformers, equivalent circuit, losses in transformers,regulation and efficiency. Auto-transformer.

UNIT-IV: AC Machines

Generation of rotating magnetic fields, Construction and working of a three-phase inductionmotor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction and working of synchronous generators.

UNIT-V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types ofWires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.Elementary calculations for energy consumption, power factor improvement and batterybackup.

COURSE OUTCOMES

Upon successful completion of the course, students will be able to

1. To understand and analyze basic DC electric circuits.

2. To measure and analyze various electrical quantities of single phase and three AC electriccircuits.

3. To develop magnetic circuits to experiment and analyze the transformers.

4. To study the working principles of electrical machines.

5. To study the domestic applications with LT switchgear.

TEXT BOOKS

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6thEdition, TMH, 2002.
2. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 4thEdition, TMH, 2010
3. Electric Machines by I.J. Nagrath& D.P. Kothari, Tata Mc Graw – Hill Publishers

REFERENCE BOOKS

1. Fundamentals of Electric Circuits / Charles K. Alexander, Matthew N. O. Sadiku. — 5thed.
2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outlineseries, TMH, 2004.
3. Electric Machinary-A.E. Fritzgerald, C. Kingsley &S. Umans, Mc Graw-Hill Companies,6thediton 2003.

WEB RESOURCES

1. http://cosmolearning.org/courses/circuit-theory/
2. http://www.nptelvideos.in/2012/11/circuit-theory.html.
3. www.nptel.iitm.ac.in/courses/iit-madras/electrical_machines
4. www.freevideolectures.com

EE 125   ENGINEERING GRAPHICS

L T P C
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COURSE OBJECTIVES

1. Bring awareness that Engineering Drawing is the Language of Engineers.
2. Familiarize how industry communicates technical information.
3. Teach the practices for accuracy and clarity in presenting the technical information.
4. Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.

UNIT- I: Introduction to Engineering graphics

Principles of Engineering Graphics and theirsignificance-Conventions in drawing-lettering - BISconventions. Dimensioning principlesand conventional representations. a) Conic sections including the rectangular hyperbolageneralmethod only,

  b) Cycloid, epicycloids and hypo cycloid.

  c) Involutes.

UNIT- II: Projection of points, lines and planes

Projection of points in any quadrant, lines inclinedto one or both planes, finding true lengths, angle made by line. Projections of regular planesurfaces.

UNIT- III: Projections of solids

Projections of regular solids inclined to one or both planes byrotational.Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder,pyramid and cone. Trueshapes of the sections.

UNIT- IV:Orthographic Projections

Systems of projections, orthographic projections (SimpleFigures).

UNIT- V: Isometric Projections

Principles of isometric projection- Isometric scale; Isometric views:lines, planes, figures, simple and compound solids.

COURSE OUTCOME

After completing the course, the student will be able to

1. draw various curves applied in engineering.

2. show projections of solids and sections graphically.

3. visualize and draw engineering objects in 3D view through isometric i.e. convertingisometric to orthographic and vice versa

TEXT BOOKS

1. K.L.Narayana& P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai,2012.

2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016

3. Engineering Graphics & Design, Jain, Maheshwary, Gautam, Khanna Publishing House

4. Engineering Drawing, ND Bhat, Charotar Publishing House

REFERENCE BOOKS

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009

2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009

3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

4. K.C.John, Engineering Graphics, 2/e, PHI, 2013

5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, 2008.

MC 140   **DESIGN THINKING AND PRODUCT INNOVATION**

(Common to all branches of Engineering)

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COURSE OBJECTIVES

- To bring awareness on innovative design and new product development.
- To explain the basics of design thinking.
- To familiarize the role of reverse engineering in product development.
- To train how to identify the needs of society and convert into demand.
- To introduce product planning and product development process.

UNIT I

Science to Engineering: Job of engineers, engineering units and measurement, elements of engineering analysis, forces and motion, energy, kinematics and motion, conversion of linear motion to rotary and vice versa, motion transmission.

Physics to Engineering: Application of Newton laws, Pascal's law, Bouncy, Bernoulli's theorem, Ohm's law, electrical induction in engineering products.

UNIT II

Historical Development: Invention wheel, early mechanics in design, mechanical advantages, industrial revolution, steam and petrol for mobility. Innovations in Electrical and Electronics: Electrical energy generation, electrical bulb, electrical equipment, electronics and automation, computing for early days to present, innovations in communications.

UNIT III

Systematic approach to product development: Design Thinking, Innovation, Empathize Design Thinking as a systematic approach to Innovation, brainstorming, visual thinking, design challenges, innovation, art of Innovation, strategies for idea generation, creativity, teams for innovation. Solution finding methods: Conventional, intuitive, discursive, methods for combining solution, decision making for new design.

UNIT IV

Reverse engineering in product development: Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, 3D printing,

study of introducing electrical and electronic controls to the old products, importance of ergonomics in product development, environmental considerations in design, safety considerations in design.

UNIT V

Study of Product Development- Agriculture, development of machines for separation of corn seeds, peeling of groundnut shells, husk removing from paddy. Electrical: Design of burglar alarm, speedometer, water level indicator, smart gates, smart lights. Design of electrical vehicles, unmanned vehicles, design principles in drones.

COURSE OUTCOMES

After completion of this course, the student will be able to

1. summarize the importance of basic sciences in product development
2. explain the historical developments in mechanical, electrical, communications andcomputational engineering
3. apply systematic approach to innovative designs
4. identify new materials and manufacturing methods in design

TEXT BOOKS

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, "ExploringEngineering: An Introduction to Engineering and Design", 4th edition, Elsevier, 2016.
2. David Ralzman, "History of Modern Design", 2nd edition, Laurence King PublishingLtd., 2010
3. An AVA Book, "Design Thinking", AVA Publishing, 2010.

REFERENCE BOOKS

1.G. Pahl, W. Beitz, J. Feldhusen, KH Grote, "Engineering Design: ASystematic Approach", 3rd edition, Springer, 2007.

2. Tom Kelley, Jonathan Littman, "Ten Faces in Innovation", Currency Books, 2006.

EE 161   ENGINEERING PHYSICS LABORATORY

L T P C
0 0 3 1.5

COURSE OBJECTIVES

- Make the students to learn about Compound, Hall effect and A.C Sonometer
- Familiarize the students to know the Electrical, Magnetic and Light experiments
- Learn the important experimental techniques in Physics lab which related to theoreticalconcepts
- Understand the various Instruments of Physic lab

LIST OF EXPERIMENTS

1. Determination of radius of curvature of plano convex lens by Newton's rings method
2. Determination of wavelength by using plane diffraction grating.
3. Determination of dispersive power of a Prism
4. Determination of wavelength of given Laser source
5. Determination of numerical aperture of a given optical fiber and hence to find itsacceptance angle
6. Photo cell – I-V Characteristic curves and determination of stopping potential
7. Hall effect –Determination of Hall Coefficient
8. Photo voltaic cell - Determination of fill-factor
9. Determination of energy gap of a semiconductor
10. Measurement of resistance with varying temperature
11. Carey- Foster's bridge: Determination of specific resistance/Temperature coefficient ofresistance.
12. Magnetic field along the axis of a circular coil carrying current.
13. Series LCR resonance circuit - Determination of "Q" factor
14. Determination of frequency of A.C supply using Sonometer
15. Determination of acceleration due to gravity by using compound Pendulum

COURSE OUTCOMES

The students will be able to

1. Handle optical instruments like microscope and spectrometer.

2. Use CRO, Function generator, Hall apparatus setup, Telescope, and Spectrometer formaking measurements.

3. Determine the given parameters by using the various instruments of physics labrelated to theoretical concepts.

4. Learn to draw conclusions from evaluates data & develop skills in experimentaldesign.

5. Improve communication & knowledge enhanced skills while conducting viva.

REFERENCES

1. A Text book of Practical Physics- S. Balasubramanian and M.N. Srinivasan, S ChandPublishers, 2017

2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

EE 162   ELECTRICAL MEASUREMENT AND INSTRUMENTATION LAB

L T P
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3 1.5

COURSE OBJECTIVES

1. To know the procedures for measuring Resistance, Inductance and Capacitance
2. To know the procedures for measuring dielectric strength of transformer oil.
3. To perform experiments to measure three phase power, frequency, core losses.
4. To conduct experiments for calibration of energy meter
5. To conduct experiments for calibration of LVDT

LIST OF EXPERIMENTS

1. Calibration and testing of single-phase energy meter.
2. Kelvin"s Double Bridge – Measurement of Resistance – determination of tolerance.
3. Schering Bridge – capacitance measurement and tan δ measurement.
4. Anderson Bridge – inductance measurement.
5. Measurement of 3-phase active and reactive power in three phase circuits.
6. Measurement of strain using strain gauge.
7. Estimation of iron losses from B-H curve using CRO.
8. LVDT characteristics, calibration and displacement measurement.
9. Energy meter calibration by phantom loading.
10. Frequency and capacitance measurement by Wein"s Bridge.
11. Measurement of medium resistance using Wheatstone bridge.
12. Determination of transformer ration and phase angle error using current transformer orpotential transformer.
13. Measurement of dielectric strength of transformer oil by transformer oil testing kit.
14. Measurement of R, L, C using digital LCR meter.
15. Measurement of 1-phase power using 3-voltmeter and 3-ammeter method.

COURSE OUTCOMES

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

1. Measure various electrical engineering parameters and quantities used in engineering practice.
2. Calibrate the operation of Energy meter
3. Calibrate LVDT for measuring distance
4. Understand the dielectric strength transformer oil by using testing kit
5. Measure three phase power, frequency and core losses

EE 163   BASIC ELECTRICAL ENGINEERING LAB

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3 1.5

COURSE OBJECTIVES

1. To provide hands on experience in setting up simple electrical circuits (DC and AC).

2. To get exposure to handle different electrical equipment's.

3. To measure various electrical parameters with different measuring instruments.

4. To get hands on experience in operating DC and AC machines.

LIST OF EXPERIMENTS

1. Study of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-liferesistors, capacitors and inductors, Fuses and MCB

2. Wiring of a simple circuit for controlling a lamp/fan point.

3. Wiring of a power circuit for controlling an electrical appliance (16A Socket).

4. Verification of Kirchoff's Laws

5. Verification of Thevenin's Theorem

6. Verification of Nortons Theorem

7. Verification of Superposition Theorem

8. Measurement of voltage, current and power in a single-phase circuit using voltmeter,ammeterand wattmeter.

9. Measurement of active power for star and delta connected balanced loads (single wattmetermethod).

10. Loading of a transformer: measurement of primary and secondary voltages and currents, andpower.

11. Demonstration of cut-out sections of machines: dc machine (commutator-brusharrangement),induction machine (squirrel cage rotor)

12. Torque Speed Characteristic of separately excited DC motor.

13. Synchronous speed of three-phase induction motors. Direction reversal by change of phase-sequence of connections.

14. Synchronous Machine operating as a generator: stand-alone operation with a load.

15. Synchronous Generator voltage Control through field excitation.

COURSE OUTCOMES

Upon successful completion of the course, the students are expected to

1. Get an exposure to common electrical components and their ratings.

2. Make electrical connections by wires of appropriate ratings.

3. Understand the usage of common electrical measuring instruments.

4. Understand the basic characteristics of transformers.

5. Understand the basic characteristics of electrical machines.