R24

SCHEME OF INSTRUCTION & EXAMINATION
BE (Group B-CSE, CME, EEE,) SEMESTER-I

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
Three Week Induction Program										
1	MC802CE	Environmental Sciences	2	-	-	2	30	70	3	-
2	BS201MT	Matrices & Differential Calculus	3	1	-	4	30	70	3	4
3	BS204CH	Engineering Chemistry	3	1	-	4	30	70	3	4
4	ES302CS	Programming for Problem Solving	3	-	-	3	30	70	3	3
5	HS101EG	English	2	-	-	2	30	70	3	2
6	MC803PY	Essence of Indian Traditional Knowledge	2	-	-	2	30	70	3	-
Practical/Laboratory Courses										
7	BS252CH	Engineering Chemistry Lab	-	-	3	3	25	50	3	1.5
8	ES351CS	Programming for Problem Solving Lab	-	-	3	3	25	50	3	1.5
9	ES352ME	Engineering Workshop Practice	-	-	2x3	6	50	50	3	3
10	HS151EG	English Lab	-	-	2	2	25	50	3	1
Total			**15**	**2**	**14**	**31**	**305**	**620**	**30**	**20**

BE (Group B-CSE, CME, EEE) SEMESTER-II

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration n Hrs	
Theory Courses										
1	MC801PO	Indian Constitution	2	-	-	2	30	70	3	-
2	ES301EE	Basic Electrical Engineering	3	1	-	4	30	70	3	4
3	BS202PH	Engineering Physics	3	1	-	4	30	70	3	4
4	BS203MT	Differential Equations &Numerical Methods	3	1	-	4	30	70	3	4
5	ES303CS	Scientific Programming	3	-	-	3	30	70	3	3
Practical/Laboratory Courses										
6	ES354EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
7	BS251PH	Engineering Physics Lab	-	-	3	3	25	50	3	1.5
8	ES353CE	Engineering Graphics	-	-	2x2	4	50	50	3	2
9	ES353CS	Scientific Programming Lab	-	-	2	2	25	50	3	1
Total			**14**	**3**	**11**	**28**	**275**	**650**	**27**	**20.5**

BS: Basic Science ES: Engineering Science MC: Mandatory Course
L: Lecture T: Tutorial P: Practical D: Drawing
CIE: Continuous Internal Evaluation SEE: Semester End Evaluation

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ENVIRONMENTAL SCIENCES

MC 802CE

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 0

Objectives:

1. To create awareness and impart basic knowledge about the environment and its allied problems.
2. To know the functions of ecosystems, social and environment related issues and their preventive measures
3. To understand importance of biological diversity, different pollutions and their impact on environment

Outcomes: Student will be able to:

1. Adopt environmental ethics to attain sustainable development
2. Develop an attitude of concern for the environment
3. Conservation of natural resources and biological diversity
4. Creating awareness of Green technologies for nation's security
5. Imparts awareness for environmental laws and regulations

UNIT – I

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

***Natural Resources*:** Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources – Use and over exploitation, deforestation & its effect on tribal people.Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification. Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

UNIT – II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

UNIT – III

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT – IV

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation

UNIT – V

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Field Work:Visit to a local area to document environmental issues- agricultural area/ pond/lake/terrestrial ecosystem.Visit to a local polluted area- market/slum area/Industrial area/traffic area.

Suggested Readings:

1	De Anil Kumar, "*Environmental Chemistry",* New Age Publisher International Pvt Ltd, New Delhi , 2016
2	E.P. Odum, '*Fundamentals of Ecology',* W.B. Sunders Co., USA.,1971
3	M.N. Rao and A.K. Datta, "*Waste Water Treatment",* Oxford and IBK Publications, New Delhi, 2009.
4	Benny Joseph, "*Environmental Studies",* Tata McGraw Hill, New Delhi, 2009
5	V.K. Sharma, "*Disaster Management",* National Centre for Disaster Management, IIPE, New Delhi, 1999

BE I-Semester syllabus for affiliated engineering colleges of Osmania University
(wef: academic year 2024-2025)
Common to all branches
MATRICES &DIFFERENTIAL CALCULUS

BS201MT	**MATRICES &DIFFERENTIAL CALCULUS**	**3L:1T:0P**	**4 credits**

Course objectives:

- To study matrix algebra and its use in solving system of linear equations and in solving eigen values problems
- To introduce the concepts of functions of one variable
- To introduce the concepts of functions of several variables
- To introduce and Interpret Multiple Integrals
- To Understand Vector Derivatives, Vector Integration techniques to solve real-world problems.

Outcomes :After completing this course, the students will be

- Solve system of linear equations and eigen value problems
- Understand and Apply Mean value theorems
- Understand partial derivatives, Maxima and minima of function of two and three variables
- Evaluate multiple integrals
- Analyze and Interpret Vector Derivatives& Vector Integration to Real-World Problems

UNIT-I

Matrices: Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors, Properties of eigen values, Cayley-Hamilton theorem(without proof), Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

UNIT-II

Calculus of one Variable: Rolle's theorem, Lagrange's Mean-value theorem, Cauchy's mean value theorem, Taylor's series(All theorems without proof), Curvature, Radius of Curvature, Circle of Curvature, Envelope of a family of curves.

UNIT-III

Multivariable Calculus (Differentiation): Functions of two variables, Limits and Continuity, Partial derivatives, Total derivative, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobians, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum of values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-IV

Multivariable Calculus(Integration): Double integrals, Change of order of integration, Change of variables from Cartesian to plane polar coordinates, Triple integrals.

UNIT-V

Vector calculus: Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem(without proofs) and their verification.

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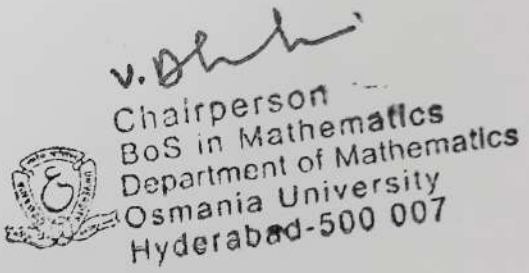
TEXT BOOKS:

1. R.K.Jain&S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.

REFERENCE BOOKS:

1. N.P.Bali&Dr.ManishGoyal, A textbook of Engineering Mathematics (Volume I), 10th Edition, Laxmi Publications, 2022.
2. B.V.Ramana, Higher Engineering Mathematics, 23rd edition, 2015.



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Chemistry

BS104CH
Instruction : 3+1 periods per week Duration of
SEE : 3 hours
CIE : 30marks
SEE : 70 marks
Credits : 4

Objectives:

1. Explain the principles of electrochemical processes and study analyze working principles and applications of various batteries.
2. Gain knowledge about the causes of corrosion and its prevention. Attain knowledge about the hard water and treatment of water for drinking purpose
3. Appraise Engineering materials their classifications, structure-property relationship.
4. Expose to qualitative and quantitative parameters of chemical fuels and awareness of eco-friendly materials, fuels and processes.
5. Understand the concepts and applications of spectroscopy

Outcomes: Student will be able to:

1. **Apply** concept of electrode potential in identifying feasibility of electrochemical reaction; **develop** a more in-depth perception on working of various types of batteries and their applications especially in electric vehicles (EVs).
2. **Identify** the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods. **Estimate** the physical & chemical parameters of quality of water and explain the process of water treatment
3. **Classify** chemical fuels and grade them through qualitative analysis and **acquire** knowledge on environment-friendly bio diesel
4. **Explain** the influence of chemical structure on properties of materials and their choice in engineering applications
5. **Relate** the concept of green chemistry to **modify** engineering processes and

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materials. **Understand** the concepts and applications of spectroscopy

BS104CH

UNIT – I

Electrochemistry: Electrolytic conductance, its types, factors affecting electrolytic conductance. Electrochemical cells: Electrolytic and Galvanic cells. Cell notation, cell reaction and cell potentials. Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems. Types of electrodes, Calomel, Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode.

Battery Chemistry: Construction and Applications of Primary batteries: Zn-Carbon battery. Secondary batteries : Pb-Acid battery and Li-Ion battery, Flow Batteries (Fuel cells): Methanol-Oxygen fuel cells.

UNIT – II

Corrosion: Causes and its effects. Types of Corrosion-Dry or Chemical Corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion – Galvanic and Waterline Corrosion. Factors influencing rate of corrosion.

Corrosion control methods: Cathodic protection methods - Sacrificial anodic and Impressed current Cathodic protection methods.

Surface coating methods: Hot Dipping-Galvanizing.

Water Chemistry: Hardness of Water-Types and units of hardness of water, estimation of hardness of water by EDTA method - Numerical problems. Alkalinity of water and its sources. Water softening by Ion exchange and Reverse Osmosis methods. Specifications of potable water. Sterilization by Chlorination. Break Point of Chlorination.

UNIT – III

Engineering Materials: Polymers: Monomer and its functionality, Polymers and degree of polymerization. Types of Polymerization - Addition, Condensation and Co-Polymerization with one example each. Classification of polymers–Plastics: (Thermoplastics &Thermosetting resins - PVC and Bakelite), Fibers: (Nylon-6:6)

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Elastomers: (Buna-S and Buna –N rubber). ***Conducting polymers***: Introduction, classification, properties and applications of conducting polymers. ***Biomaterials:*** Introduction .Definition of Biomaterials , Preparation, properties and applications of Poly lactic acid (PLA)
UNIT – IV ***Chemical Fuels:*** Introduction, definition and classification of chemical fuels.- primary and secondary – solid ,liquid and gaseous fuels Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong's formula – Numerical problems. ***Solid Fuels:*** Coal and its Ranking. Analysis of coal-Proximate and Ultimate analysis. ***Liquid Fuels:*** Composition and uses of Gasoline, Diesel and Kerosene. Knocking. .Fuel-rating– Octane and Cetane numbers. ***Gaseous Fuels***: LPG, CNG-Composition and Uses. ***Biodiesel:*** Sources, Concept of Trans esterification, properties and applications of biodiesel. Carbon neutrality and its significance. Ethanol – Biodiesel, sources and uses.
Unit V **Spectroscopy**- Description of Electromagnetic spectrum. **Principles of UV-Visible Spectroscopy**: Statement of Beer-Lambert Law. Absorption and intensity shifts: Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts with one example each.
Principle and applications of UV – Visible Spectroscopy.
IR Spectroscopy: Principle of IR Spectroscopy. Principle and applications of IR.
NMR Spectroscopy: Principle of H 1 -NMR Spectroscopy. Multiplicity, Chemical Shift. Principle and Applications of MRI
Green Chemistry: Concept, Mention - Principles of Green chemistry – example Diels – Alder reaction

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Suggested Readings

1	. *Principles of Physical Chemistry*‖ ,S.N. Chand &Co. New Delhi,1987
2	PCJain and M Jain ,—*Engineering Chemistry*‖ ,DhanpatRai&Sons ,15th Edition, New Delhi, 2004
3	JCKuriacoseandJRajaram,—*ChemistryinEngineeringandTechnology*—,TataMcGrawHill , New Delhi,2010
4	OG Palanna, —*Engineering Chemistry*‖,TataMcGrawHill, New Delhi, 2009
5	S SDaraand SSU mare, —*Engineering Chemistry*‖ ,S.N. Chand & Co. New Delhi, 2004
6	SashiChawla,—*Engineering Chemistry*‖, DhanpatRai&Sons, New Delhi, 2017
7	PrasantaRath,—*Engineering Chemistry*‖,Cengage Learning India Pvt. Ltd, 2015
8	Dr. Kishore Palle, Dr. V. Shanthi , Dr. A. Kishore Kumar and K. Ramesh -Engineering Chemistry.

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ES 302 CS	PROGRAMMING FOR PROBLEM SOLVING					
Pre-requisites			**L**	**T**	**P**	**C**
			3	-	-	3
Evaluation	**SEE**	70 Marks	**CIE**		30 Marks	

Course Objectives :	
1	To introduce the basic concepts of Computing environment, number systems and flowcharts
2	To familiarize the basic constructs of C language – data types , operators and expressions
3	To understand modular and structured programming constructs in C
4	To learn the usage of structured data types and memory management using pointers
5	To learn the concepts of data handling using files

Course Outcomes :	
On completion of this course, the student will be able to :	
CO-1	Explain various functional components in computing environment
CO-2	Develop algorithmic solutions to problems and draw the flow charts
CO-3	Explain and use basic constructs of C in writing simple programs
CO-4	Use standard library functions in C and develop modular programs using user defined functions and structured data types

UNIT – I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. **Number Systems**: Binary, Octal, Decimal, And Hexadecimal.

Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements

Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.

UNIT – II

Conditional Control Statements: Bitwise Operators, Relational and Logical Operators, If, If-Else, Switch-Statement and Examples. Loop Control Statements: For, While, Do-While and Examples. Continue, Break and Go to statements

Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. **Recursion-** Recursive Functions. **Storage Classes:** Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers

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UNIT– III
Preprocessors: Preprocessor Commands **Arrays** - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.

UNIT – IV
Pointers - Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, L -value and R-value, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command-line Arguments. **Strings** - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions

UNIT –V
Structures: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types. **Input and Output:** Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.

Suggested Reading:

1	B.A. Forouzan and R.F. Gilberg, "*A Structured Programming Approach in C*" , Cengage Learning, 2007
2	Kernighan BW and Ritchie DM, "*The C Programming Language*", 2nd Edition, Prentice Hall of India, 2006.
3	Rajaraman V, "*The Fundamentals of Computer*", 4th Edition, Prentice-Hall of India, 2006.
4	Dromey " *How to Solve it By Computer* , Pearson education, 2006

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Department of English
Osmania University
Syllabus with effect from the Academic Year 2024-25

BE I year | **English (Theory)** | **HS101EG**
(Common to all branches of BE)

Instruction: 2 hours per week
CIE: 30 marks

Credits: 2
SEE: 70 marks
Duration of the SEE: 3 hours

Course Objectives

To enhance the English language abilities of Engineering students, especially in reading and writing by

- using authentic material for language learning and exposing them to a variety of content-rich texts
- strengthening their vocabulary and grammar
- improving their reading and comprehension skills and honing their writing skills
- encouraging them to think creatively and critically

Course Outcomes

On successful completion of the course, the student will be able to

- read, understand, and interpret a variety of written texts
- use appropriate vocabulary and correct grammar
- undertake writing with confidence

Unit 1

Reading: Rudyard Kipling, "If"
Vocabulary: Word Formation: Root Words, Affixes, Compounding, Standard Abbreviations
Grammar: Basic Sentence, Sentence Structures and Types; Tenses
Writing: Note-taking, Note-making

Unit 2

Reading: Satyajit Ray, "Anukul"
Vocabulary: Synonyms, Antonyms, Homophones, Homographs, Homonyms
Grammar: Linkers and Connectives; Combining Sentences
Writing: Paragraph Writing – Structure and Development

Unit 3

Reading: Adrienne Rich, "Planetarium"
Vocabulary: Phrasal Verbs, Collocation
Grammar: Determiners and Modifiers, Comparison, Concord
Writing: Essay Writing, Paraphrasing, Summarizing

Unit 4

Reading: Martha Nussbaum, "The Silent Crisis" (From *Not for Profit: Why Democracy Needs the Humanities)*
Vocabulary: Formal/Informal Vocabulary, Inclusive Language
Grammar: Voice, Reported Speech, Prepositions
Writing: Formal Letters, Letters of Application, Curriculum Vitae/Resume

Unit 5

Reading: Chimamanda Ngozi Adichie, "The Danger of a Single Story" (TED Talk)
Vocabulary: Words often Confused; One Word Substitutes
Grammar: Punctuation, Common Errors (covering errors in all items of grammar)
Writing: Coherence and Cohesion in Writing; Avoiding Redundancy and Ambiguity

Suggested Reading

Board of Editors. *Language and Life: A Skills Approach*". Orient Black Swan, 2018.
Kumar, Sanjay and Pushp Lata. *English Language and Communication Skills for Engineers*. Oxford University Press, 2018.
Sudarshana, NP and C. Savitha. *English for Engineers*. Cambridge University Press, 2018.
Wood, F.T. *A Remedial English Grammar for Foreign Students*. Trinity Press, 2022.

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OU-Engg-English 2024-25

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ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

MC 803 PY

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 0

Objectives:

1. To get a knowledge in Indian Culture
2. To Know Indian Languages and Literature and the fine arts in India
3. To explore the Science and Scientists of Medieval and Modern India

Outcomes: Student will be able to:

1. Understand philosophy of Indian culture
2. Distinguish the Indian languages and literature.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India
5. Know the contribution of scientists of different eras.

UNIT – I

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT – II

Indian Languages, Culture and Literature: Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India.

Indian Languages and Literature-II: Northern Indian languages & literature

UNIT – III

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – IV

***Fine Arts in India (Art, Technology& Engineering*)**: Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT – V

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Suggested Readings:

1	Kapil Kapoor, "*Text and Interpretation*: *The India Tradition*", D. K. Print world, 2005
2	Gopala Krishnan , "*Science in Samskrit*", Samskrita Bharti Publisher, New Delhi, 2017
3	NCERT, "*Position paper on Arts, Music, Dance and Theatre*" NCERT, New Delhi, 2010.
4	S. Narain, "*Examinations in Ancient India*", Arya Book Depot, New Delhi, 1993
5	Satya Prakash, "*Founders of Sciences in Ancient India*", Vijay Kumar Publisher, New Delhi, 1989
6	M. Hiriyanna, "*Essentials of Indian Philosophy*", Motilal Banarsidass Publishers, New Delhi, 2005

Course Code	Course Title						Core/ Elective
BS153CH	Chemistry Lab (Common to All Branches)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	3	25	50	1.5

Course Objectives

- Conduct experiments, take measurements and analyze the data through hands-on experience n order to demonstrate understanding of the theoretical concepts of quantitative Analysis while working in small group.
- Interpret the electro analyticalprinciples with experimental results graphically
- Demonstrate writing skills through clear laboratory reports
- **Course Outcomes**

On successful completion of this course, students will be able to:

- Apply the principles of Colourimetryand Electrochemistry in quantitative estimations.
- Estimate the rate constants of reactions from concentration of reactants/products as a function of time.
- Synthesize small drug molecules.

List of Experiments:

- Introduction to Chemical Analysis.
- Techniques of Weighing

.Volumetric Analysis:

- Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and estimation of ferrous ion.by Permanganometry,
- Estimation Iron(II) by Dichromatometry

Water Analysis:

- Preparation of Standard Magnesium sulphate solution, Standardization of EDTA and Estimation of Total Hardness.
- Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity.

Conductometry:

- Estimation of HCl
- Estimation of CH_3COOH
- Estimation of mixture of acids

Potentiometry

- Estimation of HCl
- Estimation of Iron

pHMetry:

- Estimation of HCl

Colorimetry:

- Verification of Beer-Lambert's law and estimation of Manganese
- **Drug Synthesis** Preparation of Aspirin and paracetamol.

Note: Minimum ten experiments should be conducted in the semester **Suggested Readings:**

- SeniorPracticalPhysicalChemistry,B.D.Khosla,A.GulatiandV.Garg(R.Chand& Co.,Delhi)
- AnIntroductiontoPracticalChemistry,K.K.SharmaandD.S.Sharma(Vikaspublishing,N.Delhi)

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ES351CS	Programming for Problem Solving Lab					
Pre-requisites			**L**	**T**	**P**	**C**
			-	-	2	1
Evaluation	**SEE**	50 Marks	**CIE**		25 Marks	

Course Objectives :	
1	To use tools available under LINUX for C programming
2	To gain hands-on experience on basic constructs of C programming
3	To formulate problems and implement algorithmic solutions in C
4	To write modular programs in C using structure programming techniques and data files.

Course Outcomes :	
On completion of this course, the student will be able to:	
CO-1	Write, compile and debug C programs in Linux environment
CO-2	Write simple programs using control structures, user defined functions and data manipulation using arrays
CO-3	Use standard C library functions to develop modular programs in C

1. Introducing to programming Environment(Linux commands, editing tools such as vi editor, sample program entry, compilation and execution)
2. Write programs using arithmetic, logical, bitwise and ternary operators.
3. Write programs simple control statements : Roots of a Quadratic Equation, extracting digits of integers, reversing digits ,finding sum of digit ,printing multiplication tables, Armstrong numbers, checking for prime, magic number,
4. Sin x and Cos x values using series expansion
5. Conversion of Binary to Decimal, Octal, Hexa and Vice versa
6. Generating a Pascal triangle and Pyramid of numbers
7. Recursion: Factorial, Fibonacci, GCD
8. Finding the maximum, minimum, average and standard deviation of given set of numbers using arrays
9. Reversing an array ,removal of duplicates from array
10. Matrix addition , multiplication and transpose of a square matrix .using functions
11. Bubble Sort, Selection Sort ,
12. Programs on Linear Search and Binary Search using recursion and iteration

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13. Functions of string manipulation: inputting and outputting string , using string functions such as strlen( ),strcat( ),strcpy( )……etc
14. Writing simple programs for strings without using string functions.
15. Finding the No. of characters, words and lines of given text file
16. File handling programs : student memo printing
17. Create linked list, traverse a linked list, insert a node, delete a node, reversing list .

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ENGINEERING WORKSHOP PRACTICE

ES 352 ME

Instruction:6 periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits: 3

Objectives:

1.Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
2.To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
3.To gain a good basic working knowledge required for the production of various engineering products.
4.To Study different hand operated power tools, uses and their demonstration.
5.Adopt safety practices while working with various tools

Outcomes: Student will be able to:

1. Demonstrate an understanding of and comply with workshop safety regulations.
2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
3. Study and practice on machine tools and their operations
4.Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
5.Apply basic electrical engineering knowledge for house wiring practice

List of Experiments:

A. TRADE FOR EXERCISES:

1. Carpentry
2. Fitting
3. House wiring
4. Sheet metal working
5. Smithy
6. Welding /Soldering
7. Plumbing

B. TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Machining (Lathe & Drilling)
2. Injection moulding
3. Mould making and casting
4. Basic Electronics lab instruments

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Rapid Prototyping
3. Glass Cutting
4. 3D printing
5. CNC LATHE

D. IT WORKSHOP: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

Note: At least two exercises from each trade.

Suggested Readings:

1	Venugopal, K, "*Workshop Manual*", Anuradha Publications, Kumbakonam, TN, 2012
2	K.C. John, "*Mechanical Workshop*" 2nd Edn., PHI, 2010.
3	Hajra Choudary, "*Elements of Workshop Technology*" Vol. 1, Asian Publishers, Edn., 1993.
4	G.S. Sawhney, "*Mechanical Experiments and Workshop Practice*", I.K. International Publishing House, New Delhi, 2009.

Revised

Wef AY 2024-25

Department of English
Osmania University
Syllabus with effect from the Academic Year 2024-25

BE I year | **English (Laboratory)** | **HS151EG**

(Common to all branches of BE)

Instruction: 2 hours per week
CIE: 25 marks

Credits: 1
SEE: 50 marks

Course Objectives

To enhance the listening and speaking skills of students by

- Giving them adequate practice in listening with comprehension
- Providing them ample opportunities to improve their public speaking skills
- Training them in the use of correct pronunciation, stress, and intonation
- Sensitizing them to the use of verbal and non-verbal communication appropriate to the context
- Encouraging them to learn the art of conversation to suit formal and informal situations
- Preparing them to make formal presentations and face interviews

Course Outcomes

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

- Listen, understand, and interpret formal and informal spoken language
- Speak English with acceptable pronunciation, stress, and intonation
- Present themselves with confidence in formal situations
- Participate in individual and group activities with relative ease

Interactive Sessions in Language Lab:

Experiments and Practice Sessions to Enhance Listening and Speaking Skills

1. Listening Skills, Barriers to Listening, Listening for Comprehension
2. English Phonology; Varieties of English-Indian, British, American
3. Intelligible Pronunciation, Intonation, Word Stress and Sentence Stress
4. Conversation Skills: Face-to-Face and Telephone
5. Introducing Oneself and Others, Asking for and Giving Information
6. Making Requests and Responding to them Appropriately
7. Giving Instructions and Responding to them Appropriately
8. Agreeing and Disagreeing, Seeking Clarification
9. Making Formal Announcements and Emceeing
10. JAM; Role Play
11. Group Discussions
12. Debate
13. Public Speaking Skills and Body Language
14. Interviews
15. Formal Presentations

Suggested Reading

Balasubramanian, T. *A Textbook of English Phonetics for Indian Students*. Macmillan, 1981.

Board of Editors. *Language and Life: A Skills Approach.* Orient Black Swan, 2018.

CIEFL. *Exercises in Spoken English. Parts. I-III.* Oxford University Press.

Pillai, Radhakrishna G. *Spoken English For You - Level II.* 8th Edition. Emerald Publishers, 2014.

Sethi, J, PV Dhamija. *A Course in Phonetics and Spoken English.* 2nd Edition, Prentice Hall, 1999.

Shinde, Maithry et al. *Life Skills and Personality Development*. Cambridge University Press, 2022.

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OU-Engg-English 2024-25

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INDIAN CONSTITUTION

MC 801 PO

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 0

Objectives:

1. To create awareness among students about the Indian Constitution.
2.To acquaint the working conditions of union, state, local levels, their powers and functions
3. To create consciousness in the students on democratic values and principles articulated in the constitution.
4.To expose the students on the relations between federal and provincial units.
5.To divulge the students about the statutory institutions.

Outcomes: Student will be able to:

1. Know the background of the present constitution of India
2.Understand the working of the union, state and local levels
3.Gain consciousness on the fundamental rights and duties
4.Be able to understand the functioning and distribution of financial resources between the centre and states
5.Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.

UNIT – I
Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution
UNIT – II
Union Government: Executive-President, Prime Minister, Council of Minister ***State Government***: Executive: Governor, Chief Minister, Council of Minister ***Local Government***: Panchayat Raj Institutions, Urban Government
UNIT – III
Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties
UNIT – IV
Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India.
UNIT – V
Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Suggested Readings:

1	Durga Das Basu, "*Introduction to the Constitution of India*", Lexis Nexis Butterworths Wadhwa Nagpur, 2008
2	Subhash Kashyap, "*Our Parliament*", National Book Trust, India, 2004.
3	Peu Ghosh, "*Indian Government and Politics*", Prentice Hall of India, New Delhi,2012.

BASIC ELECTRICAL ENGINEERING

Common to All Branches

ES 301 EE

Instruction: 3+1 periods per week
CIE: 30 marks
Credits: 4

Duration of SEE: 3 hours
SEE: 70 marks

Objectives:

1. To provide an understanding of basics in Electrical circuits.
2. To provide an overview of ordinary differential equations

Outcomes: Student will be able to:

1. To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
2.To comprehend the working principles of Electrical DC Machines
3. To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application
4.To comprehend the working principles of electrical AC machines

UNIT – I
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Network Reduction Technique, Mesh and Nodal Analysis, Superposition, Thevenin and Norton Theorems.
UNIT – II
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.
UNIT – III
Transformers and 3-ph Induction Motors: Transformers: Electromagnetic induction, Faradays laws, statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency (simple Problems only), three-phase transformer connections. ***Three Phase Induction motor:*** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications
UNIT – IV
Single-phase induction motor and DC Machines: Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications. ***DC Generators***: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications. ***DC Motors:*** principle of operation of DC Motor, Types of DC motors, applications
UNIT – V
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

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Suggested Readings:

1	N. K. De, *"Basic Electrical Engineering"*, Universities Press, 2015.
2	J.B. Gupta, *"Fundamentals of Electrical Engineering and Electronics"*, S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, *"Utilization of Electric Power and Electric Traction"*, S.K. Kataria & Sons Publications, 2010
4	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, *"Basic Electrical Engineering"*, Tata McGraw Hill, Publications, 2009
5	Hughes, *"Electrical Technology"*, 7th Edition, Addison Welsey Longman Inc., 1995

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7) P Jagadeesh Dr. JAGADEESH.P Incharge EEE, KMEC

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UNIVERSITY COLLEGE OF SCIENCE, OSMANIAUNIVERSITY,

HYDERABAD

NO 09/cBOSP/2024 DATE 2024/8/2

Engineering Physics Syllabus for Osmania University Affiliated Engineering Colleges
B.E (SEM–I & II) AICTE
Academic Year 2024-2025 onwards (Common to All Branches)

CourseCode: BS202PH	CourseTitle : Physics						Core/Elective: Core
Prerequisite	ContactHoursper Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	-	-	30	70	04

Course objectives

- Understand the Fundamental Principles and Applications of Lasers, Fiber Optics & Ultrasonics
- Explore Semiconductor Physics and Electromagnetic Theory
- Analyze Magnetic Materials and Superconductors
- Investigate Wave Mechanics and Quantum Computation
- Explore Nano Materials and Thin Film Technologies

Course outcomes

Upon successful completion of the course student will able to:

- Understand and apply the principles of lasers, fiber optics & ultrasonics, including their construction, types, and engineering applications.
- Gain thorough knowledge of semiconductor physics, including key devices and energy harvesting technologies, and understand fundamental electromagnetic theory.
- Analyze magnetic materials and superconductors, including their properties, theories, and technological applications.
- Grasp wave mechanics concepts and quantum computing fundamentals, including quantum gates and their practical applications.
- Explore nano materials and thin film technologies, including preparation methods, characterization techniques, and their engineering uses.

2/8/2024

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UNIT I

Lasers, Fiber Optics & Ultrasonics

Characteristics of Lasers, Stimulated Emission, Population Inversion, Einstein's Coefficients, CO2 Laser, Semiconductor Laser, working of Laser Induced Breakdown Spectroscopy (LIBS) Instrument, Engineering Applications of Lasers.

Construction of Optical Fiber, Types of Optical Fibers (Refractive Index Profiles), Fiber Drawing Process (Double Crucible Method), Basic Principles of Fiber Optics Sensors, Construction and Working of Pressure Sensors, Applications of Optical Fibers in Engineering.

Introduction to Ultrasonic Waves, Production of Ultrasonic Waves - Magnetostriction Method, Ultrasonic Pulse-Echo Testing Method, Engineering Applications of Ultrasonics.

UNIT II

Semiconductor Physics and EM Theory

Types of Semiconductors, Direct and Indirect Bandgap Semiconductors, Hall Effect, Construction and Working of Quantum Light Emitting Diodes (QLEDs) & Solar Cells, Applications of Semiconductor Devices, Concept of Harvesting Energy Devices (Piezoelectric Generators, Thermoelectric Generators), Properties and Advantages of Graphene.

Basic Laws of Electricity and Magnetism, Displacement Current, Maxwell's Equations, Expression for Maxwell's Integral to Differential Equations, Poynting Theorem.

UNIT III

Magnetic Materials & Superconductors

Types of Magnetic Materials, Weiss Molecular Field Theory, Magnetic Domains, Hysteresis Curve, Soft and Hard Magnetic Materials, Magneto-Resistance Materials (CMR & GMR), Applications of Magnetic Materials.

Superconductors, Properties of Superconductors, Meissner Effect, Type I and Type II Superconductors, BCS Theory (Qualitative), High-Tc Superconductors, Applications of Superconductors.

UNIT IV

Wave Mechanics & Quantum Computation

Matter Waves, de-Broglie Wavelength, Physical Significance of Wave Function, Schrödinger Time-Independent Wave Equation, Energy of Particle in 1-D Potential Box, Kronig-Penney Model (Qualitative).

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Introduction to Quantum Computing, Idea of Classical Bits and Qubits, Basics of Quantum Gates (Hadamard, CNOT), Comments on No-Cloning Theorem, Basic Idea of Quantum Teleportation, Applications of Quantum Computing.

UNIT V

Nano Materials & Thin Films

Introduction, Properties of Materials at Reduced Size, Surface-to-Volume Ratio at Nano Scale, Classification of Nano Materials, Preparation Techniques: Bottom-Up Method (Sol-Gel), Top-Down Methods (Ball Milling), Principles of Characterization Techniques (X-ray Diffraction, Scanning Electron Microscope, Transmission Electron Microscope), Applications of Nano Materials.

Distinction between Bulk and Thin Films, Thin Film Preparation Techniques: Thermal Evaporation Method, Electron Beam Evaporation Method, Applications of Thin Films.

PRESCRIBED BOOKS

1. Modern Engineering physics-I &II : S. Chandralingam, K. Vijayakumar, S Chand Co.
2. Engineering Physics: P.K.Palanisamy, Scitech Publishers.
3. Engineering Physics: S.O.Pillai, New age International.
4. Nielsen M. A., I. L Chung, Quantum Computation & Quantum Information, Cambridge Univ. Press
5. Thin Film Fundamentals, A. Goswami , New Age International New Delhi
6. Nano Materilas, A.K. Bandyopadhyay, Newagepublishers

REFERENCE BOOKS

1. Solid State Physics: Charles Kittel, Wiley & Sons (Asia) Pvt. Ltd.
2. Fundamentals of physics:Halliday,Resnick,Walker.
3. Engineering Physics – By V Rajendran, McGraw Hill Edn.
4. Solar Photovoltaics – Fundamentals, Technologies and Applications 3rd Edition, PHI
5. Principles of Quantum computation and Information – By G. Benenti, G. Casati, G. Strini, World scientific.

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BE II-Semester syllabus for affiliated engineering colleges of Osmania University
(wef: academic year 2024-2025)
Common to all branches

DIFFERENTIAL EQUATIONS&NUMERICAL METHODS

BS203MT	DIFFERENTIAL EQUATIONS & NUMERICAL METHODS	3L:1T:0P	4 credits

Course objectives:

- To Develop strong problem-solving skills by tackling a variety of problems involving first-order differential equations
- To Develop strong problem-solving skills by tackling a variety of problems involving higher order differential equations
- To familiarizes concept of Laplace Transforms
- To Understand the Limitations and Applicability of Numerical Methods
- To Understand the Limitations and Applicability of Numerical Differentiation & Integration

Outcomes: After completing this course, the students will able to

- Students will enhance their problem-solving skills by applying the methods learned involving first-order differential equations.
- Students will enhance their problem-solving skills by applying the methods learned involving higher order differential equations.
- To learn Laplace transform and its properties
- Analyze and Interpret Interpolation
- Analyze and Interpret Numerical differentiation & integration

UNIT-I

Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

UNIT-II

Differential Equations of Higher Orders: Solution of second and higher order linear homogeneous equations with constant coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.

UNIT-III

Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof), Solution of ordinary differential equations using Laplace Transforms.

UNIT-IV

Numerical Methods-I: Solution of polynomial and transcendental equations- Bisection method, Iteration Method, Newton-Raphson Method and Regula-Falsi method. Finite differences-forward differences-backward differences-central differences-symbolic relations and separation of symbols, Interpolation using Newton's forward and backward formulae: Lagrange's method of interpolation.

UNIT-V

Numerical Methods-II: Numerical Integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.

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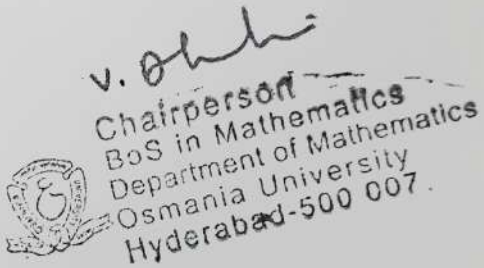
TEXT BOOKS:

1. R.K.Jain&S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.

REFERENCE BOOKS:

1. S.S.Sastry, Introductory Methods of Numerical Analysis, 5th edition, PHI Private Limited, 2012.
2. Dr.B.S.Grewal, Numerical Methods in Engineering and Science, Khanna Publishers, 2014.
3. H.K.Dass, Er.RajnishVarma, Higher Engineering Mathematics, S.Chand Publishers, 3rd Edition.



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ES 303 CS	Scientific Programming					
Pre-requisites			**L**	**T**	**P**	**C**
			3	-	-	3
Evaluation	**SEE**	70 Marks	**CIE**		30 Marks	

Course Objectives :	
1	**Introduce basic scientific programming** concepts using Python and MATLAB
2	**Teach effective use of data structures** within Python and MATLAB environments.
3	**Develop competence in applying numerical methods** to solve mathematical problems.
4	**Enable data manipulation and visualization** using Python and MATLAB tools.
5	**Expose students to emerging technologies** like machine learning, IoT, and big data

Course Outcomes :	
On completion of this course, the student will be able to :	
CO-1	**Proficiency in Scientific Programming** using Python and MATLAB for computational tasks.
CO-2	**Implementation of Data Structures and Algorithms** to solve computational problems.
CO-3	**Understanding and Application of Numerical Methods** and linear algebra in scientific computing.
CO-4	**Ability to Analyze and Visualize Data** using Python and MATLAB tools.
CO-5	**Introduction to Emerging Technologies** and project development in scientific computing.

UNIT – I
Introduction to Scientific Programming and Python Basics: Overview of Scientific Computing, Introduction to Python Programming, Basic Syntax, Variables, and Data Types, Control Structures (if-else, loops), Functions and Modules, Introduction to MATLAB.

UNIT – II
Data Structures and Algorithms: Lists, Tuples, Dictionaries, and Sets in Python, Arrays and Matrices in MATLAB, Basic Algorithms (Searching and Sorting), Complexity Analysis.

4/9/2024

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4/9/24

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UNIT– III
Numerical Methods and Linear Algebra: Introduction to Numerical Methods, Root Finding Algorithms (Bisection, Newton-Raphson), Numerical Integration and Differentiation, Basics of Linear Algebra, Matrix Operations and Solving Linear Systems.

UNIT – IV
Data Analysis and Visualization: Importance of Data Analysis, Data Manipulation using Pandas (Python) and MATLAB, Data Visualization Techniques, Introduction to Matplotlib, Seaborn (Python), and MATLAB Plotting.

UNIT –V
Emerging Technologies and Project Work: Overview of Emerging Technologies (Machine Learning, IoT, Big Data), Introduction to Machine Learning using Scikit-Learn (Python), Basics of IoT and Big Data Applications in Engineering, Guidelines for Scientific Projects, Report Writing and Presentation Skills

Suggested Reading:

1	**Python Programming and Numerical Methods: A Guide for Engineers and Scientists"** by Qingkai Kong, Timmy Siauw, and Alexandre Bayen
2	**Introduction to Scientific Programming with Python"** by Joakim Sundnes
3	**MATLAB for Engineers"** by Holly Moore
4	**Learning MATLAB** by Tobin A. Driscoll

4/9/2024

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Prof. K. Shyamala
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Faculty of Engineering
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Hyderabad-500 007.

BASIC ELECTRICAL ENGINEERING LAB

Common to All Branches

Duration of SEE: 3 hours

ES 354 EE *SEE: 50 marks*

Instruction:2 periods per week

CIE: 25 marks

Credits: 1

Objectives:

1. To impart the practical knowledge on testing of DC and AC Machines.
2. To learn the usage of common electrical measuring instruments

Outcomes: Student will be able to:

1. Get an exposure to common electrical components and their ratings
2. Analyze the performance of DC and AC Machines
3. Comprehend the usage of common electrical measuring instruments
4. Test the basic characteristics of transformers and electrical machines

List of Experiments:

Dem1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

Exp 1. Verification of KVL and KCL, superposition theorem (with DC excitation)

Exp 2 Verification of Thevenin's and Norton's theorems (with DC excitation)

Exp 3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Power factor calculation

Exp 4. Transformers: Observation of the no-load current waveform on an oscilloscope (non sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).

Exp 5. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Exp 6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).

Exp 7. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta.

Dem2. Demonstration of cut-out sections of machines: dc machine (commutator- brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

Exp 8. OCC characteristics of DC Generator

Exp 9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.

Exp 10. Power factor improvement of Induction Motor using static capacitors

Exp 11. Load Test of DC Motor

Note - : Minimum Eight Experiments should be conducted in the semester

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4) 27/8/24 DR. FATIMA AZRA, Head EED, DCET

5) Sirisha 27/8/24 P. Sirisha, Incharge EEE, GLNEC

6) K. Vijay Ratna Raju, Incharge EEE, NBRIT

7) P. Jagadeesh Dr JAGADEESH.P Incharge EEE, KMEC

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Suggested Readings:

1	N. K. De, –*Basic Electrical Engineering*‖ Universities Press, 2015.
2	J.B. Gupta, –*Fundamentals of Electrical Engineering and Electronics*‖ S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, –*Utilization of Electric Power and Electric Traction*‖ S.K. Kataria & Sons Publications, 2010
4	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, –*Basic Electrical Engineering*‖ Tata McGraw Hill, Publications, 2009
5	Hughes, "*Electrical Technology*", 7th Edition, Addison Welsey Longman Inc., 1995

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5) P. Sirisha, Incharge EEE, GLWEC
6) K. Vijay Ratna Babu Incharge EEE, NGIT
7) P Jagadeesh Dr. JAGADEESH.P Incharge EEE, KMEC

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NO 09/CBOSP/2024 DATE 2/8/2024

Engineering Physics Lab Syllabus for Osmania University Affiliated Engineering Colleges
B.E (SEM-I&II) AICTE
Academic Year 2024-2025 Onwards (Common to All Branches)

CourseCode: BS251PH	CourseTitle: Physics Lab						Core/Elective : Core
Prerequisite	ContactHoursper Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	3	25	50	1.5

Course Objective

- Master experimental procedures and programming techniques.
- Conduct experiments independently with precision and measurement accuracy
- Analyze data graphically and derive conclusions from graphs
- Evaluate experiment results critically and draw meaningful conclusions.
- Improve communication skills through group work and effective laboratory report writing.

Course Outcomes

- Apply the various procedures and programming techniques for the experiments.
- Demonstrate the experiment with task and take the measurement independently
- Examine the graphical representation data and estimate results from the graph.
- Compare and evaluate the results of the experimentand draw relevant conclusions
- Develop communication skills through working ingroups in performing the laboratory Experiments andby writing laboratory reports.

2/8/2024

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Listof Experiments

1. Determination of Dielectric Constant and Phase Transition Temperature of Dielectric Materials
2. To study the I-V Characteristics of P-N Junction Diode and Resistance Evaluation
3. Find the Electrical Conductivity and Energy Gap of Germanium (Ge) Crystal
4. Study Hall Effect in Semiconductors & find Hall Coefficients, Hall Voltage, and Conductivity
5. Study Characteristics of Thermistor: Determination of Constants A and B
6. Draw Hysteresis Loop for Ferromagnetic Material (B-H Curve)
7. Study V-I Characteristics of Solar Cell: Fill Factor and Series Resistance Calculation
8. Visualization Energy Levels of 1-Dimensional Potential Box Using Schrödinger Wave Equation in Python
9. Visualization of Allowed Energy Levels and Kronig-Penney Model in Python/MATLAB
10. Determine the Density and Elastic Properties of Oxide Glasses/polymers Using Machine learning algorithms
11. Calculate the Numerical Aperture (NA) and Acceptance Angle of Optical Fiber
12. Find the Wavelength of Laser Source using diffraction grating
13. To study the Transition Temperature Measurement of High-Temperature Superconductor
14. Find the Rigidity Modulus of Wire Using Torsional Pendulum
15. To estimate the pressure using optical fiber sensor.

Note: **Minimum Eight experiments should be conducted in the semester**

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ENGINEERING GRAPHICS

ES 353 CE

Instruction:6 periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits: 3

Objectives:

1.To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. To prepare you to use the techniques, skills, modern engineering tools to use for Engineering practice.

Outcomes: Student will be able to:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modelling
5. Exposure to computer-aided geometric design
6. Exposure to creating working drawings
7. Exposure to engineering communication

S.No	Description	Lectures	Drawing
1	Principles of Engineering Graphics and their significance, usage of drawing instruments	1	
2	Conic Sections – I, Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3	Conic Sections – II, Construction of ellipse (given major and minor axis), parabola (given bas and height), rectangular hyperbola	-	2
4	Cycloids (cycloid & epicycloid)	1	2
5	Involutes (involute of triangle, square & circle)	-	2
6	Scales (plain & diagonal scales)	1	2+2
7	Introduction to AutoCAD –Basic commands and simple drawings	-	2+2
8	Orthographic Projection , Projection of points situated in different quadrants	1	2
9	Projections of straight lines-I Lines parallel to both the reference planes, lines perpendicular or inclined to one reference plane	1	2
10	Projections of straight lines-II Lines parallel to both the reference planes	1	2
11	Projections of planes-I Perpendicular planes	1	2
12	Projections of planes-II Oblique planes	-	2
13	Projections of solids – I Polyhydra and solids revolution, projections of solids in simple position	1	2
14	Projections of solids – II	1	2

	Polyhydra and solids when the axes inclined to one or both the reference planes.		
15	Section of solids – I When the sectional plane is parallel or perpendicular to one reference plane	1	2
16	Section of solids – II When the sectional plane is inclined to one reference plane	-	2
17	Development of surfaces – I Prisms and Cylinders	1	2
18	Development of surfaces – II Pyramids and Cones	-	2
19	Intersection of surfaces – I Intersection of cylinder and cylinder	1	2
20	Intersection of surfaces – I Intersection of cylinder and cones	-	2
21	Isometric projection – I- planes and simple solids	1	2
22	Isometric projection – I – Combination of two or three solids	-	2
23	Conversion of Isometric Views to Orthographic Views	1	2
24	Floor plans of 2 or 3 rooms including windows, doors, and fixtures such as WC, bath, sink, shower, etc.	1	2

Suggested Readings:

1	Bhatt N.D., Panchal V.M. & Ingle P.R.,"*Engineering Drawing"*, Charotar Publishing House, 2014
2	Shah, M.B. & Rana B.C., " *Engineering Drawing and Computer Graphics"*, Pearson Education, 2008
3	S.N Lal, " *Engineering Drawing with Introduction to Auto CAD"*, Cengage Learning India Pvt Ltd, New Delhi, 2018
4	Agarwar B. & Agrawal C. M., "*Engineering Graphics*", TMH Publication, 2012
5	Narayana, K.L. & P Kannaiah," *Text book on Engineering Drawing*", Scitech Publishers, 2008
6	(Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 20 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 24 (AutoCAD drawings.

ES353CS	Scientific Programming Lab					
Pre-requisites			**L**	**T**	**P**	**C**
			-	-	2	1
Evaluation	**SEE**	50 Marks	**CIE**		25 Marks	

Course Objectives :	
1	Enable students to install and use Python and MATLAB for writing and debugging programs.
2	To implement control structures, data structures, and algorithms and analyze their complexities.
3	Train students to perform data manipulation and create customized visualizations using Python and MATLAB tools.

Course Outcomes :	
On completion of this course, the student will be able to:	
CO-1	Set up and use Python and MATLAB for scientific programming.
CO-2	Implement and analyze data structures, control structures, and algorithms.
CO-3	Gain skills in data manipulation, visualization, and analysis using Python and MATLAB.

1. Python and MATLAB Installation and IDE Setup
2. Writing Simple Python and MATLAB Programs
3. Implementing Control Structures and Functions
4. Implementing Data Structures in Python and MATLAB
5. Writing and Testing Search and Sort Algorithms
6. Analyzing Algorithm Complexity in Practical Problems
7. Implementing Numerical Methods in Python and MATLAB
8. Performing Matrix Operations and Solving Linear Systems
9. Case Studies and Applications in Engineering
10. Data Manipulation and Analysis using Pandas and MATLAB
11. Creating Various Plots (Line, Scatter, Bar, Histogram)
12. Customizing and Interpreting Plots for Engineering Data
13. Implementing Basic Machine Learning Algorithms in Python
14. Exploring IoT and Big Data Tools
15. Working on Individual/Group Projects
16. Preparing Project Reports and Presentations
17. Final Project Presentation

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Board of Studies in CSE
Dept. of Computer Science & Engg.
College of Engg., O.U.,Hyderabad

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SCHEME OF INSTRUCTION & EXAMINATION
B.E. (Electrical and Electronics Engineering) III – SEMESTER

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ Wk	CIE	SEE	Duration In Hrs	
Theory Courses										
1	ES302CE	Engineering Mechanics	3	1	-	4	30	70	3	4
2	BS302MT	Probability & Statistics	3	1	-	4	30	70	3	4
3	PC401EE	Electrical Circuit Analysis	3	-	-	3	30	70	3	3
4	PC402EE	Electromagnetic Fields	3	-	-	3	30	70	3	3
5	PC403EE	Electrical Machines – I	3	1	-	4	30	70	3	4
6	PC223EC	Analog Electronics	3	-	-	3	30	70	3	3
Practical / Laboratory Courses										
7	PC451EE	Electrical Circuits Lab	-	-	2	2	25	50	3	1
8	PC452EE	Computer Aided Electrical Drawing Lab	-	-	2	2	25	50	3	1
9	PC253EC	Analog Electronics Lab	-	-	2	2	25	50	3	1
Total			**18**	**3**	**6**	**27**	**255**	**570**	-	**24**

HS: Humanities and Social Sciences BS: Basic Science ES: Engineering Science
MC: Mandatory Course PC: Professional Core PE: Professional Elective
L: Lecture T: Tutorial P: Practical D: Drawing
CIE: Continuous Internal Evaluation SEE: Semester End Evaluation (Univ. Exam) EE: Electrical Engg.

Note:

1. Each contact hour is a clock hour.
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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Course Code	Course Title					Core/Elective
ES302CE	**Engineering Mechanics**					**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**1**	**-**	**-**	**30**	**70**	**4**

Course Objectives

The objectives of this course is to impart knowledge of

- ➢ Resolution of forces, equilibrium of force systems consisting of static loads
- ➢ Obtaining centroids and moments of inertia for various regular and irregular areas.
- ➢ Various forces in the axial force members, and to analyse the trusses using various methods,
- ➢ Concept of friction for single and connected bodies.
- ➢ Basic concepts of dynamics, their behavior, analysis and motion bodies
- ➢ Work energy principles and impulse momentum theory and applications to problem solving

Course Outcomes

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

1. Apply the fundamental concepts of forces, equilibrium conditions for static loads.
2. Determine the centroid and moment of inertia for various sections.
3. Analyse forces in members of a truss using method of joints and method of sections, analyse friction for single and connected bodies.
4. Apply the basic concepts of dynamics, their behavior, analysis and motion bodies.
5. Solve problems involving work energy principles and impulse momentum theory.

UNIT – I

Introduction to Engineering Mechanics: Basic Concepts

System of Forces: Coplanar Concurrent Forces, Components in Space – Resultant of coplanar and spatial systems, Moment of Force and Couple and its Application to coplanar system

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium and applications to Coplanar System.

UNIT – II

Centroid: Centroid of simple areas (from basic principles), Centroid of Composite areas.

Area Moment of Inertia: Definition, Moment of inertia of simple areas (from basic principles), Polar Moment of Inertia, Transfer formula, Moment of Inertia of Composite areas.

Centre of Gravity & Mass moment of Inertia: Centre of gravity and Mass moment of inertia of simple bodies (from basic principles).

UNIT-III

Friction: Theory of friction, Laws of friction, Friction connected to single and connected bodies. Wedge friction.

Analysis of Perfect Frames: (Analytical Method) Types of Frames, Assumptions for forces in members of perfect frame, Method of joints and Method of sections for Cantilever Trusses, simply supported Trusses.

UNIT –IV

Kinematics: Introduction, Motion of particle, Rectilinear and Curvilinear motions, Velocity and Acceleration, Types of Rigid body, Angular motion, Fixed axis rotation.

Kinetics: Introduction, fundamental equation of kinetics for a particle, D‘ Alembert‘s principle for particle motion, connected system and Fixed Axis Rotation.

UNIT – V

Work - Energy Method: Introduction, Equations for Translation, Work-Energy Applications to Particle Motion, Connected System and Fixed Axis Rotation.

Impulse Momentum Method: Linear impulse momentum, law of conservation of momentum, coefficient of restitution, Elastic impact**.**

Suggested Readings:

1. Ferdinand L. Singer, *Engineering Mechanics*, Collins, Singapore, 1994.
2. Reddy Vijay Kumar K. and K. Suresh Kumar, Singer's Engineering Mechanics, 2010.
3. S.S Bhavakatti, *Engineering Mechanics*, New age International publishers.
4. Rajeshakharam, S. and Sankarasubrahmanyam, G., *Mechanics,* Vikas Publications, 2002.
5. Junarkar, S.B. and H.J. Shah., *Applied Mechanics*, Publishers, 2001.
6. Shah., *Applied Mechanics*, Publishers, 2001.

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Common to B.E.: (CSE, CSE(DS), CSE(AI), CSE(AI&ML), CME, EEE, EIE, & IT)

Course Code	Course Title						Core/Elective
BS302MT	**Probability & Statistics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**1**	**-**	**-**	**30**	**70**	**4**

Course Objectives

1. Understand basic probability concepts, mastering probability calculations.
2. Explore random variables and probability distributions.
3. Explore regression analysis and correlation and applying statistical methods to real-world problems.

Course Outcomes

After completing this course, the students will be able to:

1. Determine conditional probability using Bayes' theorem and classify random variable and evaluate corresponding distribution functions with its mathematical expectation.
2. Evaluate statistical parameters of discrete probability distributions.
3. Evaluate statistical parameters of continuous probability distribution.
4. Perform regression analysis to compute coefficient of correlation to interpret data.
5. Testing of hypotheses for few unknown statistical parameters using types of sampling , sampling distributions of means, sampling distribution of variance, Estimation of statistical parameters .

UNIT-I:

Introduction of probability, Conditional Probability, Theorem of Total Probability, Bayes' Theorem (without proof) and its applications; Random variable, Types of random variables; Probability mass function and probability density function, Mathematical expectations.

UNIT-II:

Discrete probability distributions: Binomial and Poisson distributions, mean, variance, moment generating function , and evaluation of statistical parameters for these distributions, moments, skewness and kurtosis.

UNIT-III:

Continuous probability distributions: Uniform, Exponential and Normal distributions; mean, variance, moment generating function; evaluation of statistical parameters for these distributions.

UNIT-IV:

Curve fitting by the method of least squares—fitting of straight lines, second-degree parabolas and more general curves, Correlation, regression, rank correlation. Test of significance- Large-sample test for single proportion, difference of proportions, single mean, difference of means and difference of standard deviations.

UNIT-V:

Test for single mean, difference of means and correlation coefficients, test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.

Suggested Readings:

1. 1. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publication, 4th Edition., 2014.
2. 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
3. 3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 2014.

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Course Code	Course Title						Core/Elective
PC401EE	**Electrical Circuit Analysis**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- ➢ Obtain the steady – state response of electrical circuits.
- ➢ Application of network theorems for the electrical circuits.
- ➢ Find Solution of first and second order networks.
- ➢ To Understand the application of Laplace transforms for electrical circuits
- ➢ Learn the behaviour of two port networks

Course Outcomes

At the end of the course students will be able to

1. Obtain steady-state response of electrical circuits.
2. Apply network theorems for the analysis of electrical circuits.
3. Analyse solution of first and second order RL, RC and RLC networks.
4. Apply Laplace transforms for electrical circuits
5. Analyse the behavior of two port networks

UNIT-I

Sinusoidal steady state analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power, series and parallel resonances. Analysis of three-phase circuits, analysis of magnetically coupled circuits with dot Convention.

UNIT-II

Network Theorems – AC/DC Excitation: Superposition theorem, Thevenin‘s theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem Analysis with dependent current and voltage sources. Node and Mesh Analysis Concept of duality and dual networks.

UNIT-III

Solution of First and Second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits with DC and AC excitation - initial and final conditions in network elements, forced and free response, time constants.

UNIT-IV

Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions.

UNIT-V

Two Port Network and Network Functions: Two Port Network parameters, impedance, admittance, transmission hybrid and inter-relationship of parameters, interconnections of two port networks. Driving point and Transfer functions.

Suggested Readings:

1. M. E. Van Valkenburg, *Network Analysis*, Pearson India Education Services Pvt. Ltd T hird edition, 2019.
2. D. Roy Choudhury, *Networks and Systems*, New Age International Publications, 2013.
3. W. H. Hayt and J. E. Kemmerly, *Engineering Circuit Analysis*, McGraw Hill Education, 2013.
4. C. K. Alexander and M. N. O. Sadiku, *Electric Circuits*, McGraw Hill Education, 2004.
5. K. V. V. Murthy and M. S. Kamath, *Basic Circuit Analysis*, Jaico Publishers, 2006.
6. Robert L Boylested, *Introductory Circuit Analysis*, Pearson, 2018.

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Course Code	Course Title						Core/Elective
PC402EE	**Electromagnetic Fields**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- ➢ Review of Vector Calculus
- ➢ Application and apply the various laws of static electrical and magnetic fields
- ➢ Understand the time varying the electrical and magnetic fields
- ➢ Understand the propagation of EM waves

Course Outcomes

At the end of the course students will be able to

1. Understand the vector calculus for electromagnetism.
2. Obtain the electric fields for simple configurations under static conditions.
3. Analyse and apply the static magnetic fields.
4. Understand Maxwell‘s equation in different forms and different media.
5. Understand the propagation of EM waves

In this course, most of the students find difficult to visualize electric and magnetic fields. Instructors may demonstrate various simulation tools to visualize electric and magnetic fields in practical devices like transformers, transmission lines and machines

UNIT-I

Review of Vector Calculus: Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus-differentiation, partial differentiation, integration, vector operator del, gradient, divergence and curl, integral theorems of vectors. Conversion of a vector from one coordinate system to another.

UNIT-II

Static Electric Field: Coulomb ‘s law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density

Conductors, Dielectrics and Capacitance: Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two-wire line, Poisson ‘s equation, Laplace ‘s equation, Solution of Laplace and Poisson ‘s equation, Application of Laplace ‘s and Poisson ‘s equations with single variable.

UNIT-III

Static Magnetic Fields: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.

Magnetic Forces, Materials and Inductance: Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

UNIT-IV

Time Varying Fields and Maxwell’s Equations: Faraday ‘s law for Electromagnetic induction, Displacement current, Point form of Maxwell ‘s equation, Integral form of Maxwell‘s equations, Motional Electromotive forces. Electrical and Magnetic boundary conditions.

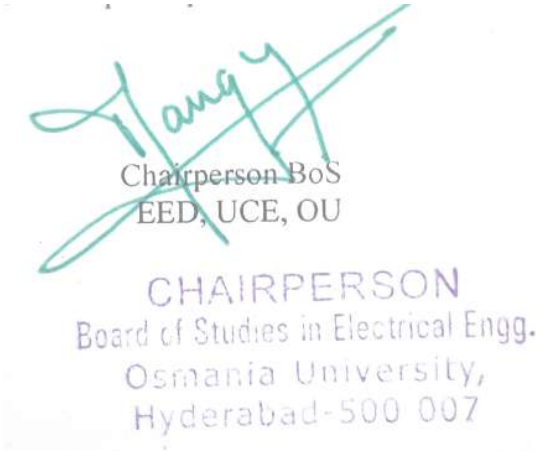
UNIT-V

Electromagnetic Waves: Derivation of Wave Equation, Uniform Plane Waves, Maxwell ‘s equation in Phasor form, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect. Poynting theorem.

Suggested Readings:

1. M. N. O. Sadiku, ―Elements of Electromagnetics‖, Oxford University Publication, 2014.
2. A. Pramanik, ―Electromagnetism - Theory and applications‖, PHI Learning Pvt. Ltd, New Delhi,

2009.
3. A. Pramanik, ―Electromagnetism-Problems with solution‖, Prentice Hall India, 2012.
4. W. Hayt, ―Engineering Electromagnetics‖, McGraw Hill Education, 2012.



Course Code		Course Title						Core/Elective
PC403EE		**Electrical Machines-I**						**Core**
Prerequisite		Contact Hours per Week			CIE		SEE	Credits
	L	T	D	P				
-	**3**	**1**	**-**	**-**		**30**	**70**	**4**

Course Objectives

- ➢ To understand the concepts of magnetic circuits.
- ➢ To understand electrical principle, laws, and working of DC machines.
- ➢ To understand the construction, characteristics and application of various types of DC generators and motors.
- ➢ To understand working of 1 – phase transformer and also conduct various tests on the transformer.

Course Outcomes

At the end of the course students will be able to

1. Understand the concepts of magnetic circuits.
2. Understand electrical principle, laws, and working of DC machines.
3. Analyse the construction and characteristics and application of various types of DC generators.
4. Analyse the construction, characteristics and application of various types of DC motors and testing of motors.
5. Understand electrical principles, laws, working,, losses, conduct various tests on of 1–phase transformer.

UNIT-I

Electromechanical Energy Conversions: Introduction, Flow of Energy in Electromechanical devices, Energy in Magnetic Systems, Singly Excited System, Determination of Mechanical Force, Mechanical Energy, Torque Equation, Doubly Excited System, energy stored in magnetic field, Electromagnetic Torque, Generated EMF in Machines, Torque in Machines with Cylindrical air-gap, General classifications of Electrical Machines.

UNIT-II

DC Machines: Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

UNIT-III

DC Machines - Generator: Armature circuit equation for generation, Types of field excitations - separately and self-excited, shunt, series, and compound. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. V-I characteristics of generators.

UNIT-IV

DC Machines – Motor: Armature circuit equation for motoring, torque-speed characteristics of separately excited, shunt, series motors and compound motors. Speed control methods. Losses and efficiency, Testing - brake test, Swinburne ‘s test, Hopkinson ‘s test and Field ‘s test.

UNIT-V

Transformers: Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses.

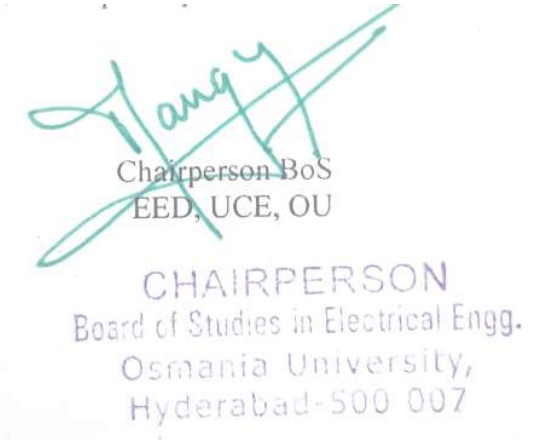
Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers.

Autotransformers - construction, principle, applications and comparison with two winding transformer. Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers.

Suggested Readings:

1. A. E. Fitzgerald and C. Kingsley, *Electric Machinery*, New York, McGraw Hill Publisher,2013.
2. P. S. Bimbhra, *Electrical Machinery*, Khanna Publishers, 2011.
3. Smarajit Ghosh, *Electrical Machines*, Pearson Education, 2018

4. I. J. Nagrath and D. P. Kothari, *Electric Machines*, McGraw Hill Education, 2010.
5. P. Satish Kumar, G. Sridhar, *Electrical Machines – A Practical Approach*, De Gruyter Publication, Germany. 2020.



Course Code	Course Title						Core/Elective
PC223EC	**Analog Electronics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

1. Study the characteristics of diode in forward and reverse bias and applications of diodes.
2. Describe the construction and working of Bipolar Junction Transistor in various modes and JFET.
3. Familiarize with feedback concepts and identify various types of feedback amplifiers.
4. Study the importance of power amplifiers and Oscillators.
5. Understand the operation and applications of op-amps.

Course Outcomes

At the end of the course students will be able to

1. Apply diode characteristics to design rectifiers with L/C filters and one-level clipper/clamp circuits
2. Analyze BJT/JFET characteristics, configurations, and small-signal models
3. Classify feedback topologies and qualitatively assess effects on gain, bandwidth, impedances, and stability.
4. Analyse RC/LC/crystal oscillators via Barkhausen criterion and compare power-amp classes (A/B/AB).
5. Design and evaluate core op-amp applications (amplifiers, arithmetic, integrator/differentiator, comparators/ZCD, precision/peak/S&H, waveform generators) using ideal/DC/AC characteristics.

UNIT-I

Junction characteristics, V-I characteristics, Avalanche breakdown, Zener diode, Applications of Diodes as rectifiers. Filters (L, C), LED, photodiode. Basic Clipping and clamping circuits using diodes. (One level only)

UNIT-II

Bipolar Junction Transistor - V-I characteristics, JFET - I-V characteristics, and various configurations (such as CE/CS, CB/CG, CC/CD) and their features. Small signal models of BJT and JFET. Analysis of BJT as an amplifier, estimation of voltage gain, current gain, input resistance, output resistance. **Transistor Biasing:** Fixed bias, collector to base bias, self-bias, thermal stability, heat sinks

UNIT-III

Concept of Feedback - positive and negative, Feedback topologies: Voltage series, current series,voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., and concept of stability. (Qualitative treatment only)

UNIT-IV

Oscillators: Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts), CRYSTAL Oscillator. (Qualitative treatment only) **Power Amplifiers:** Various classes of operation (Class A, B, and AB), their power efficiency and distortion (Qualitative treatment only)

UNIT-V

OP-AMP Block diagram, Ideal OP-AMP, DC and AC Characteristics, Inverting and Non-Inverting Amplifiers, Adder/Subtractor, Integrator, Differentiator, Comparator, Zero crossing detector, Square and Triangular wave generators, Peak detector, Sample and Hold circuit and Precision Rectifiers

Suggested Readings:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, Electronic Devices and Circuits, 3rd ed.,McGraw Hill Education, 2010.
2. S Salivahanan, N Kumar, and A Vallavaraj, Electronic Devices and Circuits, 2nd ed., McGraw HillEducation, 2007.
3. Jacob Milliman and Herbert Taub, “Pulse, Digital and Switching Waveforms”,3rd Edition.
4. A.Anand Kumar “Pulse and Digital circuits”.
5. Ramakanth A. Gayakwad, “Op-Amps and Linear Integrated Circuits” Pearson,2018, 4th edition

Course Code	Course Title						Core/Elective
PC451EE	**Electrical Circuits Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
PC401EE	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- ➢ To Train the Students for acquiring practical knowledge in time response and frequency response of series / parallel RC, RL and RLC Circuits.
- ➢ To prepare the students for finds out parameters of a given two port network.
- ➢ To make the students for understanding the verification of theorems.

Course Outcomes

At the end of the course students will be able to

1. Evaluate the time response and frequency response character sties of R,L, C Series and parallel circuits.
2. Able to validate the network theorems.
3. Able to find various parameters of a two-port network.
4. Able to simulate electrical circuits using spice.
5. Able to synthesize networks from a given transfer function.

List of Experiments:

1. Charging and Discharging Characteristics of RC and RL series circuits.
2. Locus diagrams of RC and RL Circuits.
3. Frequencies Response of a Series RLC Circuits.
4. Frequencies Response of a Parallel RLC Circuits.
5. Parameters of two port network.
6. Series, parallel and cascade connection of two port networks.
7. Verification of Thevenin‘s and Norton‘s theorems.
8. Verification of Superposition theorem and Maximum power transfer theorem
9. Two Wattmeter method.
10. Simulation and transient analysis of series RLC circuits using PSPICE.
11. Mesh and Nodal analysis of electrical circuit using PSPICE.
12. Network Synthesis.
13. Characteristics of Linear, Non-Linear and Bilinear Elements.

Note: At least ten experiments should be conducted in the Semester.

Suggested Readings:

1. Van Valkenburg M.E., Network Analysis, Prentice Hall of India, 3rd Edition, 2000.
2. William Hayt H, Kimmerly Jack E, Steven Durbin M, Engineering Circuit Analysis, McGraw Hill, 6 Edition, 2002.
3. Jagan N.C, Lakshrninarayana C., Network Analysis, B.S. Publications, 3rd Edition, 2014.

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Course Code	Course Title						Core/Elective
PC452EE	**Computer Aided Electrical Drawing Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
ES301EE	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- ➢ Identify and draw different components of electrical systems
- ➢ Draw different control and wiring diagrams
- ➢ Draw winding diagrams of electrical machines
- ➢ Draw different starter diagrams of A.C and D.C machine
- ➢ Acquire knowledge on various Electrical Engineering Softwares

Course Outcomes

At the end of the course students will be able to

1. Identify and draw different components of electrical systems
2. Draw different control and wiring diagrams
3. Draw winding diagrams of electrical machines
4. Draw different starter diagrams of A.C and D.C machine
5. Acquire knowledge on various Electrical Engineering Softwares

Drawing of the following using Electrical CADD / Corel Draw / MS Word / PPT/Visio

1. Lines, Arcs, Curves, Shapes, Filling of objects, Object editing & Transformation.
2. Electrical, Electronic & Electro – mechanical symbols.
3. House – wiring diagrams and layout.
4. Simple power and control circuit diagrams.
5. Electrical machine winding diagrams. (A.C & D.C)
6. Transmission tower, Overhead lines – ACSR conductors, Single circuit, Double circuit, Bundle conductor.
7. Constructional features of D.C motors, AC motors and Transformers.
8. D.C and A.C motor starter diagrams.
9. Lamps used in illumination
10. Single line diagram of Power System

Suggested Readings:

1. K.B. Raina, S.K. Bhattacharya, *Electrical Design, Estimating and Costing*, New Age International, 2007.
2. Nagrath, Kothari, *Electrical Machines*, Tata McGraw Hill Publishing Company Ltd., 2000.
3. A.K. Sawhney, *A Course in Electrical Machines Design*, Dhanpat Rai and Sons, 2016.

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Faculty of Engineering, O.U. AICTE Model Curriculum with effect from Academic Year 2025- 26

Course Code	Course Title						Core/Elective
PC253EC	**Analog Electronics Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- ➢ Designing basic circuits of rectification with and without filters using diodes
- ➢ Designing wave shaping circuit using diodes.
- ➢ Designing of single and multistage amplifier circuits.
- ➢ Demonstrate negative feedback in amplifier circuits and positive feedback in Oscillators
- ➢ Design of P, PI and PID controllers.

Course Outcomes

At the end of the course students will be able to

1. Calculate ripple factor, efficiency and % regulation of rectifier circuits
2. Analyse feedback amplifiers and op-amp oscillator circuits
3. Design single, and multi-stage amplifier, wave shaping and controller circuits
4. Understand the characteristics of electronics devices
5. Design of P, PI and PID controllers using op-amps.

List of Experiments:

1. Characteristics of Silicon, Germanium and Zener Diode in forward bias and reverse bias
2. Application of diode as a full wave rectifier with and without filters. Calculation of Ripple factor,voltage regulation and efficiency with various loads
3. Static characteristics of BJT in CE configuration
4. Static characteristics of MOSFET in CS configuration
5. Frequency response of Single and two stage BJT amplifier in CE configuration
6. Frequency response of Single and two stage MOSFET amplifier in CS configuration
7. Inverting amplifier using op-amp.
8. Non-inverting amplifier using op-amp.
9. Instrumentation amplifier.
10. Design of integrator and differentiator using op-amp.
11. RC Phase Oscillator and Wein Bridge Oscillator using op-amp.
12. A/D converters.
13. Clipping circuits
14. Clamping Circuits.
15. Monostable Multivibrator using op-amp.
16. Generation of triangular and square wave using op-amp.
17. Design of P, PI and PID controller using op-amp.
18. Design of Lead/lag compensator using op-amp

Note: At least ten experiments should be conducted in the Semester

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Suggested Readings:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, Basic Electronics, A text- Lab Manual, 7th Edition. Mc- Graw- Hill Higher Education 2001.
2. D Roy Chaudhary, Shail B Jain, Linear Integrated circuits, New Age International Publishers, 2007.

SCHEME OF INSTRUCTION & EXAMINATION

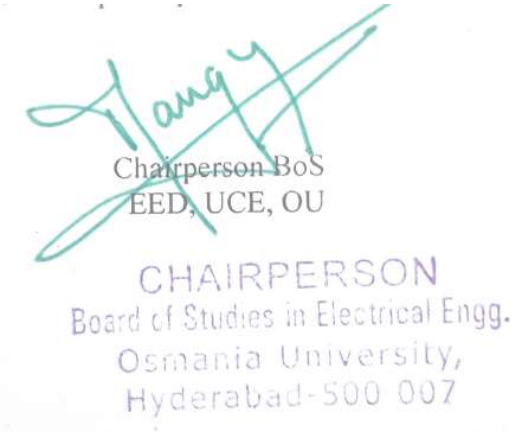
B.E. (Electrical and Electronics Engineering) IV – SEMESTER

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ Wk	CIE	SEE	Duration In Hrs	
Theory Courses										
1	HS201EG	Effective Technical Communication in English	3	-	-	3	30	70	3	3
2	PC408EE	Power Systems – I	3	-	-	3	30	70	3	3
3	ES305ME	Energy Sciences and Engineering	2	-	-	2	30	70	3	2
4	PC409EE	Electrical Machines – II	3	1	-	4	30	70	3	4
5	PC410EE	Digital Electronics and Logic Design	3	-	-	3	30	70	3	3
6	PC411EE	Power Electronics	3	-	-	3	30	70	3	3
Practical / Laboratory Courses										
7	PC455EE	Electrical Machines Lab – I	-	-	2	2	25	50	3	1
8	PC456EE	Power Electronics Lab	-	-	2	2	25	50	3	1
9	PC457EE	Digital Electronics and Logic Design Lab	-	-	2	2	25	50	3	1
Total			**17**	**01**	**06**	**24**	**330**	**570**	-	**21**

HS: Humanities and Social Sciences BS: Basic Science ES: Engineering Science
MC: Mandatory Course PC: Professional Core PE: Professional Elective
L: Lecture T: Tutorial P: Practical D: Drawing
CIE: Continuous Internal Evaluation SEE: Semester End Evaluation (Univ. Exam) EE: Electrical Engg.

Note:

1. Each contact hour is a clock hour.
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.



Course Code	Course Title						Core/Elective
HS201EG	**Effective Technical Communication in English**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

To expose the students to:

- ➢ Features of technical communication
- ➢ Reading and comprehending technical texts
- ➢ Professional writing and correspondence
- ➢ Forms of digital communication
- ➢ Aspects of data transfer and presentations

Course Outcomes

- ➢ On successful completion of the course, the students would be able to:
- ➢ Handle technical communication effectively
- ➢ Understand technical texts and writing
- ➢ Use various types of professional correspondence and technical writing
- ➢ Use digital communication and platforms effectively
- ➢ Enhance their skills of information transfer and presentations

UNIT I

Introduction to Technical Communication: Definition and features of technical communication (precision, relevance, format, style, use of visual aids); Differences between general writing and technical writing, Types of technical communication (oral and written); Group communication (Channels and advantages); Communication barriers; Strategies to improve group communication.

UNIT II

Reading Technical Texts: Understanding technical writing, instructions, manuals, reports; Reading skills, Strategies and Methods (ERRQ & SQ3R reading techniques).

UNIT III

Technical Writing: Memos and Notices; Emails, IOM, Business letters, Business proposals; Report writing (format, features, types); Technical articles (format, style, publication ethics); Statement of Purpose (SOP).

UNIT IV

Digital Communication: Writing for Digital platforms: blogs, social media (academic/professional purpose), key principles and strategies; Professional networking; Video conferencing skills, online meeting protocol and etiquette; AI tools and ethical use.

UNIT V

Information Transfer and Presentations: Non-verbal (table, bar diagram, flow chart, pie chart, tree diagram) to verbal (writing), reading and interpreting information; Verbal (written) to non-verbal, Important aspects of oral and visual presentations.

Suggested Readings:

1. Konar, Nira. (2022). *Communication Skills for Professionals*. (3rd ed.) New Delhi, PHI Learning.
2. Raman, Meenakshi & Sharma, Sangeeta. (2015). *Technical Communication:Principles and Practice* (3rd ed.).New Delhi.
3. Rizvi,Ashraf,M.(2017). *EffectiveTechnicalCommunication* (2nd ed.).NewDelhi,Tata McGraw Hill Education.
4. Sharma, R.C., & Mohan, Krishna.(2017). *Business Correspondence and Report Writing: A Practical Approach to Business & Technical Communication* (4th ed.). New Delhi, Tata McGraw Hill Education.
5. Tyagi, Kavita & Misra, Padma. (2011). *Advanced technical communication*. New Delhi, PHI Learning.
—-*Professional Communication*. (2011). New Delhi, PHI Learning.
6. Jungk, Dale. (2004). *Applied writing for technicians*. New York, McGraw-Hill Higher Education.

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Course Code	Course Title						Core/Elective
PC408EE	**Power Systems – I**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The course is introduced

- ➢ To be able to learn and understand the conventional and renewable generating power stations and economics of generation.
- ➢ To be able to understand design concepts of transmission lines and cables.

Course Outcomes

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

1. Analyze load curves and perform basic AC distribution calculations (2-/3-wire, ring mains).
2. Explain and compare steam/hydro plant layouts and components.
3. Explain nuclear plant principles and evaluate basics of wind, solar, biomass, and gas-turbine systems.
4. Compute sag and tension and compute three-core cable capacitance.
5. Calculate transmission-line inductance/capacitance for single/three-phase lines.

UNIT I

Economics of Power Generation: Load Curve, Load Demand and Diversified factors, Base Load and Peak load operation, Types of costs and depreciation fund calculations, Methods of power factor improvement, Economics of power factor improvement, Tariffs, Distribution: 2 wire and 3 wire distributors, Ring mains, AC distribution calculations.

UNIT II

Steam Power Stations: Choice of site, Layout & various parts of station, Boilers, Turbines, Super Heaters, Economizers, Air pre-heaters etc. and their Pulverized fuel, Coal handling. Hydro-Electric Power plants: Estimation Hydrograph, Flow duration curve, Mass curve, Storage and poundage, Types electric plants and layouts, Prime movers for hydro- electric plants.

UNIT III

Nuclear Power Plants: Fissile materials, working principle of nuclear plants and reactor control, Shielding, Types of reactors. Non-Conventional Energy Sources – Basic principles of Wind, solar, biomass and gas turbines.

UNIT IV

Over-Head Lines: Supports sag and tension calculations, Effect of wind and ice, Erection conditions, Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. Insulated Cables: Conductors for cables, insulating materials, Mechanical protection, Low voltage cables, Grading of cables, Three phase high voltage cables and Super voltage cables, Capacitance of three-core cables.

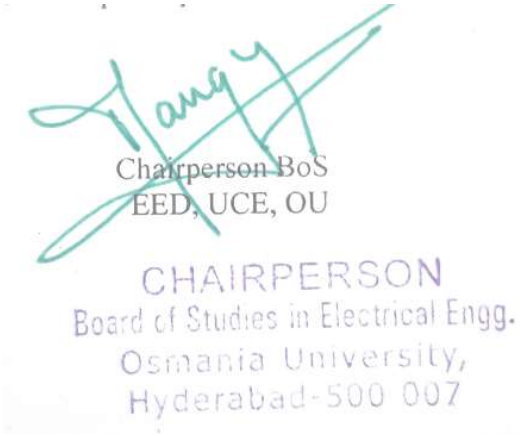
UNIT V

Inductance and Capacitance of Transmission Lines: Inductance and capacitance of overhead line conductors, Single phase and three-phase with symmetrical composite conductors, GMR and GMD Spacing, Transposition, Bundled conductors, Effect of earth capacitance.

Suggested Readings*:*

1. Wadhwa C.L., *Electrical Power Systems*, New Age International (P) Ltd., 4th Edition, 2007.
2. Wadhwa C.L., *Generation, Distribution and Utilization of Electrical Energy*, New Age International (P) Ltd., 4th Edition, 2006.
3. Singh S.N., *Electrical Power Generation*, Transmission and Distribution, Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

4. V.K.Mehta, *Principles of Power Systems,* S. Chand and Co., 2007.



Course Code	Course Title						Core/Elective
ES305ME	**Energy Sciences and Engineering**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**2**

Course Objectives

The objectives of this course is to impart knowledge of

- ➢ Able to identify various sources of energy.
- ➢ Understand the difference between Conventional and renewable energy sources.
- ➢ Identify various storage devices of Energy.
- ➢ Able to estimate the costing of power plant.

Course Outcomes

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

1. Understand the basics of various sources of energy
2. Analyze the present status of conventional energy sources.
3. Understand the working principles of Renewable Energy systems
4. Design and develop waste heat recovery systems.
5. Relate energy economics, standards and future challenges.

UNIT-I

Introduction: Various sources of energy, relative merits and demerits, Statistics and prospects of conventional and Renewable energy sources.

UNIT-II

Conventional Energy Sources: Fossil Fuels: Power generation using steam turbine and gas turbine power plants, Nuclear Fuels: Parts of reactor core, Nuclear power plant outline, Methods to dispose radioactive waste. Hydro Energy: Spillways, Hydroelectric power plant outline.

UNIT-III

Renewable Energy Systems: Solar Energy – Types of collectors and concentrators, Solar Photo Voltaic Cell. Wind Energy – Types of Wind Turbines and their working, geothermal power plant, Biomass conversion, Wave Energy power plant, Tidal Energy power plant, Ocean thermal energy power plant.

UNIT-IV

Storage: Methods to store Mechanical Energy, Electrical Energy, Chemical Energy and Thermal Energy. Co-generation &Tri-generation: Definition, application, advantages, classification, saving Potential. Energy waste, waste heat recovery classification, advantages and applications, commercially viable waste heat recovery devices.

UNIT-V

Power Plant Economics and Environmental Considerations: Costing, Estimation of power production - Pollutants and Pollution Standards -Methods of pollution control. Energy Efficiency rating and BEE standards, Future energy needs and challenges.

Suggested Reading:

1. Wakil MM, *Power Plant Technology*, McGraw Hill Publishers.
2. P.K. Nag, *Power Plant Engineering*, McGraw-Hill Publishers.
3. G.D. Rai, *Non-Conventional Energy Sources,* Khanna Publishers.
4. Mili Majumdar, *Energy Efficient Buildings in India,* Ministry of Non-Conventional Energy Sources.

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Course Code	Course Title						Core/Elective
PC409EE	**Electrical Machines – II**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
PC403EE	**3**	**1**	**-**	**-**	**30**	**70**	**4**

Course Objectives

- To be able to understand in detail about induction machines and Synchronous machines. Construction, principle, performance characteristics and testing.
- To understand the construction, principle and performance characteristics of fractional horse power motors.

Course Outcomes

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

1. Acquire the knowledge of three phase Induction Motor, Rotating magnetic field theory, Double field revolving theory
2. Acquire the knowledge of Starting and Speed Control Methods of three phase Induction Motor
3. Acquire the knowledge of Synchronous machines and methods for finding regulation
4. Develop the knowledge of Theory of operation of Synchronous Motor
5. Acquire the knowledge of Single Phase Motors and Special Machines

UNIT-I

Three - Phase Induction Motors: Constructional features - Rotating magnetic field theory, Principle of operation of Squirrel cage and Slip ring motors, Phasor diagram, Equivalent Circuit, Expression for torque, starting torque, Max torque. Slip-torque characteristics, Equivalent circuit parameters from no-load and blocked rotor test, Circle diagram, Determination of performance characteristics of induction motor, Applications.

UNIT-II

Starting and Speed Control Methods: Starting methods of 3-phase induction motor –Auto transformer, Star- delta Starter. Double cage machine, Speed control methods – Resistance control, Voltage Control, Pole changing, Cascading, Induction Generator - Principle of operation, Applications.

UNIT-III

Synchronous machines: Types and Constructional Details - Types of Winding, Winding factors - E.M.F. equation - Fractional pitch and fractional slot windings - Suppression of harmonics and tooth ripple - Armature reaction and reactance - Synchronous impedance. Synchronous Generator**:** Voltage Regulation - Phasor diagram of alternator with non-salient poles - O.C. and S.C. Characteristics- Synchronous impedance, Ampere turn, ZPF methods for finding regulation - Principle of two reaction theory and its application for the salient pole- synchronous machine analysis - Synchronizing and parallel operation.

UNIT - IV

Synchronous Motor: Theory of operation - Vector diagram - Variation of current and p.f. with excitation - Hunting and its prevention - Current and power circle diagram - Predetermination of performance - Methods of starting and synchronizing - Synchronizing power, Synchronous condenser. Applications.

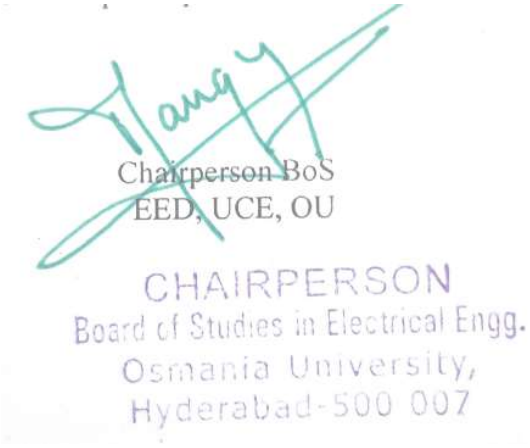
UNIT-V

Single Phase Motors: Double field revolving theory. Equivalent circuit of single-phase induction Motor- Principle of operation, speed torque characteristics of a split phase and capacitor motors. Compensated and uncompensated series motor, Repulsion motor and universal motor - Applications.

Special Machines: Stepper Motors – Constructional features, Principle of operation, Types of Stepper Motors, Brushless DC Motor – Construction and Principle of Operation, Switched Reluctance Motor –Construction and Principle of Operation, Applications.

Suggested Readings:

1. P.S.Bimbhra, *Electrical Machinery*, 7th Edition, Khanna Publishers.
2. D.P. Kothari and I.J. Nagrath, *Electrical Machines,* Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say, *The Performance and Design of AC. Machines,* Pitman Publication, 2002.
4. Irving L. Kosow, *Electric Machinery and Transformers,* PPH, Pearson Education 2nd Edition, 2009.
5. P. Satish Kumar, G. Sridhar, *Electrical Machines – A Practical Approach*‖ by De Gruyter Publication, Germany, 2020.



Course Code	Course Title						Core/Elective
PC410EE	**Digital Electronics and Logic Design**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- ➢ Understand and apply the Boolean algebra and arithmetic circuits.
- ➢ Apply combinational digital circuits for logic functions
- ➢ Logic gates, memory, including CMOS gates, flip-flops, arrays, and programmable logic.
- ➢ Design tools, both manual and computerized, for design, optimization, and test of logic circuits.

Course Outcomes

At the end of the course students will be able to

1. Understand and apply the Boolean algebra, including CMOS gates and arithmetic circuits.
2. Apply combinational digital circuits for logic functions
3. Use the concepts of Boolean Algebra for the analysis & design of sequential logic circuits
4. Design various A/D and D/A converters
5. Design various logic gates starting from simple ordinary gates to complex programmable logic devices and arrays.

UNIT- I

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two‘s complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don‘t care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices-M method of function realization.

UNIT-III

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flipflop, J, K, T and D-type flip flops, applicationsofflipflops,shiftregisters,applicationsofshiftregisters,serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC‘s, asynchronous sequential counters, applications of counters.

UNIT-IV

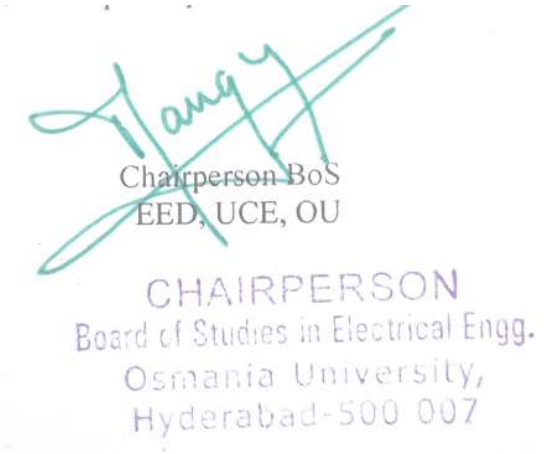
A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT-V

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Suggested Readings:

- R. P. Jain, *Modern Digital Electronics*, McGraw Hill Education, 2009.
- M. M. Mano, *Digital logic and Computer design*, Pearson Education India, 2016.
- A. Kumar, *Fundamentals of Digital Circuits*, Prentice Hall India, 2016.



Course Code	Course Title						Core/Elective
PC411EE	**Power Electronics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- Understand the characteristics and performance of various power electronic devices.
- Analyze single and three phase controlled rectifier circuits.
- Understand choppers circuits and AC voltage controllers
- Understand the performance of single phase and three phase inverter circuits.

Course Outcomes

At the end of the course students will be able to

1. Understand the characteristics and performance of various power electronic devices.
2. Analyze single and three phase controlled rectifier circuits.
3. Understand choppers circuits and AC voltage controllers
4. Understand the performance of single-phase inverter circuits.
5. Analyse the operation of three phase voltage source inverters.

UNIT-I

Power Switching Devices: Diode, Thyristor, MOSFET, IGBT: static and dynamic Characteristics; Firing circuit for thyristor; Voltage and current commutation of a thyristor; Gate drive circuits for MOSFET and IGBT.

UNIT-II

Thyristor Rectifiers: Single-phase half-wave, full-wave and semi controlled rectifiers with R-load and highly inductive load; Three-phase half wave, full wave and semi controlled bridge thyristor rectifier with R- load and highly inductive load; Input current wave shape and power factor.

UNIT-III

DC-DC Converters: Elementary chopper with an active switch and diode concepts of duty ratio and average voltage, power circuit and operation of buck, boost and buck-boost converters in continuous conduction mode, duty ratio control of output voltage. AC-AC Converter: Power circuit and operation of single-phase AC Voltage Controller with R & RL Load. Basic concepts of Cycloconverter and Matrix converter.

UNIT-IV

Single-phase Inverter: Power circuit and operation of single-phase voltage source inverter in square wave mode, sinusoidal pulse width modulation (Unipolar and bi-polar), relation between modulation index and output voltage. Calculation of performance parameters of inverter.

UNIT-V

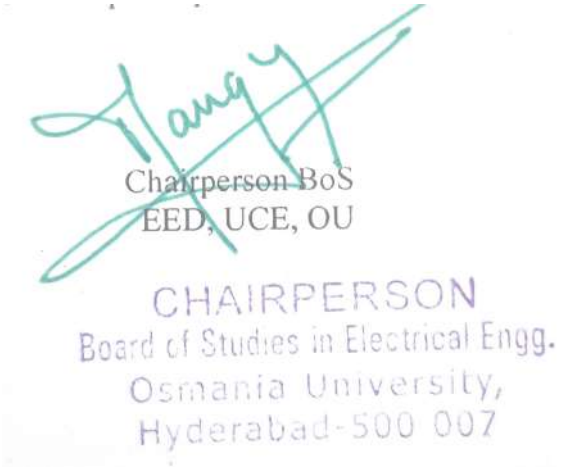
Three-phase Inverter: Power circuit and operation of three-phase voltage source inverter in 180^0 and 120^0 modes, Bi-polar sinusoidal pulse width modulation, relation between modulation index and output voltage. Elementary operation of CSI, Comparison of Voltage Source Inverter and Current source Inverter

Suggested Readings:

1. M. H. Rashid, *Power Electronics: Circuits, Devices and Applications*, Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, *Power Electronics: Converters, Applications and Design*, John Wiley & Sons, 2007.
3. R. W. Erickson and D. Maksimovic, *Fundamentals of Power Electronics*, Springer Science & Business Media, 2007.

4 L. Umanand, *Power Electronics: Essentials and Applications*, Wiley India, 2009.

1. Dr. P.S. Bhimbra, *Power Electronics*, Khanna Publishers, 2009.



Course Code	Course Title						Core/Elective
PC455EE	**Electrical Machines Lab - I**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
PC403EE	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

1. To learn operation and performance characteristics of d.c machines by conducting various experiments and tests practically.
2. To understand the operation and performance characteristics of transformers by conducting various experiments and tests.

Course Outcomes

The students will be able to:

- ➢ Estimate the efficiency and voltage regulation of D.C. generator and transformers under various loading conditions.
- ➢ Acquire the knowledge of efficiency and speed regulation D.C. Motors under various loading conditions.
- ➢ Able to understand the speed control of DC motor by conducting different experiments

List of Experiments:

1. Magnetization characteristics of a separately excited D.C. generator.
2. Determination of the load characteristics of shunt and compound generators.
3. Determination of the performance and mechanical characteristics of series, shunt and compound motors.
4. Separation of iron and friction losses and estimation of parameters in D.C. machine.
5. Speed control of D.C. Shunt motor using shunt field control and armature control methods.
6. Separation of core losses in a single phase transformer.
7. Open circuit and short circuit and load test on a single phase transformer.
8. Sumpner's test on two identical transformers.
9. Three phase Transformer connections.
10. Three phase to two phase transformation and open delta connection.
11. Retardation test.
12. Hopkinson's test.
13. Swinburne's test.

Note: At least ten experiments should be conducted in the Semester.

Suggested Readings:

1. P.S.Bimbhra, *Electrical Machinery*, Khanna Publishers 2006
2. D.P. Kothari & I.J. Nagrath, *Electrical Machines*, Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say, *The Performance and Design of AC. Machines*, Pitman Publication, 2002.
4. Irving L. Kosow, *Electric Machinery and Transformers*. PPH, Pearson Education, 2nd Edition, 2009.
5. P. Satish Kumar, G. Sridhar, *Electrical Machines – A Practical Approach*‖ by De Gruyter Publication, Germany, 2020.

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Course Code	Course Title						Core/Elective
PC456EE	**Power Electronics Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
PC411EE	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

1. To be able to understand various power switching devices, trigger circuits, characteristics and applications by conducting the experiments.
2. To learn and understand the rectifiers, choppers and inverters principle operation, characteristics and applications.

Course Outcomes

At the end of the course students will be able to

- ➢ Able to understand speed control of motors by using controlled rectifier
- ➢ Able to understand the applications of cyclo-converters
- ➢ Able to simulate different power electronic devices using software.

List of Experiments:

1. R, RC, UJT Trigger Circuits for SCR's.
2. Design and fabrication of trigger circuits for single phase half and fully controlled bridge rectifiers.
3. Study of SCR chopper.
4. Design and fabrication of trigger circuit for MOSFET chopper.
5. Study of forced commutation techniques of SCRs.
6. Speed control of separately excited DC motor by controlled rectifier.
7. Speed control of universal motors using choppers.
8. Study of single phase half and fully controlled rectifier.
9. Study of single phase and three phase AC voltage controller.
10. Study of single phase dual converter.
11. Study of single phase cyclo converter.
12. IGBT based PWM inverters.
13. Simulation of single phase half and fully controlled rectifier.
14. Simulation of single phase and three phase AC voltage controller.
15. Simulation of single phase inverter & three phase inverter.

Note: At least ten experiments should be conducted in the Semester.

Suggested Readings:

1. Bimbra.P.S., *Power Electronics*, Khanna Publications, 2006.
2. Rashid M.H., *Power Electronics Circuits, Devices and Applications*, PHI, 2004.
3. Singh. M.D., Khanchandani K.B., *Power Electronics*, TMH, 14th reprint, 1999.
4. Mohan, Undeland and Robbins, *Power Electronic Converters. Applications and Design*, John Wiley & Sons, 3rd Edition, 2007.

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Course Code	Course Title						Core/Elective
PC457EE	**Digital Electronics and Logic Design Lab**						**Core**
Prerequisite	Contact Hours per Week				CI E T	Prerequisite	Contact Hours per Week L
	L	T	D	L			
PC410EE	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

1. Identify the different types of number systems and their use.
2. Explain the principle concepts of Digital Logic Design.
3. Implement the logic circuits using Combinational Logic IC‘s.
4. Distinguish between the Sequential and Combinational Logic Circuits.
5. Reconstruct the Logic Circuits for real time applications with Combinational Circuits
6. Formulate the Digital Logic Circuit function.
7. Design the Logic Circuit using Combinational and Sequential Circuits

Course Outcomes

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

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Use PLCs to implement the given logical problem.
5. Analysis of synchronous and asynchronous counters.

List of Experiments:

1. Study and operation of IC tester, pulse generator and probe.
2. Realization of different logic gates.
3. Realization of inverter using different logic families.
4. Multiplexer application for logic realization and parallel to serial Conversions.
5. Synchronous counters.
6. Asynchronous counters.
7. Half adder, full adder and subtractor and realization of combinational logic.
8. A / D converters.
9. D / A converters.
10. Experiment on Sample and hold circuit.
11. Simulation of error detecting codes using VHDL/Verilog/Multisim
12. Simulation of encoder/decoder using VHDL/Verilog/Multisim
13. Simulation of flip/flops using VHDL/Verilog/Multisim
14. Experiment on programmable logic devices (ROM/RAM/PLA/PAL/FPGA)

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Note: At least ten experiments should be conducted in the Semester.

Suggested Readings:

1. R. P. Jain, *Modern Digital Electronics*, McGraw Hill Education, 2009.
2. M. M. Mano, *Digital logic and Computer Design*, Pearson Education India, 2016.
3. A. Kumar, *Fundamentals of Digital Circuits*, Prentice Hall India, 2016.